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CONFERENCE ABSTRACTS

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Academic pharmacy

Inaugural immunisation training for pharmacists in South Korea: Building on immunisation education for pharmacists for public health workforce preparedness and response to optimise patient care

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Background: The pharmacists in South Korea do not have the provision of vaccination within the scope of practice by the Pharmacy legislation. Nonetheless, the pharmacy-based immunisation delivery certificate training program (CTP) of the American Pharmacists Association (APhA) was implemented for 50 student pharmacists In 2023. However, pharmacists were not included at the time.

Objective: To describe the processes of continuing development and implementation and lessons learned from the inaugural immunisation training for pharmacists in South Korea.

Method: After the success of the immunisation CTP for student pharmacists in 2023, EWU executed a memorandum of understanding (MOU) with APhA to become an APhA's licensing partner for pharmacy-based immunization delivery CTP. EWU with support from the Korean Academy of Community Pharmacy (KACP) planned for the first pharmacist training session based on expert opinions and needs assessment. The preparation process included forming supporting groups, securing funders, budget allocation, disseminating information about the event, and consisting team for financial and operation. An EWU professor coordinated the programs and logistics, while two pharmacists/professors from the USA and another pharmacist/professor in Korea facilitated the training program. A survey was created to evaluate the feedback of pharmacist trainers

Results: An inaugural training program was conducted at EWU in February 2025, for 53 pharmacists who work in a variety of settings. Among 53 participants, 34 responded to the feedback (response rate 64%). It showed that all pharmacists agreed or strongly agreed (four and above out of five) with the need to continue training pharmacists in immunisations in Korea, that it would be beneficial to train students. Pharmacists responded if legally permitted, that pharmacist immunisers would be critical to improving public health and increasing vaccination rates.

Conclusion: The successful provision of the inaugural immunisation training for Korean pharmacists was highly appreciated. The efforts to overcome legal challenges should be advocated further to support the pharmacy community. Further immunisation CTP should be continued to meet the needs of the Korean pharmacists and public health workforce to improve health for patient populations and society in South Korea.

Acquisition of pharmaceutical care competencies. Student self-assessment and proposals for improvement

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Background: The General Council of Official Pharmacist Associations, the Pharmaceutical Care Foundation, the Spanish Society of Clinical, Family, and Community Pharmacy (SEFAC), the National Conference of Deans of Pharmacy Faculties, and the Pharmaceutical Care Research Group of the University of Granada form a Working Group called the Forum on Pharmaceutical Care in Community Pharmacy (Foro AF-FC). The Forum on Pharmaceutical Care in Community Pharmacy (Foro AF-FC) is a consensus group on Pharmaceutical Care in Spain that initiated a line of work focused on the professional competencies required for the various Pharmaceutical Care Services (PCS) provided in community pharmacies. To this end, a working group was set up to break down the knowledge, skills, and attitudes necessary to acquire these competencies, including suggestions on the structure and/or tools needed for their development, without being prescriptive or restrictive. Finally, once the competencies for each PCS were shared, they were grouped, reviewed, and listed, resulting in a total of 31 competencies. These competencies were classified into four categories: analytical, executive, collaborative, and management. The Forum produced a document detailing these competencies and their relationship to each PCS. Based on this document, the objective of this study was set to gather students' opinions regarding the acquisition of these competencies through academic activities and to strengthen any areas identified as necessary.

Method: The document outlining professional competencies developed by the Forum was presented and explained to fourth-year students during the subject History, Legislation, and Deontology-II. A self-assessment questionnaire was provided to the students to analyse whether they had already acquired these competencies. Working in groups of three, students were required to reach a consensus on their self-assessment by completing the questionnaire, indicating: The three competencies they believed they had mostly acquired during their academic training up to the fourth year. The three competencies they believed they had not acquired during their academic training. The three competencies they would preferably like to acquire or improve during their upcoming supervised internships.

Results: Seventy-two students, organised into 29 groups, completed the provided self-assessment questionnaire. After analysing the questionnaires content, it was found that the competencies most widely considered already achieved were: Managing therapeutic adherence, Recommending treatment, and Conducting a clinical interview. The competencies that students aim to improve through their supervised internships were mainly: Dispensing medicines and health products, Pharmacotherapeutic follow-up, and Communication with the patient. The competencies least acquired, according to the students, were those related to document management and population-based strategic planning.

Conclusion: Students' self-assessment regarding the acquisition of professional competencies makes it possible to strengthen academic and methodological aspects of their training in the field of pharmaceutical care. It also facilitates the alignment of academic follow-up during the period of supervised internships.

Research & training activities: Needs in community pharmacies

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Background: According law 16/1997, of April 25, regulating the services of Pharmacies in Spain, establishes that they must provide a series of basic services, including collaboration in teaching leading to the degree of graduate in Pharmacy as tutors during placements. Furthermore, among the skills that a pharmaceutical professional must have acquired are the ability to apply the scientific method and acquire skills in handling legislation, information sources, bibliography, protocol development, and other aspects considered necessary for the design and critical evaluation of preclinical and clinical trials.

Method: To understand the training needs of tutors at supervised placements centres and to learn about their research-related activities in the field of community pharmacy, a survey was conducted among all our accredited centres. A questionnaire was sent to the centres via email and invited full-time, assistant, and substitute pharmacists to participate. Data from all questions was collected to analyse the tutors' training needs and their research activity.

Results: The survey was sent to 370 centres and 105 responses were obtained, representing a return rate of 28%. 88.6% of the responses came from owner - pharmacists, and 11.4% were substitute pharmacists. It is noteworthy that 83.9% of the tutors have more than 10 years of experience as community pharmacists. Regarding whether they have collaborated in pilot studies for the implementation of professional services, 56.2% answered affirmatively, while when asked about collaboration in clinical studies, only 28.6% answered yes. Regarding whether they have published as a lead or collaborating author in scientific journals, 79% answered no, while only 21% have published a scientific

article. Personal interest and requests from research-promoting organisations are perceived as the factors that most contribute to this issue, while a lack of time and lack of community pharmacists are perceived as the main obstacles to conducting research in community pharmacy. When asked about training activities in the last 12 months, 82% have participated in courses in the last year, 50% 1 to 3 times, 21% 4 to 7 times, 5.7% 8 to 10 times, and 15.2% more than 10 times. The training topics that respondents consider most interesting for their professional practice are those based on therapeutic innovations, health promotion or health campaigns, pharmaceutical indications, and aspects related to pharmacy management. Online formats are preferred by 48.6%, hybrid by 38.1%, and 13.3% prefer in-person training.

Conclusion: The pharmacist tutors at our practice centres are highly motivated by continuous training, preferring hybrid or online formats. Regarding research activities in community pharmacies, they are not the majority among this group: personal interest and requests from research-promoting organizations are perceived as the factors that most contribute to their implementation, but a lack of time and professionals are perceived as the main obstacles. Only 21% have participated in the publication of scientific articles, and 28% have participated in clinical studies from community pharmacies.

AI'm here to help! Translating preceptor expectations into student success using artificial intelligence

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Background: Preceptors in experiential pharmacy education often have expectations for student performance that exceed the school's practice-ready competency standards. This discrepancy can arise as preceptors, being highly specialised practitioners, anticipate a level of mastery that students may not yet have developed within a six-week pharmacy practice experience. Additionally, language barriers can further complicate communication between preceptors and students, leading to misunderstandings regarding performance expectations.

Objective: This case study explores the use of AI to align preceptor expectations with practice-ready performance standards. It examines how AI can assist in defining clear performance benchmarks, facilitating communication, and supporting student improvement during Advanced Pharmacy Practice Experiences (APPEs).

Method: Two pharmacist preceptors, who each recently completed two years of post-graduate residency training, struggled to define successful student performance. Their student, a non-native English speaker, faced challenges in interpreting midpoint evaluation feedback. The student was unclear on how to improve performance to achieve a passing grade. The experiential director employed AI to analyse the preceptors' midpoint evaluations and compare them against the school's APPE grading rubric. AI generated a table outlining three levels of performance: the student's current standing based on midpoint feedback, the minimum passing level, and an A-level performance. This table was then used to guide discussions with both the student and preceptors, offering clarity on expectations and actionable steps for improvement

Results: The AI-generated framework, that aligned with the school's evaluation rubric, provided the student with a clearer understanding of improvement areas. This led to significant performance enhancement during the second half of the APPE. The student successfully met expectations and passed the experience. Additionally, preceptors reported feeling more empowered in guiding the student's development. The structured table also mitigated language barriers by presenting performance expectations in a clear, written format.

Conclusion: When performance expectations are misaligned and misunderstood, AI can serve as a valuable tool in experiential pharmacy education by helping to define and communicate expectations. By aligning preceptor evaluations with the school's practice-ready standards, AI can be used to enhance student comprehension, facilitate constructive feedback, and support both students and preceptors in achieving educational goals.

Assessment of pharmacy students' knowledge, attitudes, and practices regarding evidence-based medicine resources

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Background: Evidence-Based Medicine (EBM) is a crucial approach that enables healthcare professionals to make informed decisions by integrating the best available evidence

with clinical expertise and patient values. Pharmacists play a key role in ensuring the safe management of medications and optimising treatment plans through EBM. However, previous studies suggest that pharmacy students may have limited access to and utilisation of EBM resources. In Türkiye, data on pharmacy students' EBM knowledge, attitudes, and practices remain scarce. This study aims to evaluate pharmacy students' knowledge, attitudes, and practice regarding their utilisation of EBM resources and to identify potential gaps that may impact professional practice.

Method: This cross-sectional survey study was conducted among pharmacy students from the faculties in Istanbul. Data were collected via an online questionnaire between January and February 2025. The survey included questions assessing participants' demographic characteristics, knowledge, attitudes, and practical application of EBM resources. The reliability and validity of the survey were evaluated through a pilot test-retest study.

Results: A total of 450 students were invited to participate, and 339 (75.3%) completed the survey. The median total EBM knowledge score was 1 (IQR: 1–2). Among participants, 53.3% had low, 40.7% had moderate, and only 5.8% had high knowledge levels. Total scores did not significantly differ by gender or prior EBM training ($p > 0.05$), but students from the private universities scored significantly higher than those from the state universities ($p = 0.034$). A significant difference was observed across academic years ($p = 0.003$), with fourth-year students achieving the highest mean rank (204.64), while second-year students had the lowest (110.60). Additionally, 41% had never heard of EBM, and 74.1% had not received EBM training. PubMed (40.4%) and UpToDate (27.1%) were the most commonly used EBM resources.

Conclusion: This study highlights significant gaps in pharmacy students' knowledge and use of EBM resources. The findings suggest a need for enhanced EBM training within pharmacy curricula to improve students' competence and integration of EBM in professional practice. Addressing these educational gaps may contribute to improved healthcare decision-making and patient outcomes in pharmacy practice.

Nothing for us without us: Successes and learning from partnership with a community-oriented advisory committee

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Background: Mindful efforts to integrate 2SLGBTQ+ competencies into pharmacy education is critical to address the health inequities 2SLGBTQ+ communities face when accessing healthcare. These efforts, in response to the call for trans and queer competency training for health care providers by the House of Commons of Canada, should be informed by community perspectives and patient experiences. The QCAC is a 17-member committee, comprised of community and university stakeholders, with the mandate to advise on a pharmacy curriculum that prioritises the lived experiences of 2SLGBTQ+ communities. In partnership with the QCAC, a longitudinal 2SLGBTQ+ curriculum was embedded across all four years of the UBC Entry-to-PharmD (E2P) Doctor of Pharmacy (PharmD) program.

Method: Since its inception, annual evaluations were conducted to identify strengths and areas of learning, ensuring the QCAC's time and expertise are leveraged fully. Findings inform future committee activities. Meeting attendance and meeting minutes were analysed. Additional data was collected through anonymous surveys gathering quantitative and qualitative data about members' perception of the committee's operations, dynamic, performance, and their own performance within the committee.

Results: Year 1 and 2 evaluations captured 8 meetings. Notable findings emerged in all domains. Members felt positively about the dynamics of QCAC. In terms of operations, members appreciated detailed briefing notes which provided context to agenda items prior to meetings. On performance, members highlighted that the QCAC's ability to produce tangible results toward the committee mandate is a strength. Overall, members viewed their personal level of engagement as favourable. Areas of improvement highlighted in Year 1, including improving diversity of representation and streamlining meeting logistics, were addressed in Year 2, and the impacts of these changes were reflected in member evaluations. Annual evaluation also provided a lens into the shifting priorities of the committee's work as the pharmacy curriculum it advises on matured.

Conclusion: Annual evaluations of the QCAC provide insight into the strengths of the team's engagement and identifies strategies to optimise committee operations. These learnings may also serve as a launching point for other health professions education programs wishing to integrate community perspectives in curriculum development.

A hybrid educational model for the pharmacy curriculum: lessons learned from a public health elective course in the United States of America

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Background: Student pharmacists are the next champions in the pharmacy arena, and educators are responsible for

familiarising them with a variety of public health topics, enabling them to advocate for change. Emerging evidence links endocrine-disrupting chemicals (EDCs) to various reproductive, metabolic, and developmental disorders. Pharmacy educators are responsible for addressing student pharmacists' education deficits, ensuring their ability to identify medical components/devices and medication products manufactured with EDCs. To reduce this knowledge gap, we developed an in-class intervention to provide exposure to the public health implications of EDCs. The prospective study's objectives were to evaluate the applicability of a hybrid educational model to the pharmacy curriculum and characterise the public health implications of student pharmacists' knowledge gap regarding patient counselling.

Methods: A low-fidelity simulation, including a lecture, pre-brief, role-play, debrief, and post-activity written reflection, was implemented to support the development of knowledge regarding EDCs and provide an opportunity to practice counselling skills. Third-year students attending a college of pharmacy in the Mid-South of the United States of America who were enrolled in an elective public health course between 2022 and 2024 were eligible to participate in this study. All reflections (n= 17) were de-identified and then imported into the qualitative software Dedoose®, where thematic analysis with an inductive approach was used. The University's Institutional Review Board approved the study.

Results: The theme, "Lessons learned: how to enhance student awareness" indicated that this hybrid educational model engendered knowledge growth and public health thinking. One lesson learned from the model was that it can be used to teach public health issues and counselling skills, as illustrated in the quotes below:

"Lecture provided me with foundational knowledge and catalysed brainstorming questions and curiosity… Learning that endocrine disruptors have a huge impact on various populations and everyday use…"

"I learned that Endocrine Disrupters can be found in plastics, cleaning supplies, lotions, canned foods, and more. Basically, things that we use in our everyday life... It puts a new perspective on the stuff we consume throughout our day; we normally choose plastic because it is cheaper not realising it will cost us in the long run with our body. I was able to play a concerned parent and a pharmacist consulting a concerned parent. I learned from being on both sides of the role play and really enjoyed that part of the class."

"These scenarios impacted my thinking on the topic tremendously. I had no idea about endocrine disruptors and all the importance of counselling the information to the patients."

Conclusion: The study demonstrates that a methodology consisting of a didactic lecture, role-play, debrief, and written reflection encourages critical thinking, helping student pharmacists to develop the skills necessary to connect EDC prevalence with their future careers, public health advocacy, and daily activities. One lesson learned from this activity was that limited EDC knowledge reduced counselling skills. Educators can use this novel educational approach to enhance future pharmacists' patient counselling skillsets.

Evaluation of an international mentoring programme from the mentees' view

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Background: The 10,310 kilometres / 6,406 miles collaboration between the LiveWell Initiative of Lagos, Nigeria and the University of Nebraska College of Pharmacy in Omaha, Nebraska is a mentoring program helping new health care professionals and health professions students to learn about themselves and about pharmacy in other countries. This program focuses on mentors from the United States and the LiveWell Initiative and mentees from Nigeria and South Africa. This qualitative report examines the experiences reported by the mentees in the program.

Method: A seven question, short-answer survey was developed and pre-tested for understanding using faculty at the University of Nebraska College of Pharmacy. The survey was then distributed via email to the mentees in the program. All responses were anonymous. The responses were reviewed and categorised to determine the most common answers to each of the seven questions. The determination of the commonality between responses was made by the authors. This survey was declared exempt research by the University of Nebraska Medical Centre IRB.

Results: Overriding themes identified from this qualitative analysis include:

- Pharmacists want to provide the best quality care possible for their patients, regardless of country.
- Pharmacists are viewed differently throughout the world due to differences in required education, public opinion, and health care systems. The American system is confusing to the rest of the world.
- Learning from other cultures can improve the practice of pharmacy.
- Time zones are difficult to navigate, particularly when daylight saving time is started or stopped in the middle of the program.
- It is a bigger challenge to present verbally in English than it is to write in English, leading to a reluctance to speak up.

- In many areas of the world people speak multiple languages, this is not so common in the United States.

Conclusion: These findings may guide international collaborators by highlighting common positive views and those areas requiring additional attention. The overall perception of the program is positive from the view of the mentees. Future work will include an evaluation of the perception of the mentors and a comparison of responses from the 10,310 kilometres / 6,406 miles collaboration and a HIVER-based collaboration in Jordan.

The role and perceptions of pharmacy students in a novel rehabilitation-focused clinical rotation

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Background: In 2019, a study estimated that over 2.41 billion individuals globally could benefit from rehabilitation services for one or more conditions, equating to approximately one-third of the global population. The United States of America Improving Medicare Post-Acute Care Transformation (IMPACT) Act of 2014 mandates the monitoring of standardised data related to medication reconciliation, including drug reviews and enhanced communication during patient discharge to ensure continuity of care in the community. This legislation highlighted the need for integration of pharmacy practice within rehabilitation settings. In 2022, the School of Pharmacy established a partnership with a 100-bed inpatient rehabilitation health system to offer pharmacy students experiential learning opportunities in rehabilitation care. The experiential learning course incorporated supervised student activities, focusing on direct patient care tasks such as monitoring high-risk medications, tracking elevated-risk patients daily, and providing discharge counselling within 24 hours prior to patient discharge.

Method: The project evaluated the role and impact of a novel clinical rotation in a rehabilitation hospital on pharmacy students' perceptions and learning outcomes. The experiential course was overseen by a pharmacy faculty member, responsible for supervising pharmacy students during their adult inpatient clinical rotation. The rotation lasted five weeks per student. Students were randomly assigned to the rehabilitation-focused rotation via a computer-based algorithm that considered student preferences. During the first week of the rotation, students completed an in-house orientation, received training in electronic health record (EHR) systems and participated in training focused on high-risk medication consultations and discharge counselling. Upon completion of the course, students were required to submit assessments using a standardised evaluation tool, which gathered feedback regarding their perceptions of the clinical experience (Strongly Agree – 4 to Strongly Disagree – 1). Additionally, students submitted a standardised form detailing their involvement in direct patient care activities. The evaluations were anonymised and blinded to the instructor and site. Aggregated data was used for analysis. Data were analysed using the Likert scale, descriptive statistics, and qualitative feedback.

Results: A total of 23 students participated in the clinical rotation at the 100-bed inpatient rehabilitation health system during a two-year period. Majority of students noted that the site positively fosters an environment that nurtures student learning (3.89 out of 4.0). In addition, students positively rated the learning experience in meeting the goals and objectives of the clinical experience (3.95 out of 4.0). During each rotation, students conducted greater than 30 consultations on several topics, including anticoagulation therapy, SGLT2 inhibitors, opioid therapy, renal medication dosing, pharmacokinetics, discharge counselling, and infectious disease monitoring with supervision.

Conclusion: The new rehabilitation-focused clinical rotation resulted in positive student perceptions of patient care. This emerging healthcare domain offers valuable opportunities for enhancing students' knowledge and understanding of patient care, while also presenting further avenues for the pharmacy profession to contribute to improved patient care outcomes.

Anti-doping and sports pharmacy in pharmacy education: Integrating comprehensive knowledge and ethical practices

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Background: Anti-doping refers to the efforts and measures taken to prevent athletes' use of prohibited substances and methods to enhance performance. It also encompasses the prevention of inadvertent doping, which can occur due to improper use of pharmaceuticals and dietary supplements. Sports pharmacy is a specialised field within pharmacy that emphasises medication management, therapeutic needs, and health optimization for athletes, including a comprehensive understanding of anti-doping regulations and principles. Both disciplines require a thorough knowledge of pharmacology, analytical chemistry, and clinical medicine, combined with ethical considerations and regulatory frameworks.

Objective: Pharmacists, with their expertise in pharmacology, analytical chemistry, and regulatory framework, are ideal for contributing to anti-doping efforts. However, this field is not typically included in pharmacy curricula. To address this, the Department of Pharmacy at the University of Oslo launched a master's course in anti-doping and sports pharmacy in close cooperation with Anti-Doping Norway in 2020.

Method: The syllabus is inspired by the IOC Drugs in Sport Course and is presented as an optional ten-credit course to master-level pharmacy students at the University of Oslo. Lecturers include the Department of Pharmacy, the University of Oslo, Anti-Doping Norway, and the Norwegian Doping Control Laboratory personnel. The program consists of lectures, student-active teaching sessions (case discussions, quizzes), and observation of a simulated doping control. The course concludes with an oral exam, during which the students discuss practical cases with the lectures to showcase their knowledge.

Results: The course has been offered four times, with an increased number of students each year. The feedback from the students has been positive. One survey response exemplifies this: “I chose this course because I am interested in sports and how things related to sports work. This is the first course in the pharmacy program relevant to sports pharmacy, making it an easy choice. I think the teaching program has been effective. I hope more people take this course, as it is important for pharmacists to have knowledge in sports pharmacy.”

Conclusion: Integrating anti-doping and sports pharmacy into pharmacy education is crucial for equipping pharmacists with the skills to address the specific challenges associated with working with athletes, sports teams, federations, and anti-doping organizations. Additionally, such knowledge would be highly beneficial when advising athlete customers in community pharmacy settings. By equipping future pharmacists with the necessary knowledge, skills, and ethical foundations, pharmacy education can safeguard athletes' health, ensure fair competition, avoid unintentional doping, and uphold the integrity of sports. As the pharmacy field expands, integrating these critical disciplines will pave the way for more holistic and effective healthcare practices in sports.

Generative artificial intelligence in health professions education: a scoping review of implementation, opportunities, challenges, and regulatory frameworks

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Background: Generative Artificial Intelligence (GenAI) is a transformative innovation poised to significantly impact multiple sectors, including health, security, and education. Within health professions education (HPE), there is a growing expectation to leverage emerging technologies to equip future professionals with the knowledge and skills required for high-quality, patient-centred care. While the adoption of GenAI in HPE is expanding across various teaching and learning processes, its integration remains insufficiently defined. The absence of consistent regulations and comprehensive guidance poses challenges to its effective and responsible use. Currently, there are no standardised strategies or regulatory frameworks tailored to the unique needs and characteristics of HPE curricula, leaving a critical gap in ensuring the safe and pedagogically sound application of GenAI in this field.

Objective: This study aims to analyse the current use of Generative AI in HPE, examining its opportunities, challenges, facilitators, and barriers while exploring regulatory frameworks, ethical considerations, and case studies of countries that have implemented GenAI policies to identify patterns, distinctions, and best practices.

Method: This scoping review followed the 2020 JBI methodology and PRISMA-ScR guidelines. A systematic search was conducted across multiple databases, including PubMed, ERIC, CINAHL, Embase, Scopus, Cochrane Library, and ProQuest Central, with no language or study design restrictions. Studies on the use of Gen AI in undergraduate or graduate HPE published since 2017 were included. Data extraction focused on Gen AI application, curricular integration, benefits, challenges, ethical considerations, and regulatory frameworks. Findings were analysed using descriptive statistics, visualised through graphs and tables, and synthesised through narrative thematic mapping.

Results: Thematic analysis revealed several core findings. The included studies discuss the application of GenAI in the diverse education process of different health professions such as curriculum design, teaching, assessment, and feedback. However, its integration into curricula varied widely, often occurring without structured institutional guidance. Reported benefits included improved student engagement, critical thinking, and accessibility. At the same time, concerns were raised about academic integrity, potential biases, and the reliability of AI-generated content. Regulatory and policy frameworks were generally limited, though some emerging guidelines emphasised ethical and

responsible use. Successful implementation was facilitated by faculty training and interdisciplinary collaboration, whereas resistance to change and inadequate institutional support were noted barriers. Case studies suggested that countries with established regulations achieved more consistent and confident integration of GenAI in HPE.

Conclusion: The integration of Gen AI in HPE is rapidly advancing, offering promising opportunities alongside notable challenges. Understanding the key enablers and obstacles can help students, educators, and researchers make informed decisions about its use in educational settings. Establishing standardised guidelines and evidence-based policies will be essential for ensuring the responsible and sustainable integration of GenAI in HPE.

Interdisciplinarity meets team teaching: shaping the future of pharmaceutical workforce education through foresight elements

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Background: The ongoing global crises and the rapidly evolving health ecosystems have significantly impacted person-centred healthcare, highlighting the need to adapt Master's curricula in health, pharmacy, business, and economics. These fields are deeply intertwined and complementary within healthcare. A multidisciplinary curriculum within an interdisciplinary, collaborative teaching framework integrates diverse perspectives from various fields, essential for navigating complexities and transforming health systems. By incorporating future-oriented thinking, curricula can proactively shape and equip students with a strong foundation in pharmaceutical and health sciences, business, economics, and policy development, enabling them to respond to large-scale health threats—such as pandemics and natural disasters—while ensuring personalised, person-centred healthcare.

Aim: The project proposes a framework for a curriculum in a team-teaching setting that incorporates foresight and explorative learning elements. The framework aims to prepare and future-proof students for their professional lives and guide them in lifelong learning across public, non-profit, and private sectors. It provides a basis for discussing interprofessional and interdisciplinary teaching approaches.

Method: A mixed-methods approach will be employed to develop a comprehensive framework for pharmaceutical workforce education. This will include a scoping review, focus group discussions, and a modified Delphi technique followed by a survey. The diversity of experiences from various faculties, countries, healthcare systems, learning biographies, and different stages within the educator's lifecycle will be reflected in this framework. Modern approaches like hackathons and design thinking ensure the curriculum reflects current and future working practices. Initial discussions with key stakeholders, including academic faculty, industry professionals, and students, will provide broader insights into evolving educational needs. The modified Delphi technique will finalise the framework, and a survey will be conducted for cross-validation. The framework will be tested in a pilot course, with feedback used to refine the curriculum. The new framework will be aligned with existing FIP frameworks to ensure its robustness and relevance. This iterative approach ensures that the final framework is evidence-based, stakeholder-informed, and adaptable to future pharmaceutical challenges.

Results: The developed framework will guide the design of educational curricula that integrate relevant teaching methodologies. It aims to bridge gaps between different fields of educator expertise and student skill sets, research methods and approaches to critical health issues. By addressing complex global health challenges such as pandemics, climate change, health inequities and globalization, it will foster a comprehensive understanding of the complexities of modern global health challenges. The interdisciplinary structure will facilitate cross-sector collaboration across public health, medicine, and economics, effectively tackling these challenges. Through improved education and training, the framework will equip the future workforce with necessary skills to respond to emerging global health issues, ensuring capacity strengthening for stakeholders involved in this framework.

Conclusion: By fostering interdisciplinary collaboration and integrating diverse perspectives, this framework will lay the groundwork for a more comprehensive and adaptive approach to global health education. Its implementation will enhance the capacity of students and educators to navigate evolving health challenges in evolving health ecosystems, ultimately contributing to more resilient, adaptive and person-centred healthcare systems.

Knowledge, attitude and practice of early-year university students towards microplastics

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Background: Microplastics, tiny plastic particles less than five millimetres in size, have become a growing environmental and health concern. These particles originate from various sources, including plastic waste breakdown, synthetic textiles, car tyres, and personal care products. Exposure to microplastics through ingestion, inhalation, and skin contact poses potential health risks, including endocrine disruption and bioaccumulation in the food chain. Despite the increasing awareness of microplastics pollution, university students' knowledge, attitude, and practice (KAP) regarding this issue remain unclear. Understanding these factors is crucial for developing targeted educational initiatives to promote sustainable behaviours and reduce microplastics pollution.

Objective: This study aims to assess the knowledge, attitude and practice of early-year university students towards microplastics to inform targeted educational interventions.

Method: Early-year university students from two private higher education institutions in Malaysia were selected through convenience sampling. Participants completed a structured KAP questionnaire consisting of ten knowledge questions, nine attitude statements, and seven practice questions. Knowledge scores were calculated by awarding one point for each correct response, while incorrect or "don't know" answers received 0zero points. Attitude scores were calculated by summing the points on a 4-point Likert scale, where higher scores indicated a greater positive attitude, with negatively worded items reverse-coded during analysis. Data were analysed using SPSS version 29, utilising Spearman's Rho correlation to assess relationships between knowledge, attitude and practice. Chi-Square tests were used to examine associations between socio-demographic characteristics and KAP levels. A p-value of < 0.05 was considered statistically significant.

Results: Among the 405 participants, 64.9% demonstrated moderate knowledge of microplastics, and a higher 78.5% exhibited mixed attitude towards the issue. Although 73.3% correctly identified microplastics as plastic pieces smaller than five millimetres, only 14.1% recognised all major sources, indicating knowledge gaps. Furthermore, while 80.7% acknowledged that microplastics affect plants and 57.5% understood their potential health risks, misconceptions persisted. Notably, 79.5% incorrectly believed bottled water contains fewer microplastics than tap water and 77.3% believed microplastics consumption cannot be minimised by not eating seafood. Regarding attitude, 96.1% were happy to bring recycled bags when shopping, and 94.8% preferred biodegradable alternatives, reflecting strong environmental awareness. However, sustainable practices were inconsistent, with only 70.8% actively participating in recycling plastic waste. Additionally, although 76.8% of students disagreed that plastic pollution mitigation is not their responsibility, 59.3% were unwilling to avoid single-use plastics from hawker stalls. Spearman's Rho correlation showed a significant positive relationship between knowledge ($r = 0.104$, $p < 0.05$), attitude ($r = 0.145$, $p < 0.01$) and recycling activities of plastic food and water containers. Chi-square tests identified statistically significant associations between university courses enrolled and both knowledge ($p = 0.001$) and attitude ($p = 0.014$).

Conclusion: This study highlights moderate knowledge and mixed attitude towards microplastics among early-year university students, with notable misconceptions. Additionally, weak correlation between knowledge and attitude with practice suggests greater knowledge and positive attitude may not necessarily lead to sustainable behaviours such as recycling. While further research is required, practical activities such as lab experiments analysing microplastic in water samples and partnering with NGOs for community cleanup may help bridge the gap and foster sustainability.

A content analysis: which antimicrobial stewardship interventions do pharmacy students resonate with the most?

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Background: The inappropriate prescribing and consumption of antimicrobials have led to the emergence of antimicrobial resistance (AMR) over the years. The World Health Organisation (WHO) has declared AMR as a global public health threat, as it renders antimicrobials ineffective resulting in delayed onset of therapy, prolonged hospital admissions, and impeding successful prevention and treatment of serious diseases. Antimicrobial stewardship (AMS) is a core strategy to tackle AMR, and optimise safe and judicious antimicrobial prescribing and use. Pharmacists play a vital role in promoting AMS strategies through educating healthcare professionals within multidisciplinary teams on evidence-based prescribing guidelines and policies, monitoring antimicrobial prescribing, and being involved in clinical research.

Objective: The aim of this study was to explore the AMS knowledge gained by pharmacy students, and to assess their survey responses in accordance with the WHO AMS interventions guide, in order to acknowledge gaps and inform recommendations that can be in incorporated in future curricula.

Methods: Third-year pharmacy students were provided a post-unit reflection survey, after completing the infectious diseases (ID) academic unit at two international campuses (Australia and Malaysia). The cross-sectional reflection survey consisted of three main parts: "(A) Reflect on your knowledge of Antimicrobial Stewardship (AMS) from this unit, (B) Discuss which aspects of AMS have resonated with you the most, and (C) Do you feel confident to seek opportunities and intervene when antimicrobial prescribing is not optimal?" The responses were deductively analysed, categorised into subthemes and mapped to the WHO AMS interventions guide using summative content analysis. The guide describes ten commonly used stewardship interventions (themes) to promote the optimal use of antimicrobials at a variety of healthcare facilities: six of which occur prior to or at the time of prescription and four of which occur afterwards. In this study, the guide was used as a foundation to identify themes that were strongly represented or lacking within the data.

Results: A total of 98.1% of Australian-based students (n = 610) and 97.8% of Malaysian-based students (n = 185) provided a response which could be mapped to at least one theme. The two most represented themes were Clinician education (55.7% of Australian-based students and 89.5% of Malaysian-based students) and Self-directed antibiotic reassessments (antibiotic timeouts) (69.8% of Australian-based students and 39.2% of Malaysian-based students). There were 31.6% more Malaysian-based students than Australian-based students that acknowledged the Importance of AMS knowledge in curbing AMR subtheme. In contrast, there were 27.9% more Australian-based students than Malaysian-based students who resonated with the Confident to intervene when antimicrobial prescribing is not optimal sub-theme.

Conclusion: Overall, the data has shown that Malaysian-based students tended to resonate more with AMS interventions prior to or at the time of prescription. Alternatively, Australian-based students tended to resonate more with AMS interventions after prescription. The data has also highlighted important themes that were underrepresented by students from both campuses, such as De-labelling of spurious antibiotic allergies and Dose optimisation. This information can be utilised to reinforce student learning outcomes associated with these themes within the pharmacy curriculum in the future.

A global investigation into antimicrobial knowledge in medicine, pharmacy, nursing, dentistry and veterinary undergraduate students: A scoping review to inform future planetary health multidisciplinary education

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Background: The inappropriate use of antimicrobials can push the environment out of balance, cause unnecessary waste that can contaminate our soil, animals and waterways and, ultimately, contribute to the propagation of antimicrobial resistance (AMR). The World Health Organisation has deemed AMR as one of the top ten global public health threats facing humanity, and advocates worldwide for the development and implementation of antimicrobial stewardship (AMS) programs to improve the responsible, safe and judicious use and prescribing of antimicrobial drugs. Health professional education is committed to preparing students for AMS and supporting planetary health, but a more multidisciplinary action is needed to curb the expansion of AMR. Implementing AMS education early on in the health professional undergraduate curriculum will increase the likelihood of retention of knowledge and clinical implementation post-graduation.

Objective: The aim of this scoping review is to showcase the current antimicrobial knowledge of undergraduate students towards antimicrobial prescribing, AMR and AMS across the disciplines of medicine, pharmacy, nursing, dentistry and veterinary. This will consequently showcase the gaps and trends across the different disciplines and countries to help inform planetary health multidisciplinary undergraduate curriculums. It is hoped that this review will provide a strong foundation for health professional academics to instigate interprofessional AMS innovations and programs.

Methods: The Joanna Briggs Institutes manual framework for scoping reviews was followed when conducting this scoping review. A search of the existing literature published prior to December 2023 was conducted using CINAHL, EMBASE, MEDLINE, SCOPUS, and ERIC databases. Studies were excluded if they included postgraduate students or discussed the knowledge, attitude and practice of students towards antimicrobial prescribing, AMR and AMS related to a specific learning activity.

Results: A total of 144 articles were included. The most represented countries were India and Pakistan accounting for 17% and 8% of the studies, respectively. Single-disciplinary research accounted for approximately 80% of the studies. Medicine was the most represented discipline in both single-disciplinary and multidisciplinary research, appearing in approximately 62% of the studies, followed by pharmacy

appearing in approximately 30% of the studies and dentistry appearing in approximately 18% of the studies. Three major priority themes were identified: students are more familiar with the term AMR compared to AMS; inappropriate use of antimicrobials is seen as the main driver of AMR; and the need for more training and education in the field of appropriate antimicrobial prescribing, AMR and AMS.

Conclusion: This review has highlighted that there is a need for more AMS interprofessional education activities in all five disciplines, and especially within the disciplines of nursing, veterinary and dentistry, as shown by a lack of multidisciplinary research in this area. Most of the knowledge assessments have just touched the surface of AMS and focused on inappropriate antimicrobial use alone. Interdisciplinary planetary health education needs to go beyond these skills and broaden the understanding of other factors that can contribute to AMR such as inappropriate disposal, environmental contamination, monitoring and surveillance, one health, false allergies, and more importantly, how each health professional can contribute to a team.

Improving patient health outcomes through a multi-institutional partnership for interprofessional education

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Background: In the United States of America, schools of pharmacy and schools of medicine are held to rigorous standards for developing interprofessional collaborative practice competency through interprofessional education (IPE). Due to the complex scheduling requirements behind developing IPE activities among two or more different professional schools, it can be challenging to create high-quality, and meaningful, IPE experiences. Faculty members from the University of Southern California Alfred E. Mann School of Pharmacy and Pharmaceutical Sciences (USC Mann) and from the David Geffen University of California Los Angeles School of Medicine (UCLA DGSOM) partnered to create a joint pharmacy and medicine, early-learner experiential education program with real-world practice implications.

Objective: To develop an introductory level learning experience where student pharmacists and medical students perform comprehensive assessments of social determinants of health and medication appropriateness for high-risk patients in Los Angeles.

Methods: The UCLA Extensivists program was developed as an interprofessional, Early Authentic Clinical Experience (EACE) for UCLA DGSOM medical students and an elective patient care focused Introductory Pharmacy Practice Experience (IPPE) for USC Mann student pharmacists. Activities of the clinical service included identifying medically complex patients who were at risk for hospital readmissions after discharge or utilization of the emergency department and improving patient health outcomes using team-based care. Student pharmacists and medical students were assigned to a multidisciplinary team called a “pod” to collaboratively initiate patient encounters under the supervision of an internal medicine attending physician and primary care pharmacist.

Results: Between 2021 to 2024, eighteen second- and third-year student pharmacists completed an elective patient care focused introductory pharmacy practice experience (IPPE) with fifteen EACE medical students. Each multidisciplinary pod was matched with one patient from the clinic for a 6 month to one-year longitudinal care experience. Learning experiences included visits to the patients’ homes as well as well as clinic visits to assist patients with complex medical and social needs. Pre-post surveys given to medical students found that participation in this interprofessional clinical experience improved understanding of roles and responsibilities, confidence in working with interprofessional teams to treat chronic illnesses, and abilities to provide effective patient education for health problems. Student pharmacist reflections indicated improved confidence in interprofessional collaboration as well as management of patients with complex needs.

Conclusion: Intentionally developed IPE involving early learners in team-based care can provide opportunities to develop competencies in providing patient education, contextualisation of patient environment in care plan development, and inter-professional collaboration.

Education abroad: A transformative learning experience for pharmacy students

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Background: Pharmacy schools across the globe engage in student exchange programs to enhance knowledge and skills and to expose students to a broader worldview. Despite numerous pharmacy student exchanges, there is a paucity of

data on achieved learning outcomes for education abroad experiences.

Objective: of this project is to determine which American Association of Colleges of Pharmacy (AACP) Curriculum Outcomes and Entrustable Professional Activities (COEPA) learning outcomes are achieved through pharmacy student education abroad experiences. The 13 COEPA outcomes are divided into three categories: knowledge (scientific thinking); skills (problem-solving process, communication, cultural and structural humility, patient-centred care, advocacy, medication-use process stewardship, interprofessional collaboration, population health and wellness, leadership); and attitudes (self-awareness, professionalism).

Method: This scoping review included English-language literature published in the past ten years which described learning outcomes associated with patient-facing education abroad activities that included at least one United States school of pharmacy student. Databases searched were Embase, Medline, Web of Science, and ERIC; PubMed Central was also reviewed for studies included in the journal Innovations in Pharmacy. Included studies were analysed independently by three investigators/teams:

1) A team of two students that created one mapping document based on consensus and

2) Two faculty involved in education abroad initiatives that created separate, independent mapping documents. Each investigator/team mapped which COEPA domains were achieved through the experiences described in the identified articles. Results were then reconciled. In the event of mapping differences, the ultimate mapping decisions were determined by consensus through discussion.

Results: The comprehensive literature search yielded a total of 577 articles. After removal of duplicates, 333 studies underwent title/abstract screening and 50 were included for full-text review. Of those, 38 studies were ultimately excluded, and three studies reviewed the same study abroad students and were collapsed into one entry. Ultimately, 11 unique investigations across 13 publications were included in the final analysis. Diverse countries were represented, including all four World Bank country income classifications (low, lower-middle, upper-middle, and high income). Evidence of student learning in 12 out of 13 COEPA domains were identified in at least one study. The most commonly achieved domains were communication (10), cultural and structural humility (9), scientific thinking (8), and self-awareness (8). Advocacy was not mapped to any included study.

Conclusion: Education abroad opportunities enhance knowledge, cultural humility, and smart skills. They are transformative experiences impacting personal and professional identity development. Future research should examine which learning outcomes are achieved more commonly by students who study abroad versus those who remain in their country of residence during rotations. Furthermore, schools of pharmacy should prioritise tools and resources to support transformative education abroad experiences to meet educational goals and keep pace with the global pharmacy landscape.

Enhancing skincare expertise: Apotek1's comprehensive training and new skin analysis service

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Background: An insight study revealed that there was untapped potential within the facial care category in Norway`s leading pharmacy. The aim was to address this by enhancing the confidence and competence of employees interested in the facial care category. Generally, the focus of skincare in the education of pharmacy employees is minimum, which does not align with the extensive range within this category. Therefore the need for competence boost to offer a new service within skin health.

Method: Employees in 69 pharmacies in Norway`s largest pharmacy chain Apotek1, participated in a four-day course at Hudpleieakademiet, Scandinavia's largest school for training skin and body therapists. Participants received digital training from Apotek1 to implement and perform skin analysis in pharmacies. Before the course at Hudpleieakademiet, participants had to complete tailored digital training. After the course, an evaluation was conducted by the participants.

Advanced Competence: This level was aimed at employees with a special interest in skincare who wanted to expand their knowledge and skills. After completing the course program and further training from Apotek1, the employees received the title of Skin Consultants and could then offer the new skin analysis service.

Specialist Competence: This level was for Skincare Specialists at Apotek1 and included specialised courses and training from Apotek1. Skincare Specialists interested in the skin analysis service were the first to implement this service at Apotek1.

Skin Analysis: A new service that provides a thorough assessment of skin using advanced moisture meters and other tools to identify specific needs and recommend tailored facial care products for any skin type and condition, as well as provide tailored advice and guidance.

The training program consisted of a digital preparatory course with two modules, basic competence and advanced competence. Then there was digital training provided by Hudpleieakademiet and Apotek1. All content in the training was quality assured by Apotek1 to ensure that the content was targeted and met the needs. During the allocated digitaltraining, Hudpleiekademiet was available for any questions from the participants. Participants attended a two-day physical course at Hudpleieakademiet with

accompanying digital training provided by Apotek1 before implementing the skin analysis service in their pharmacies.

Results: Participants reported that they had gained good learning from the course, both the digital and physical course that also included practical training in a "mini-pharmacy" with products from their range. An evaluation of the course was conducted, and the results showed that participants were very satisfied with the training, and that they would greatly benefit from this in future customer meetings. Feedback in the evaluation included:

“Everything was perfect, I am so glad I had the opportunity”.

“Useful and enjoyable to learn about the different skin types so I can better guide customers”.

Conclusion: Based on insights and results, it is clear that there is great interest and need for a competence boost within facial care in pharmacies. The customers are very satisfied with the skin analysis service and the sale of facial care products has increased where skin analysis is performed in line with the training.

Data driven AI-gamification learning and rewards to enhance pharmacist engagement and professional development

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Background: Pharmacists are pivotal in patient care, making continuous professional development indispensable. Memory and brain health are particularly important as they are tasked to remember vast amounts of information, handle multiple tasks simultaneously and stay up to date with all things pharmacy. Yet 60% of pharmacists report significant levels of fatigue, attributed to long hours and high workloads which can impair memory and cognitive function. This project investigates the impact of gamification's effectiveness as an alternative to the low engagement and motivational approach of traditional learning by integrating interactive challenges, rewards, collaboration, and personalization to the learning experience. The goal of said experience will be to enhance pharmacist education, skills mastery, and sustained engagement with a central component focusing on bolstering memory and cognitive functions, drawing inspiration from the COSMOS-Web study. This study demonstrated a multivitamins' effect on cognitive health in older adults, and its methodology was adapted for game mechanics, focusing on translating evidence into practice. The aim is to transform complex research outcomes into an accessible and motivating format for pharmacists, bridging the gap between scientific discovery and practical application.

Method: A gamified learning platform was developed to equip pharmacists with interactive tools and game-based modules. The platform employs established gamification techniques, including episodic memory reinforcement, achievement-based learning, personalised incentives tailored to learning styles, and engaging challenges. Learning content focuses on key pharmaceutical practice areas, emphasizing sharpening cognitive skills relevant to clinical decision-making and patient management. Specifically, interactive memory games were created to reinforce the COSMOS-Web study findings. These games incorporated key numbers, terminology, and critical conclusions of the study to name a few. The games were also designed to be adaptive, utilizing Artificial Intelligence (AI) algorithms to adjust the difficulty level based on individual performance and learning progress. Data on user engagement, knowledge retention (assessed through in-game quizzes, simulated patient scenarios, and peer evaluations), and the perceived impact on professional practice were systematically collected.

Results: While formal results are pending, the platform's design is grounded in decades worth of prior research demonstrating gamification's effectiveness in pharmacy education. Studies, like Hope et al. (2023), show gamified approaches improved pharmacist engagement, knowledge retention, and learning outcomes. That review highlighted that strategies like points, badges, leaderboards, and activities can boost engagement, motivation, and learning. Nowbuth et al. (2023) demonstrated that a gamified mobile application significantly improved pharmacy student antimicrobial stewardship knowledge. This platform is anticipated to yield positive results regarding pharmacist engagement, cognitive skill development, and pharmaceutical knowledge.

Conclusion: Gamification offers a promising approach to enhancing pharmacist education and growth. Integrating game elements, AI-driven adaptive learning, and personalised reward boosts motivation, amplifies retention, and drives engagement. This underscores gamified platforms' potential to improve cognitive abilities, refine decision-making, and elevate efficiency in patient care. Future research should explore long-term impacts on practice and outcomes, and opportunities for broader dissemination.

Gamification in pharmacy education: Application in pharmacist prescribing for minor ailments

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Background: In 2023, Ontario pharmacists in Canada were granted authority to prescribe for 19 minor ailments (MAs). Gamification, also known as serious games, in education has been shown to facilitate user engagement and knowledge retention; however, it remains relatively under-explored in pharmacy education. The objective of this project is to identify the most challenging MAs perceived by senior pharmacy students and explore how gamified education may facilitate learning and knowledge reinforcement of pharmacist prescribing for minor ailments (PPMA) concepts. Kern's six-step approach to curriculum development was adopted to identify the needs perceived by senior pharmacy students. Post-intervention/MA Games evaluation questionnaires were developed and informed by Kirkpatrick's Four-Level Training Evaluation Framework.

Methods: A needs assessment survey was disseminated to fourth-year PharmD students at the University of Toronto in December 2023 to identify MAs and associated concepts that were perceived to be challenging. A series of educational games was developed using Quizizz (gamification platform). In May 2024, two online synchronous Quizizz sessions, followed by an asynchronous, self-directed homework-mode Quizizz were offered to students. Six multiple choice questions (MCQs) were developed to assess student knowledge for each of the top three identified MAs. Participating students completed a 12-item post-game evaluation questionnaire, sharing their experience with the MA games. Quantitative data collected were analysed using descriptive statistics, and free-text input was subject to thematic analysis.

Results: Pinworms and threadworms, nausea and vomiting in pregnancy, and impetigo were perceived to be the three most challenging MAs. Sixty-nine students (30% Year 4 PharmD class) participated in the Quizizz sessions. Their average MCQ scores (i.e., knowledge accuracy) were 52%, 47%, and 41% for nausea and vomiting in pregnancy, pinworms and threadworms, and impetigo, respectively. On average, the Quizizz games took 337 seconds for students to complete the online synchronous sessions and 260 seconds the homework mode (p=0.048). Twenty students (29% response rate) from both formats completed the post-game evaluation. They reported that MA games allowed them to become more familiar with the MAs that they have minimal practice experience, identify knowledge blind spots, and recognise important concepts for patient assessments.

Conclusion: This project provided us with an opportunity to identify challenging topics in teaching and learning of PPMA, implement gamification in pharmacy education, and confirm the user engagement and knowledge retention potential of gamification in health profession education. It will inform further development in MA gamification application, supporting pharmacy education and continuing professional development for early-career pharmacists.

Engaging students in One Health: A gamified approach to interprofessional education

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Background: The World Health Organisation (WHO) defines One Health as 'an integrated, unifying approach that aims to sustainably balance and optimise the health of people, animals, and ecosystems.' Recognising the need for a multisectoral and transdisciplinary strategy, the United States developed the National One Health Framework to Address Zoonotic Diseases and Advance Public Health Preparedness (NOHF-Zoonoses) for 2025–2029. This framework fosters collaboration across federal agencies to address zoonotic disease threats and strengthen public health preparedness. At the University of Kentucky, One Health principles are incorporated into interprofessional education through PPS 983 and NUR 382-701: Interprofessional Teamwork in Global Health. These courses engage six colleges and prepare students for experiential learning opportunities, such as the Ecuador Shoulder to Shoulder Global (STSG) short-term experience in global health. To reinforce One Health principles, an innovative virtual escape room activity was designed to simulate real-world challenges encountered in global health settings. The objective was to enhance interprofessional collaboration and decision-making while reinforcing key One Health concepts through an interactive, problem-solving exercise.

Method: A web-based virtual escape room was developed using the Breakout EDU digital game platform. The activity, titled Ecuador Earthquake Response Escape Room, required students to work in interprofessional teams to solve One Health challenges following a major earthquake in Ecuador. The escape room was delivered synchronously via Zoom after students completed required pre-work on One Health principles. Students were required to complete seven interactive puzzles in a 25-minute timeframe. Each puzzle was aligned with key concepts from the NOHF-Zoonoses framework and centred around the intersection of environmental, human, and animal health. One critical component of the activity involved engaging with a zoonotic disease document, which required students to assess surveillance data, evaluate outbreak risks, and develop coordinated response strategies. Participants applied One

Health principles to address issues such as public health, environmental safety, and medical response in disaster settings.

Results: A total of seven inter-professional teams (n = 56 students) participated in the escape room activity. Six out of seven teams (87.5%) successfully completed the challenge within the allotted time (n = 49 students). Students effectively applied One Health principles, employing multisectoral approaches to problem-solving in a simulated disaster setting. Student feedback indicated that the activity was engaging, reinforced key One Health concepts, and enhanced teamwork and communication skills in a simulated global health emergency. Participants noted that working through the zoonotic disease document provided a realistic challenge that required them to integrate knowledge across multiple disciplines.

Conclusion: This virtual escape room model provides an innovative and scalable approach to integrating One Health principles into interprofessional education and disaster preparedness training. The activity successfully reinforced the role of One Health in addressing complex public health challenges. Future iterations will focus on expanding scenario complexity, enhancing team-based problem-solving, and evaluating long-term knowledge retention. This model has broad applicability for interprofessional education and can be adapted for various global health training settings.

Improving antibiotic learning in undergraduates using modules based on the inn stems system

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Background: Antibiotics are a core topic in the training of pharmacy undergraduates, due to the threat of bacterial resistance. In the pharmacology subject of our Pharmacy Degree, we have worked on implementing strategies to improve the students' knowledge on this topic. There is some difficulty in determining the in-depth knowledge that students can cope with and considering their characteristics and learning habitudes nowadays. Therefore, the supply of materials adapted to the needs and desired outcomes can help to achieve the desired competencies in this topic. The modules described herein comprise the different materials/strategies used during the pharmacology lectures.

Methods: We have prepared documents (modules) about antibiotics with the following characteristics:

- One first module devoted to basic concepts about antimicrobials.
- Specific modules for each antibiotic group.

The basis of each module is the ATC classification and the INN (International Nonproprietary Names) nomenclature and stems for drug identification. Following the INN structure can help the students in their learning. The content is based on the information included in the Stems in a Pill published on the website of the School of International Nonproprietary Names of WHO1, where each pill contains information correlating the INN stem and its pharmacology. Each module contains the following sections: ATC, INN Stem, Medical substances related to the class, Chemical structure, WHO's list of essential medicines, Mechanism of action, Antimicrobial activity and main indications, Adverse reactions, Use in specific populations, Pharmacokinetics, Pharmacogenomics, Interactions, Administration, Dosage forms, Important patient information, References, Different activities based on the modules have been done during the classes.

Results: So far, we have elaborated the following modules: Basic concepts on antimicrobials, Penicillins, Carbapenems and Quinolones. Modules are included with other materials used in the learning platform Moodle. Derived from the information in the modules, students have performed different activities:

1. Use the content as reinforcement and complementary material for the lectures.
2. Exercises about the topic described in each module after the lecture that include:

a) Quizzes for matching INN and stems with drugs, adverse reactions, and mechanism of action.

b) Using information from the modules in the resolution of clinical cases in workshops.

c) Self-assessment quiz.

Conclusion: The modules have allowed us to include the amount and depth of information that we consider suitable for students to achieve competencies in antibiotic use. The use of the INN stems system as a learning basis helps prepare the modules by teachers and facilitates students learning processes. The results of the different tests and engagement in activities have been satisfactory.

Analysis of compliance rates with the accreditation council for pharmacy education (ACPE) Quality criteria during initial or continued evaluation reviews

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Background: The Accreditation Council for Pharmacy Education (ACPE) International Services Program implemented revised Quality Criteria (hereafter "Criteria") for programs seeking International-Accreditation, effective January 1, 2017. The 26 Criteria are organised into six main sections. The four possible ratings that can be given to each Criterion include: compliant, compliant with monitoring, partially compliant, and non-compliant. ACPE analysed compliance rates with the Criteria.

Methods: Programs evaluated for initial or continued International-Accreditation between the period of January 1, 2017, and January 31, 2025, were included in the analysis. Compliance was determined using the ACPE Board of Directors' final action on the basis of review of the program's self-study, the evaluation team report from the evaluation visit, any additional documentation submitted by the program, and the recommendations of the International Commission. Compliance rates were calculated for each Criterion using the four possible ratings.

Results: A total of 55 programs at 40 colleges were evaluated for ACPE International Accreditation; 47 programs were evaluated for initial International-Accreditation and eight programs for continued status. Of the 55 programs, 26 were at the bachelor's level, two were Master's programs, and 27 were Doctor of Pharmacy programs. Analysis of the 55 programs revealed that, on average, a program was found to be in compliance with 18.1 Criteria (SD 3.7) and compliant with monitoring for 7.2 Criteria (SD 3.6). Only one program was found to be compliant without any further monitoring requested for all 26 Criteria. Eight programs (14.5%) had at least one criterion found partially or non-compliant. While compliance concerns were not identified for the majority of programs, follow-up reporting was requested for most programs across the 26 Criteria as 46 programs (84%) were found compliant with monitoring for at least one Criterion. Only one criterion (program information) was found to be compliant across all programs with no follow-up report requested. Criteria with the highest rates of "compliant with monitoring" include strategic planning (45%); assessment of mission and goals (49%); development of the curriculum (82%); practice experiences (69%); assessment of learning (73%); quantity of faculty (73%); and practice sites (78%). A total of five programs were found to be out of compliance (defined as partially or non-compliant) with one or more of the 26 criteria. Criteria that were rated as partially compliant or non-compliant related to: strategic planning (four programs), assessment of the mission and goals (three programs), organisation and governance (one program); program competences (three programs); curricular design (two programs); practice experiences (two programs); academic policies (three programs); quantity of faculty (two programs); quality of faculty (two programs); and practice sites (two programs).

Conclusion: While the majority of programs were found to be in compliance with the ACPE Criteria for International-Accreditation at the time of initial or continued evaluation, follow-up reporting is frequently requested by the ACPE Board of Directors. Criteria with the highest rates of requested monitoring pertain to strategic planning, assessment of the mission, development of the curriculum, assessment of student learning, development of practice experiences including practice sites, and the quantity of the faculty.

Revision of ACPE international-accreditation quality criteria

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Background: The Accreditation Council for Pharmacy Education (ACPE) developed the Quality Criteria for International-Accreditation of Professional Degree Programs in Pharmacy in Countries Outside the United States and its Territories, effective July 1, 2026. This presentation will describe the processes used in revising the Quality Criteria; obtaining input from various interested communities; and changes made from legacy Quality Criteria to the revised Quality Criteria 2026.

Method: Interested communities, including pharmacy programs, were invited to provide written comments and participate in the Quality Criteria Revision Survey. The survey was open from August 2022 to April 2023. An email requesting comments was sent seven times between the opening and closing of the survey to an average of 888 email addresses, and 23 responses were received. Additional feedback was gathered through two listening sessions conducted in April 2023 with members of the International Services Program Advisory Group (ISPAG). A sub-committee of the International Commission was created in summer 2024 to review feedback received through the survey and listening sessions. An initial draft of the revised Quality Criteria was approved by the ACPE Board of Directors in January 2025 and shared with interested communities. Subsequently, three online listening sessions and another web-based survey was conducted between February and April 2025 to gather feedback on the draft Quality Criteria. This feedback was presented to the ACPE Board at their June 2025 meeting. The

ACPE Board reviewed all comments received on the draft Quality Criteria before the revised Quality Criteria were approved in June 2025 for implementation in July 2026.

Results: Findings from the initial survey and ISPAG meetings included recommendations to include a greater emphasis on assessment, incorporate expectations for interprofessional education, and outline expectations related to distance delivery of the curriculum. These findings were used by the International Commission Subcommittee to develop the initial draft revised Quality Criteria. In the revised Quality Criteria, the number of Criteria was reduced from 26 to 7. Each Criterion consists of sub-criteria which will be used in the reporting process.

Elements incorporated in the revised Quality Criteria include: 1) Professional Identity Formation; 2) expectations that the program competencies are appropriate for the degree awarded and are designed to ensure graduates are practice ready; 3) interprofessional education; 4) expectations for sequencing of the curriculum; 5) the use of technology and distance education within the curriculum; 6) expectations for the experiential education for PharmD and Masters programs; 7) professional development of preceptors; and 8) expansion of assessment expectations. Additional findings from the 2025 web-based survey and online listening sessions will be provided in the final presentation along with the final Quality Criteria approved at the June 2025 Board meeting.

Conclusion: The revision process for the ACPE Quality Criteria for International-Accreditation 2026 involved engagement of interested communities over three years, ensuring that the updated Quality Criteria are rigorous, relevant, and aligned with trends and advancements in the profession of pharmacy globally. This thoughtful and inclusive process provided a robust framework for maintaining high quality and continuous improvement in global pharmacy education.

Sustainability in instructional design: Optimizing simulation-based learning by reducing cognitive overload

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Background: Simulation-based learning is an essential part of pharmacy education, offering students a risk-free environment to develop clinical decision-making, critical thinking, and problem-solving skills. Access to educational simulation capabilities is now required in the 2025 Accreditation Council for Pharmacy Education standards. However, simulations can also be stressful leading to excessive cognitive load that can limit knowledge retention and skill acquisition. Balancing cognitive load is critical in ensuring that simulation remains an effective teaching tool for developing practice ready pharmacists. Objective: This narrative review investigates the complex relationship between cognitive load and simulation-based learning.

Method: A literature review was conducted on PubMed, Google Scholar, and select educational journals including the American Journal of Pharmaceutical Education, Pharmacy Education, Currents in Pharmacy Teaching and Learning, and the Simulation in Healthcare Journal. A search using the terms “cognitive load AND simulation AND healthcare”, “cognitive load theory AND simulation AND healthcare” and “cognitive overload AND simulation” was conducted to identify research in pharmacy and health professions education. A thematic analysis was then conducted to synthesise key findings and determine best practices for managing cognitive load in simulation-based activities.

Results: The initial keyword search resulted in 123 studies. The results were reviewed and any studies that did not include novice learners, were not in a healthcare setting, or did not mention cognitive load, were excluded, revealing 13 relevant studies. Most studies utilised cognitive load theory (CLT) as the framework for their interventions. CLT suggests that there are three different types of cognitive load: intrinsic load, which is related to the inherent difficulty of the task; extraneous load, which refers to the mental resources expended on elements that do not directly contribute to learning (such as instructions, instructor expectation, fidelity); and germane load, which refers to the proportion of working memory spent on organising complex information into long-term memory. Findings suggest that excessive extraneous cognitive load can reduce learning efficiency and limit the effectiveness of training. Strategies for reducing extraneous load included concise instructions, limited use of mixed modalities, limiting multitasking, and orientation to available resources. Strategies for optimising germane cognitive load included scaffolding learning experiences, pre-briefing, worked-out modelling, and systematic debriefing. While intrinsic load is fixed, optimisation techniques include baseline knowledge/skills assessment and alignment with the learner's capabilities.

Conclusion: By incorporating evidence-based strategies aimed at balancing cognitive load, pharmacy education can improve learner outcomes and strengthen workforce readiness.

Teaching ethics in the digital era: Impact of an interprofessional education workshop on student knowledge and attitudes

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Background: Digital health has revolutionised patient care. However, these tools also come with inherent risk including confidentiality breaches, unauthorised access to protected health information, disparities in access due to the digital divide, lack of transparency regarding ownership of data, and errors in algorithmic computation. It is imperative that health professions students understand the ethical issues related to the use of digital health. Discourse in an interprofessional education (IPE) setting can encourage diverse conversations on the role of healthcare professionals in protecting patient data from maleficence.

Methods: First-year pharmacy and physician assistant (PA) students enrolled in an IPE workshop were eligible for this study. All students first watched a 2-hour didactic lecture covering ethical principles including autonomy, beneficence, non-maleficence, and justice. Digital specific concepts such as the validity of artificial intelligence (AI) algorithms, data safety, and digital divide were also incorporated into the lecture. This was followed by small group discussion on seven ethical vignettes. Students completed a 15-question pre- and post- assessment quiz. Students also completed a three-item survey using a Likert scale with "1=strongly disagree" and "5=strongly agree" and a reflection on "the top three ethical dilemmas they had not considered prior to the IPE workshop." The reflections were transcribed by independent coders and descriptive statistics were utilised for thematic analysis. A student t-test was used to analyse the survey data.

Results: Two hundred and fifteen students (pharmacy, 72%) attended the workshop, of which, 192 (response rate 89.3%) completed all quizzes and surveys. Thematic analysis of the reflections revealed the top three dilemmas namely: 1.) data safety, 2) patient autonomy, and 3) validity of AI algorithms. There was improvement on the knowledge quiz (64% versus 88%). On the attitudes survey, there was statistically significant improvement on all questions including " I feel confident in my ability to handle ethical dilemmas related to digital health" (pre 2.97 versus post 4.02, $p < 0.01$) and " As a healthcare professional, it is my ethical responsibility to inform patients of any privacy issues related to digital health products (pre 3.96 versus post 4.5, $p < 0.01$).

Conclusion: Integrating digital health ethics into IPE enhances student awareness of technology-related risks in healthcare, empowering future professionals to navigate ethical challenges effectively.

Weight bias and stigma in healthcare: Description of an innovative interprofessional education workshop

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Background: Weight bias/discrimination can result in negative patient outcomes and discourage healthcare seeking behaviours. Stigma is a multi-level construct that can operate at the micro level (such as interpersonal interactions between the patient and health professional), mezzo level (such as physical environment including equipment and decor), and macro level (including institutional policies and research). To promote equity, health professionals need to understand their own biases, advocate for weight inclusive spaces/equipment, and develop policies that ensure patients of all sizes and weights receive high quality care. Exploring this in an interprofessional education (IPE) setting can encourage multidisciplinary dialogue on providing weight-inclusive care. The objective of this study is to assess the impact of a four hour IPE workshop on student knowledge and attitudes regarding weight bias and stigma.

Methods: Students from ten health professions participated in this study. A Zoom-based IPE workshop was designed to improve student knowledge and attitudes related to weight bias/discrimination. The workshop featured lectures from subject matter experts interspersed with three breakout room sessions in which interprofessional teams applied the lecture content in problem-based scenarios which incorporated pictures of patient care settings, chart notes, and clinical vignettes. Breakout sessions were titled: 1.) Introduction to weight stigma using a comic strip, 2.) Identifying barriers to care in the built environment, and 3.) Practicing intervening in potentially stigmatizing situations. To assess the impact of this workshop, students completed a pre/post-event survey which included the Knowledge and Beliefs About Weight Stigma (KABAWS) scale; a 24-item, 5-point Likert-based survey developed for the workshop. Data analysis: The Wilcoxon Signed Rank Test was used to determine any changes in the pre/post KABAWS survey.

Results: Six hundred and forty-seven students participated in this study. Five hundred and twenty-nine students completed the pre/post survey (response rate 81.8%). Statistically significant improvement was noted on 19 items of the KABAWS survey including "It is unacceptable for fat people to leave a healthcare appointment feeling bad about their weight" ($p < 0.001$) and "Fat people should lose weight so they don't experience weight stigma anymore" ($p = 0.002$).

Conclusion: Few studies in the literature have addressed weight bias among health professions students. The results of this study suggest that the IPE workshop successfully shifted student attitudes regarding weight bias and stigma. Educational interventions targeting bias awareness are essential for fostering weight-inclusive patient care.

Biomedical ethics teaching during times of political turmoil

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Background: ACPE Standards 2025 require PharmD programs to provide an "Exploration of approaches for resolving ethical dilemmas in patient care and its delivery, with an emphasis on moral responsibility and the ability to critically evaluate viable options against the needs of patients and other key stakeholders." Teaching biomedical ethics during times of political turmoil can be challenging but is important for health professions students. Historically, clinicians have been trusted based on their expertise. Challenges to expertise have come under attack from multiple sources and inserted into the political arena. To provide patient-centred care, pharmacists need to apply their clinical knowledge while navigating the political landscape.

Methods: A required course in Biomedical and Professional Ethics was taught during the spring of the first professional year of the Doctor of Pharmacy (Pharm.D.) program. Ethics education serves to establish a foundation for decision-making to assist student pharmacists navigate complex moral issues while considering scientific, societal, and philosophical perspectives. Ethical frameworks provide students with structured ways to evaluate and resolve dilemmas. Approaches including The Four Principles Approach (Principlism), Virtue Ethics, Deontologic Ethics (Duty-Based), Utilitarianism Ethics (Consequential), Pragmatic Ethics, and the Social Justice Framework were covered and applied to provide students with multiple approaches to address competing ethical considerations. Students were evaluated on analysis and decision-making on ethical issues that can arise in pharmacy practice and healthcare. Pre- and post-assessments were conducted to determine student knowledge of biomedical ethical principles and prior ethics education. Results from the pre-assessment were compared to the post-assessment to evaluate student knowledge, application of decision-making frameworks, and ethical principles. Case-based examinations (midterm and comprehensive final exam) were utilised to assess student development in addressing ethical dilemmas.

Results: One-hundred first year Pharm.D. students completed the course during the spring semester. Student baseline knowledge of ethics was evaluated using a questionnaire administered prior to the first lecture. Approximately 75% of students indicated they had not received formal training in ethics and were ill-equipped to address ethical dilemmas in practice. A modified questionnaire was administered at the end of the course prior to the final examination to assess student perception of their knowledge and development. Students indicated they were more comfortable and confident in their ability to address ethical dilemmas at the end of the course. Student performance on the midterm and final examinations reinforced this self-perceived development as final course grades for 85% of the students were greater than 90%.

Conclusion: Student pharmacists will face ethical dilemmas that intersect with political, social, and cultural forces. This course equips student pharmacists with knowledge, skills, and ethical frameworks necessary to navigate complex biomedical ethics dilemmas during heightened political polarization. In today's rapidly evolving healthcare landscape, political influences often intersect with medical practice, patient care, and policymaking. This course provided a structured approach to teaching biomedical ethics by fostering critical thinking, empathy, respectful dialogue, helping students develop a deeper understanding of ethical decision-making in a politically charged environment.

Shaping the future of pharmacy: A unified pre-graduate education framework for lusophone countries

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Background: The harmonisation of pharmaceutical education is essential for strengthening healthcare systems and ensuring equitable access to quality pharmaceutical services. Recognising this need, the Association of Pharmacists of Portuguese-Speaking Countries (AFPLP), which represents

the pharmacists from Angola, Brazil, Cape Verde, Guinea-Bissau, Mozambique, Portugal, and São Tomé and Príncipe has developed a strategic framework for the standardisation of core pre-graduate education for pharmacists across Lusophone nations. This initiative aligns with global healthcare objectives, such as the Sustainable Development Goals (SDGs) and the World Health Organisation's (WHO) Universal Health Coverage agenda, aiming to enhance the competency and mobility of pharmaceutical professionals within the Lusophone space. Ensuring access to safe and effective medicines is a fundamental human right and a key pillar of healthcare systems. However, many Lusophone countries face significant disparities in the density of pharmacists per capita, limiting the availability of pharmaceutical services. Addressing this challenge requires investment in education and workforce expansion, reinforcing the need for a harmonised curriculum that prepares pharmacists to meet evolving healthcare demands.

Method: The AFPLP conducted an extensive review of international education standards, including the International Pharmaceutical Federation's (FIP) Nanjing Statements, the European Directive on Professional Qualifications, and the Brazilian Pharmaceutical Education Resolution. A multidisciplinary approach was adopted to define core competencies, curricular structures, and training methodologies. The framework was developed through consultations with policymakers, academic institutions, and pharmaceutical organisations. It includes structured guidelines for admission requirements, course duration, theoretical and practical components, and professional competencies.

Results: The proposed curriculum spans a minimum of five years, integrating foundational scientific disciplines with applied pharmaceutical sciences. The core areas of knowledge include drug development, clinical pharmacy, pharmacovigilance, public health, and regulatory affairs. Emphasis is placed on interdisciplinary education, fostering skills in patient-centred care, pharmaceutical technology, and quality assurance. The framework also mandates practical training in community and hospital pharmacy settings to bridge the gap between academic learning and professional practice. The initiative underscores the importance of lifelong learning, advocating for continuous professional development (CPD) and post-graduate specialisations. Key recommendations target governments, universities, and professional organisations, urging them to implement quality assurance mechanisms, update curricula in alignment with international standards, and promote the mobility of pharmaceutical professionals across Lusophone countries.

Conclusion: The harmonisation of pharmaceutical education within the Lusophone space is a crucial step toward ensuring a highly skilled and adaptable workforce. This initiative not only enhances the quality of education but also facilitates professional recognition across borders, improving access to competent pharmaceutical care. Future efforts will focus on the phased implementation of these recommendations, continuous assessment of training outcomes, and alignment with evolving global healthcare needs. The AFPLP remains committed to fostering collaboration among stakeholders to drive the transformation of pharmaceutical education and reinforce the role of pharmacists in healthcare delivery.

Impact of co-curricular engagement on students' self-perceived personal and professional development: An artificial intelligence (AI)-supported metacognitive analysis

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Background: Metacognition, often described as "thinking about thinking," is vital for lifelong learning. Although students enhance their professional and personal development through co-curricular activities that complement the doctor of pharmacy curriculum, the impact of these activities on metacognition is not well-researched. This study aims to (1) identify students' self-described development through co-curricular activities including improvement in their learning strategies and planning abilities, confidence in their knowledge and performance in addition to the recognition of the areas needing improvement, and (2) describe the alignment of student pharmacists' self-perceived personal and professional development with the areas of metacognition through engagement in co-curricular activities.

Method: The study analysed self-reflections written by students in a single cohort at the end of their first (P1) and second (P2) curriculum years, to assess their personal and professional growth through co-curricular professional development activities. Data was collected from a web-based platform where students submit their reflections on their engagement with co-curricular professional activities. All submissions were de-identified and assigned unique identifiers. Students' reflections from the established and required co-curricular activities were retrieved from the secure database. The reflections were then analysed using a secure generative artificial intelligence (AI) tool. The tool evaluated the reflections based on specific prompts and identified comments that match with predefined metacognitive categories, then assigned a numerical value to each reflection indicating the frequency with which comments in the predefined categories appeared within the reflection. The researcher then evaluated each reflection to verify the accuracy of the AI-generated analyses and documented the actual number of comments that matched with the predefined metacognitive categories. After verification, reflections were categorised into weak, medium, and strong correlations with metacognition based on numerical intervals. This analysis demonstrates the relationship between co-curricular activity engagement and

metacognitive development. The P2 reflection evaluations will be completed by the end of March 2025.

Results: The initial analysis reveals a strong relationship between co-curricular activities and students' metacognitive development. The analysis of second-year reflections will determine the metacognitive development progress over time. Data analysis is still in progress, and final results will be presented upon completion.

Conclusion: At completion of data analysis, we aim to highlight the implications on metacognitive growth through pharmacy professional development activities and the utility of a secure generative AI tool in ensuring a consistent analysis.

Uniting ten health professions: Advancing health through interprofessional education focusing on social determinants of health

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Background: Health outcomes are influenced by a variety of factors such as access to healthcare, education, employment, housing, and social support. These can have a profound impact on an individual's wellbeing and health. Despite hearing about these factors, many healthcare professional students are not adequately trained to address them. The purpose of this interprofessional education (IPE) program was to train students from ten different health professions to collaborate to address the social determinants of health (SDOH) in vulnerable populations. This program fills gaps in their knowledge by improving their awareness of the SDOH and prepares them to work collaboratively to address these factors.

Method: Students from ten health professions schools, at one institution, including Dentistry, Family Nurse Practitioner, Medicine, Dietetics/Nutrition, Occupational Therapy, Pharmacy, Physician Assistant, Physical Therapy, Social Work, and Speech and Language Pathology, participated in a virtual half-day IPE session facilitated by faculty from each of the participating health professions. Students received prework including the case study, and roles and responsibilities of participating professions, prior to the live IPE session. During the live session, students were divided into smaller multi-professional groups, and watched two, pre-recorded, patient interviews conducted by a Physician Assistant and a Social Worker, that explored the SDOH of an older adult patient who was unhoused due to job loss and had multiple chronic health needs. Teams of students collaboratively assessed the patient's SDOH, psychosocial needs, identified risk factors, protective factors, and prioritised interventions to address the needs of the patient. Student outcomes included post surveys of the Interprofessional Collaborative Competencies Attainment Survey (ICCAS), and Assessing Student Competence Knowledge of Social Determinants of Health (ASCK-SDH).

Results: In 2024, 963 students from ten health professions participated in the school-wide IPE day. Three largest groups were Pharmacy, Medicine, and Dentistry (N = 187, 168, 168, respectively) and 39.8% had participated in one previous IPE session. A majority (70.5%) of students "Strongly Agreed" to being more "aware of the importance of SDOH in healthcare treatment planning." Biggest changes in ICCAS Subscales before and after means were for Collaboration (5.88 and 6.53); Team Functioning (5.89 and 6.51); and Roles & Responsibilities (5.99 and 6.54) out of 7 = strongly agree. The highest mean from the SDOH knowledge scale was that IPE teams were in a better position to assess SDOH than single providers (3.83 out of 4 = strongly agree). The overall mean of the SDOH scale was 3.79.

Conclusion: IPE Day enhanced health profession students' understanding of interprofessional education, increased their awareness of SDOH, and highlighted the importance of collaborative practice in addressing health disparities through interprofessional teams.

Developing international and interprofessional collaborations through a fulbright scholar experience

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Background: A Fulbright Scholar experience aims to foster international collaborations and enhance global understanding between people from the US and other countries. The program supports faculty, professionals, and teachers from the USA to engage in teaching, research, or both, with experiences ranging from six months to one year.

The Fulbright Award provided me with international and interprofessional clinical collaborations between professional medical, nursing, and pharmacy colleagues and offered academic collaborations in the School of Pharmacy and Medicine. Such international experiences broaden perspectives and foster a deep understanding of the culture. Serving in a different healthcare delivery model, my skills and abilities were challenged, requiring me to adapt and pivot to a new, innovative way of delivering care. Academically, the opportunity to engage with faculty and students, where a different model of pharmacy education is delivered, was another opportunity to grow and learn.

Methods: The Fulbright program is immersive, with most awardees living abroad for 6 months to a year. I spent 6 months in Kisumu, Kenya, from August 2024 to January 2025, and I was affiliated with Maseno University, School of Medicine, Department of Paediatrics. I collaborated with paediatricians, medical staff, nurses, pharmacists, and laboratory personnel at JOOTRH and Obama Children's Hospital. My teaching focused on clinical education for medical students and paediatric residents from Maseno University. My collaborative research involved mentoring a paediatric medical resident from Maseno on her master's project with colleagues from Upstate Medical University in Syracuse, NY. Our project aimed to create an antibiogram at Obama Children's Hospital. Additional aims are to develop relationships with the pharmacists at JOOTRH and to establish relationships with the School of Pharmacy at Maseno University.

Results: During my time in Kenya, strikes by nurses, hospital pharmacists, medical and pharmacy interns, and faculty members occurred at various times. Despite this, I provided clinical education on the wards and presented several in-services to an interdisciplinary audience. I created educational materials focused on appropriate culturing practices and worked closely with microbiology staff to ensure adequate culture bottle supplies and strengthen communication of culture results. Our project supported hiring two phlebotomists and increasing culture collections. My clinical teaching extended to mentoring and teaching pharmacy students from Maseno University on rotations. This relationship led to discussions with the Dean and faculty at Maseno School of Pharmacy about collaboration opportunities, with a memorandum of understanding (MOU) between our schools in draft form. I forged meaningful relationships with hospital pharmacy department leadership and clinical pharmacy staff, continuing to collaborate on antimicrobial resistance projects, malaria treatment policy development, and discussions on restarting a pharmacy revolving fund and starting an intravenous admixture program for neonate and pediatric patients.

Conclusions: A Fulbright Scholar award aims to foster mutual understanding between people from the USA and other countries through research and education. During my Fulbright experience, I achieved these goals and promoted sustainable collaborations between our two countries and pharmacy communities. I will return in May 2025 to continue my research and advance additional projects.

Academic Pharmacy Section of the International Pharmaceutical Federation: Insights from the membership survey

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Background: The Academic Pharmacy Section (AcPS) of the International Pharmaceutical Federation (FIP) supports members in advancing training and education to improve health. The membership committee (AcPS Executive Committee) works to increase member visibility and leadership pathways within working groups. This committee takes members' concerns and suggestions for improvement very seriously. As such, the committee routinely surveys its members to solicit feedback. This report presents findings from the AcPS membership survey conducted between September 2023 and February 2024, aiming to explore member satisfaction with AcPS activities and services and to understand their needs and expectations.

Methods: A cross-sectional survey, developed by the Membership Working Group and revised by the Executive Committee, was distributed to all AcPS members via personalised email, the newsletter "The Mortar Board" and LinkedIn. The 11 question survey was distributed three times through each platform and hosted by Qualtrics™. The survey used scales to measure expectation fulfilment (4 = exceeded expectations to 1 = had no expectations) and communication quality (1 = poor to 5 = excellent). There were also open-ended questions to capture additional feedback. Descriptive statistics were calculated using SPSS.

Results: There were 60 completed responses, representing approximately 6.3% of the AcPS membership from more than 23 different countries. Seventy-one percent (n=41) of responders were members for one to five years (39% for one to three and 31% for three to five). Fifty-two percent of respondents are not associated with any working group. The most common reasons noted for joining AcPS (from 32 responses) included: networking and collaboration, advancement of pharmacy education, professional and personal development, and alignment with academic interests. Seventy-three percent of respondents indicated that their expectations of the section had been met (2.84

±0.83 out of four). Reasons for having no expectations were primarily related to new membership/lack of familiarity or a feeling of distance/uncertainty about involvement. Seventy-four percent of respondents expressed satisfaction or high satisfaction with the performance of the AcPS leadership (President and ExCo), compared to seven percent who expressed dissatisfaction or very dissatisfaction. The areas identified for improvement included: communication, publicity (more interactive engagement, onboarding, social Engagement, and media presence), congress programme development and involvement (transparency, member input), networking and collaboration (facilitating connections outside of meetings), and structural clarity (clarifying FIP structures and AcPS's role within FIP). Based on this feedback, the AcPS leadership is considering several action plans including: virtual business meetings, a new member onboarding program, open working group sign ups and adjustments to Congress program development, and increasing LinkedIn platform use. Future surveys will consider targeted follow-up with gather more tailored feedback and exploration of additional strategies to increase response rates.

Conclusion: While the response rate is lower than desired, the feedback received offers valuable insights into key areas of AcPS activity. The responses highlight strengths in communication and leadership satisfaction, while also identifying opportunities for improvement in member engagement, congress program development, and networking. Although some respondents reported high satisfaction, given the response rate, these results will be interpreted cautiously and continuous improvement prioritised.

Self-assessment in pharmacy law and ethics e-learning: Experience from a national capacity building programme

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Background: In line with the FIP Centennial Declaration, which urges "pharmacists and pharmaceutical scientists to adhere to the highest standards of professional conduct," the Portuguese Pharmaceutical Society (PPS) has developed a capacity building programme on pharmacy law and ethics. This programme is designed to help pharmacists apply ethical principles, the PPS Code of Ethics, and pharmaceutical legislation in their daily practice. Since its inception in 2021, the programme has developed one webinar and three e-learning courses. A key challenge is moving beyond knowledge acquisition to support changes in daily practice. To address this, we incorporated self-assessment into the design and development of e-learning. According to the literature, when used reflectively, self-assessment fosters critical thinking and metacognitive skills, both essential for translating learning into meaningful changes in professional practice. However, few practical examples exist on how to operationalise this approach in continuing professional development through asynchronous e-learning.

Objective: This work reports on the implementation of self-assessment practices in an e-learning course and may encourage other professional bodies and educators to adopt similar strategies to enhance continuing professional development.

Method: The course "Managing conflicts of interest and medicines advertising: a practical approach" was designed and developed using a case-based approach centred on a hospital pharmacist serving on a Pharmacy and Therapeutics Committee. It was created by a team of subject matter experts and an e-learning developer, informed by a literature review, key references (including the Code of Ethics of the PPS and legislation governing medicinal products for human use), and iterative feedback from a senior practising hospital pharmacist. The content was structured into modules. The self-assessment component was guided by literature from undergraduate education using the same learning management system (Moodle) in which the course would be delivered. It followed four key steps within each module: (1) presentation of a question related to the case study; (2) submission of the learner's response; (3) provision of an exemplar response for comparison; and (4) review of the principal topics within the exemplar response. Articulate Storyline 360 was employed to integrate human voice narration into animated slides, and the course was deployed through the PPS's Moodle platform.

Results: The first edition of the course, launched in February 2025, had an estimated duration of 11 hours and was delivered asynchronously over a four-week period. It included six content modules, covering the definition and management of conflicts of interest, as well as the interpretation of legal and regulatory concepts related to conflicts of interest and medicines advertising, and a total of 16 self-assessment activities. A total of 57 pharmacists enrolled in this first edition.

Conclusion: This course provides a practical example of how to operationalise self-assessment in continuing professional development. This approach has the potential to promote critical thinking and support changes in pharmacy practice without requiring significant resources. Ongoing evaluation

will offer insights into learner experiences and guide refinements for future editions.

Case-based learning in clinical pharmacokinetics course

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Background: This study applies the theory of "Case-Based Learning" (CBL) to the Clinical Pharmacokinetics course in the pharmacy program. Through clinical case discussions, the approach aims to enhance students' understanding and application of course content. CBL not only allows students to explore topics in depth through cases but also encourages them to share and exchange perspectives during discussions, thereby improving engagement and learning outcomes. The effectiveness of the CBL teaching method and its impact on learning outcomes were analysed using course assessments and student self-evaluations.

Results: According to student survey results, their foundational knowledge—particularly in biopharmaceutics—was sufficiently accurate before the course. Consequently, CBL further deepened their understanding and improved learning outcomes. Although no significant difference was observed in midterm exam average scores between students taught using CBL and traditional lectures (71.6 vs. 72.7, n = 200), other aspects showed remarkable improvement. Specifically, the standard deviation decreased from 17.0 to 12.7, indicating more consistent student performance, and the pass rate increased from 76.0% to 86.7%, reflecting a significant enhancement in overall learning outcomes. Additionally, over 80% of students expressed high satisfaction with the course, stating that it improved their learning experience (n = 54). In self-evaluations, students reported that the CBL approach not only enhanced their competencies but also fostered teamwork skills.

Conclusion: Notably, CBL encouraged students to actively raise questions in class and engage in discussions with instructors, teaching assistants, and peers. In summary, this teaching method successfully enhanced student learning outcomes, with its effectiveness supported by multiple evaluation metrics. Beyond deepening students' understanding of course material, CBL also cultivated practical skills beneficial for future clinical practice.

E-Learning and simulation to train French pharmacists for their new duties

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Background: Since 2016, in France, pharmacists' roles have been constantly evolving, incorporating increasing responsibilities in patient orientation, prescribing, and administration. Today, the vaccination, the management of common conditions such as cystitis and sore throat, as well as the handling Covid-related care, are part of their duties. This evolution presents a major challenge, both for professionals and for initial and continuing education. Universities must therefore quickly adapt to new training requirements by offering flexible programmes suitable for all profiles, including students and graduates. These training courses must combine theoretical knowledge, practical skill acquisition, and contextualised application.

Objective: This communication aimed to highlight the efficiency, relevance, rapid implementation, and long-lasting impact of the training courses developed by the Faculty of Pharmacy at Grenoble Alpes University.

Method: To meet the needs of pharmacists' expanding responsibilities, we developed three training courses, combining e-learning and simulation: "Vaccination, Prescription, and Practice", "Rapid Testing for Angina and Cystitis and Associated Antibiotic Prescribing", and "Learning How to Take Samples Safely, Confidently, and Without Stress". The e-learning modules included between ten and 25 resources, such as narrated PowerPoint presentations, educational films, and short videos. The practical, classroom-based sessions featured mannequin training, role-playing, simulated pharmacy scenarios, clinical case studies, and effective health communication techniques. These courses were offered to professionals as part of continuing education but were also used by students in training.

Results: We trained just over 800 students in initial training in vaccination and almost 450 professionals including a majority of community pharmacists but also hospital and pharmacists working in other care centres and finally biological pharmacists. This equivalent to 72 training sessions The two others training were proposed more recently. We trained less people and less hindsight of them.

Conclusion: The training courses developed by the Faculty of Pharmacy at Grenoble Alpes University quickly adapted to the new roles of community pharmacists in France. Integrated into routine initial training, they have been widely adopted, ensuring long-term success and stability of the continuing education offering. Built around e-learning and simulation, they offer flexibility in continuing education, with sessions organised according to field needs and the ability to open a new session within days. Their success and flexibility has also led to training beyond the university's academic region, including French Polynesia, and has expanded to other healthcare professionals, such as nurses that were authorised to prescribe vaccinations and pharmacy technicians authorised to administer it.

Using GenAI to assess student reflections of a living with diabetes simulation activity

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Background: Grading written reflections can be time-consuming and subjective, yet providing clear, consistent, and objective feedback is essential for student learning and equitable assessment. In pharmacy education, reflection-based assessments help students engage with complex experiences, such as self-management of diabetes. The use of generative AI (GenAI) offers a potential solution to streamline grading while maintaining fairness and accuracy. This study explores the application of GenAI in developing a grading rubric and assessing student reflections in a diabetes simulation experience. This project aimed to evaluate the effectiveness of GenAI in (1) creating a grading rubric based on course objectives, (2) grading student reflections using this rubric, and (3) comparing AI-generated grades with faculty-assigned grades. We hypothesised that GenAI-generated grades would be consistent with faculty grading when using a structured rubric and provide a more efficient, standardised assessment process.

Methods: This study was conducted in a 2-credit Advanced Diabetes Management elective course. A key graded component of the course required students to wear two different continuous glucose monitoring (CGM) devices and participate in a diabetes self-management simulation. After completing the experience, students submitted a written reflection. For this project, GenAI was used to create a grading rubric aligned with the activity's learning objectives. The AI then graded student reflections from the previous year, which were originally assessed by faculty without a rubric. The AI-assigned grades were compared to faculty grades. The process was repeated for the current year's students, modified so that faculty also graded using the GenAI-generated rubric, allowing for direct comparison between AI and faculty evaluations.

Results: GenAI successfully developed a detailed grading rubric that differentiated student performance and provided structured feedback. When grading without a rubric, faculty tended to assign similar scores across students, whereas GenAI grading demonstrated more variability in student performance. When both faculty and GenAI used the same rubric, the assigned grades were closely aligned. Additionally, GenAI-generated feedback provided individualised insights for each student as well as global feedback for the class. Refinements to AI prompts improved the quality of feedback over time, ensuring more targeted and actionable comments for students.

Conclusion: Using GenAI to develop and apply a grading rubric for student reflections proved to be both effective and efficient. AI-generated assessments provided differentiated, consistent, and actionable feedback that aligned well with faculty grading when a structured rubric was used. This approach has the potential to improve efficiency and consistency in grading written reflections while maintaining high-quality, objective evaluations. Future studies should explore additional applications of GenAI in assessment and further refine feedback generation techniques.

NU POET* Society [*Peer Observation Evaluation Tool]

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Background: Student evaluations, despite their limitations, remain a primary component in assessing teaching for promotion and tenure. These evaluations can be influenced by factors unrelated to teaching effectiveness, including instructor characteristics and course logistics. Faculty peer evaluations offer an alternative method for obtaining constructive feedback on teaching quality. This project aims to revise and validate the Peer Observation Evaluation Tool (POET) for use in new teaching/learning environments, including flipped classrooms, problem-based learning, and small group sessions. The objective is to create a comprehensive POET that complements student evaluations and supports faculty and post-graduate trainees development in the context of a newly implemented integrated, competency-driven curriculum.

Method: The project will be created from the existing POET process, which was developed and implemented in 2008 through a four-step process: pre-observation meeting, classroom observation, post-observation meeting, and post-assessment meeting. The revised POET will be adapted for various teaching methodologies and validated for use in both large classroom and small group settings with faculty and post-graduate trainees. Feedback will be gathered about

formative and summative processes used in the revised POET process.

Results: Previous implementation of the POET process showed overwhelmingly positive feedback, with 89% of faculty surveyed believing that the benefits outweighed the effort of participating. The revised POET is expected to provide a valid and reliable tool for peer evaluation in diverse teaching environments, supporting the revised curriculum implemented in fall 2023.

Conclusion: The updated POET process will address the need for a validated peer observation tool outside traditional lecture-based classroom environments. This tool will be crucial for evaluating teaching effectiveness in competency-driven learning environments and small group facilitation. The project will contribute to the limited literature on peer evaluation tools in health care academics and provide a framework for faculty development and teaching improvement.

French Chamber's 360° communication campaign to boost attractiveness of the profession

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Background: In France, the start of the academic year of 2022 revealed a major shortage of second-year pharmacy students (1,100 vacant spots). In response, the French Chamber of Pharmacists launched an "Attractiveness Roadmap" to make pharmacy studies more visible, accessible and increase awareness of the diverse career opportunities in the sector. By 2024, only 294 places remained vacant, encouraging the institution to continue along this path.

Objective: A three year communication campaign, "Pharmacist: The Least Known of the Well-Known Jobs", was launched in 2023. Targeting middle and high school students and their families, the campaign aims at inspiring young people to pursue pharmacy studies, spark new vocations, and support future pharmacists.

Method: The first year, the foundations of a 360° communication strategy were set (print and digital tools designed for middle school to university students to clarify access to pharmacy studies and highlight the various career opportunities including a dedicated website, brochures on studies and career diversity, a YouTube film, quizzes, pharmacist testimonial videos, promotion on social media platforms i.e. LinkedIn, Instagram, and TikTok). With the involvement of the French Chamber of Pharmacists' representatives, the campaign was brought to young audiences through career fairs in schools and universities, ensuring strong engagement and visibility. The second year, launched in September 2024, focused on expanding digital and field communication to engage young people by addressing common misconceptions about pharmacy careers. This was illustrated in the second promotional film. Additionally, a competition called "Shake up your Pharmacy", initiated by the French Chamber in partnership with the National Association of Pharmacy Students (ANEPF), was rolled out across all of the 24 pharmacy faculties. Key innovations included partnerships with influencers, the development of new digital formats, the strong activities on Instagram et TikTok accounts and the first participation in the Printemps de Bourges, a national music festival. By reaching young people both online and in unexpected venues, the campaign successfully expanded its impact.

Results: Over the past two years, the campaign has resulted in: More than 120 events involving representatives from the French Chamber. The opportunity for young pharmacists to present their profession to over 3,500 students through career fairs. Over 1,400 "Shake up your Pharmacy" challenges developed by students (some of them shared on social networks) to encourage field actions to promote pharmacy Significant social media reach, with over 700,000 views for the campaign's first promotional film and over six million views for its second edition. Nearly 200,000 views for videos created in partnership with Thotis, an educational media platform. Over 40, 000 views of thematic videos during the last six months Increase of subscribers on our Instagram and TikTok accounts (+ 500% during six months for TikTok and + 13% for instagram).

Conclusion: The third year will focus on strengthening visibility, and increasing the number of students, pharmacists serving as career ambassadors. New initiatives will be launched to maintain campaign visibility across social media and in real-world settings, potentially through new formats developed in collaboration with all the actors previously involved.

Longitudinal interprofessional education throughout the pharmacy curriculum

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Background: Interprofessional collaborative practice (IPCP) is a critical part of effective healthcare and interprofessional education (IPE) is required to develop practice ready

pharmacists. College of pharmacy curricula must prepare pharmacy students in IPCP. Longitudinal integration of IPE allows students to develop a foundational understanding of the importance of IPCP and build competence throughout their training. The following describes the strategies and processes for the development and implementation of a longitudinal IPE curriculum integrated in all professional years at a US college of pharmacy.

Methods: Over the last seven years, a longitudinal IPE program has been developed within the pharmacy curriculum. An initial inventory of Interprofessional (IP) activities was completed to determine gaps and areas needed for improvement. IP partnerships with other healthcare professionals were developed or expanded to create IP activities to meet learner needs. All events were aligned with specific Interprofessional Educational Collaborative (IPEC) competencies and rated for expected level of learning (exposure, immersion, competence). Yearly review based upon student and faculty feedback were made to refine the IPE curriculum.

Results: Initial inventory indicated a need to expand IPE experiences in the years one to three of the pharmacy curriculum and to identify and formalise the IP interactions that the students had during the advance pharmacy practice experiences (APPEs) in the fourth year. To address the first two years, two one credit hour required IPE courses were created. In the 1st year, students are required to take a foundational IPE course which introduces them to IPCP and provides several learning opportunities (exposure) for them to interact with students in other professions. In the 2nd year, a second required IPE course builds upon these skills. Activities include direct observation of healthcare practice, additional simulations and case studies (exposure/immersion). In the 3rd year, new IPE activities amounting to 12 contact hours were created and integrated in current required courses including advanced case discussions and simulations. For the three year didactic curriculum, pharmacy students now participate in structured IP learning activities with students from various allied health professions, nursing, and medicine. In the 4th year, students rotate monthly to a variety of clinical sites for their APPEs. Each month students document the healthcare professionals/students with whom they interact, the frequency and type of interaction, and provide examples of the IP interaction. Assessments have been developed throughout the curriculum that align with the objectives of selected activities including reflections, peer assessments, standardised patient feedback and faculty observation rating. The final assessment occurs during the 4th year APPE's where all students must demonstrate IPCP competency based upon preceptor evaluation. Annual refinements have been made to the program for continuous quality improvement.

Conclusions: By systematically identifying gaps, developing key partnerships, strategically integrating appropriate IP activities, and incorporating diverse assessment methods, a structured, longitudinal IPE curriculum was effectively implemented to enhance pharmacy students' preparedness for IPCP.

Exploring student pharmacists' and preceptors' views on professional attire in the pharmacy practice setting

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Background: Professional dress has long been associated with the medical field. A major reason why professional dress is required in the workplace is due to patients' positive perceptions of their healthcare providers. A 2018 study found that 53% of patients indicated that their physician's attire was important to them during care while a 2023 study of chiropractor students found that patients associated a higher level of trust to students wearing dress pants, shirts, and shoes versus more casual clothing. In the pharmacy profession, there is existing literature both supporting and opposing the expansion of dress code requirements in the pharmacy curriculum. However, there is a lack of data regarding professional dress in the pharmacy workplace.

Objective: The primary objective of this study was to compare perceptions of student pharmacists versus preceptors on professional dress items commonly worn in pharmacy practice settings.

Methods: An anonymous, voluntary, and IRB-approved Qualtrics XM® survey was emailed to first through fourth professional year (P1-P4) student pharmacists, Introductory Pharmacy Practice Experience (IPPE) preceptors, and Advanced Pharmacy Practice Experience (APPE) preceptors. The survey was conducted over two weeks and assessed four areas: 1) perceptions of specific clothing items (33 items: shoes, pants, tops), 2) eleven potential factors influencing their professional dress, 3) demographics and 4) comments. For part one, a five-point Likert Scale was utilised; a rating of 1-2 was considered unprofessional, 3 was neutral, 4-5 was professional. Descriptive statistics and Mann Whitney were used. A p-value < 0.05 was considered statically significant.

Results: A total of 304 participants [143 pharmacy preceptors, 66 P1 students, and 95 P2-P4 students) completed part one of the survey. Most preceptors identified as female, white/Caucasian, 25-44 years old, and practiced as an adjunct preceptor in a hospital (clinical role) or community setting. The P1 and P2-P4 students were similar with the majority identifying as female, Asian, 18-24 years old, and interested in pursuing fellowship; however, more P2-P4s had pharmacy employment compared to P1s (90% versus 73%).

There were 24 instances where all groups rated the clothing items similarly (15 as professional and nine as unprofessional). However, for seven of those items that were "casual", there was a statistically significant difference ($p < 0.001$) when comparing P1 students to both the P2-P4 and the preceptor groups as P1s rated a lower median score (e.g. 4 vs 5). Similarly, for seven additional clothing items that were more "casual", P1s were stricter than both P2-P4s and preceptors as they rated images at a lower degree of professionalism (e.g. neutral versus professional). Preceptors and P2-P4s cited that professional dress is highly dependent on the practice setting and noted the increased acceptability of comfort and casual wear, including medical scrubs and sneakers, in the comment section.

Conclusion: For clothing items considered more "casual," P1 students tended to be more conservative and viewed these items as less professional compared to both P2-P4 students and preceptors. This could be attributed to their limited experience in pharmacy practice.

Enhancing student pharmacists' patient interviewing skills with artificial intelligence

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Background: Traditional methods for practicing patient interview skills include simulated patient experiences using actors as standardised patients (SPs) or students as role-play models. These methods, although effective, can be difficult to utilise especially with large class sizes, the cost of funding such activities, and the time it takes professors for coordination. Artificial intelligence (AI) is a newer form of technology that may be more readily available to incorporate into the pharmacy curriculum. One study in Japan used AI for medical students to practice their medical interviewing skills showed that the AI group had higher scores for the medical interviewing than the control group. Limited data is available of using AI for student pharmacists to practice their patient interviewing skills.

Objective: The primary objective of this study was to assess student pharmacists' perceptions of utilising AI during labs to practice patient interviewing skills.

Methods: Faculty at Rutgers, Ernest Mario School of Pharmacy and University of Iowa College of Pharmacy created patient cases for AI to mimic SPs for self-care focused cases (smoking cessation, allergies, cold, headache, and musculoskeletal injuries). The AI were given strict criteria on how to respond to questions. During lab, student pharmacists inputted these patient cases into a large language model (LLM) where they could then ask questions (up to 15 per session) to practice patient interviewing skills and ultimately selecting appropriate self-care recommendation. After the activity, student pharmacists were electronically sent an anonymous, voluntary, IRB-approved Qualtrics XM® survey. The survey was open for 14 days and consisted of up to 17 questions detailing their perceptions of the activity and basic demographic information. Descriptive analyses were used to evaluate all questions.

Results: A total of 326 student pharmacists were eligible to complete the survey with 103 completing it (31.6% response rate). Most students identified as Gen Z (95, 92.2%), Asian (42, 40.8%) or White (40, 38.8%) and having utilised AI before this activity (79, 76.7%). Majority of students, 94.2% (92), used the written feature in AI over the voice function. Overall, the students perceived the activity as positive with 94 (91.3%) agreeing the activity was easy to use, 91 (88.3%) finding it valuable for practicing patient interviewing skills, 66 (64.1%) stating it helped them prepare for a real patient interview and 70 (69%) wanting AI to be incorporated more into the pharmacy curriculum. However, 42.7% (44) students preferred roleplaying with a partner citing it provides more face-to-face interaction and mimics a real-life scenario. Students still commented that the activity was valuable as it provided practice in asking questions without being prompted from a partner, was easy and efficient to use, and could be completed at home.

Conclusion: Students pharmacists felt using AI as an SP enhanced their patient interviewing skills with the majority wanting to see more in the pharmacy curriculum.

Leveraging AI as a tool in assessment and evaluation for PharmD verbal clinical simulation

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Background: Clinical simulations, particularly Verbal Clinical Simulations(VCSs), are widely used in health professional student(HPS) education to evaluate clinical knowledge, critical thinking, and oral communication. However, grading these assessments is a subjective and arduous process which can lead to intra- and inter-rater variability and inaccuracies. Generative-AI(GenAI), specifically large language models(LLMs), present a novel solution to this issue, by automating the process of transcribing, grading and providing feedback on VCSs to reduce the time burden of human assessors and ensure consistency. Previous studies suggest LLMs are inclined toward systematic overmarking when

evaluating short-answer assessments, which raises concerns about AI's ability to capture nuanced elements of medical reasoning and contexts which are embedded in HPS education. Additionally, variations in LLM choice and usage may contribute towards inconsistencies in evaluation, complicating a standardised implementation of AI technologies. The investigation aimed to evaluate the feasibility of using LLMs to assess First-year Doctor of Pharmacy(PharmD) student VCSs. It compared AI-generated scores with human assessors while analysing its potential benefits for grading consistency, efficiency, and scalability in pharmacy education. Furthermore, it aimed to identify the challenges associated with maintaining well-structured data streams, ethical standards, and evaluation reliability when integrating GenAI into HPS education.

Method: Student VCSs from 2023 were retrospectively marked using three different LLMs: GPT-3.5 Turbo, GPT-4.0 and o3-mini. The 2023 marking rubrics from these clinical simulations were separated into two sections: quantitative "checklist" style questions and qualitative "communication" style questions. These rubrics were converted into item claim verification prompts, wherein each criterion was framed as a yes-or-no question, and the LLM was instructed to assign marks depending on whether it answered yes or no. These prompts were fed into the three LLMs along with the transcripts of the student clinical simulations. The results were then compared to the marks attributed by human evaluators, and inter-rater agreement was analysed using percent agreement(%) Cohen's kappa(κ), Prevalence Adjusted Bias Adjusted Kappa(PABAK), and Spearman's coefficient(ρ). Human and LLM evaluations with < 90% agreement were deliberated by an expert assessor.

Results: The extent of agreement between the original human marks and the GenAI (GPT-3.5 Turbo, GPT-4o, o3-mini) marks of VCSs were analysed, with the aim of quantifying how similarly the humans and LLMs evaluated these assessments. Initial results have found that in the Medical History simulation, o3-mini achieved a 94% agreement and $\kappa = 0.50$ in checklist questions, and 72% agreement and $\kappa = 0.06$ in communication questions, with an overall $\rho = 0.64$.

Conclusion: This investigation will demonstrate the level of agreement in evaluating VCSs between LLMs (GPT-3.5 Turbo, GPT-4o, and o3-mini) and human evaluators, as well as the strengths and weaknesses of each LLM model in respect to its novelty as an evaluator of HPSs. Furthermore, the investigation also demonstrated the current barriers that challenge the implementation and adoption of LLMs into the existing infrastructure for the evaluation of HPS Verbal Clinical Simulations. The concepts explored in this investigation may ultimately guide the development of prospective frameworks that integrate LLMs into HPS assessment grading and will be adaptable to the rapidly evolving nature of GenAI.

Pharmacy students as catalysts for public health in maternal health campaigns: A case study from Ghana

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Background: Maternal health remains a significant public health challenge in Ghana, with disparities in access to healthcare services, prenatal education, and postpartum care. Pharmacies and pharmacists are crucial in bridging these gaps by providing medication counselling, preventive care, and health education. However, integrating pharmacy students into public health initiatives targeting maternal health is still underutilised. This abstract presents insights from a recent global health rotation in Ghana, where pharmacy students participated in maternal health campaigns to support community health efforts and the Ghana Reproductive, Maternal, Newborn, Child, and Adolescent Health and Nutrition (RMNCAH&N) Strategic Plan.

Objective: This initiative aimed to explore how pharmacy students and schools of pharmacy can contribute to maternal health campaigns by leveraging their clinical and community engagement skills, and public health knowledge. The objectives were to enhance maternal health literacy, promote safe medication use during pregnancy and postpartum, and support healthcare teams in rural and underserved areas.

Method: Pharmacy students from the University of Maryland Eastern Shore (UMES) participated in a global health Advanced Pharmacy Practice Experience (APPE) rotation in Ghana, collaborating with rural healthcare providers and community leaders. Students were involved in:

- Conducting maternal health education sessions on breastfeeding
- Assisting in screenings and surveying women to assess their needs and challenges to see a healthcare provider
- Creating a public health campaign to address common misconceptions about maternal health.
- Engaging in community outreach through counselling and patient education at an outdoor market

Qualitative feedback was gathered through reflections from students and local stakeholders.

Results:

- Positive community reception: Women who attended the outdoor market campaign expressed gratitude for the accessible and practical health education.
- Student reflections on real-world impact: Pharmacy students reported that the experience reinforced the

importance of community engagement in healthcare. Many described the rotation as transformative, emphasising how working directly with expectant mothers deepened their understanding of public health challenges and inspired them to integrate global health initiatives into their future careers.

- Strengthened healthcare partnerships: A formal partnership was established with a rural clinic, allowing for continued pharmacy student involvement in maternal health outreach. This collaboration aims to increase engagement in prenatal education, medication counselling, and postnatal follow-ups, ensuring sustainability beyond the initial rotation.

Conclusion: Pharmacy students can play a vital role in advancing maternal health in Ghana. Their contributions extend beyond medication management to include public health education, early risk identification, and healthcare advocacy. Schools of pharmacy should integrate such experiences into their curricula to foster global health competencies and community impact. Future efforts should focus on expanding these initiatives, nurturing long-term collaborations with local health institutions, and assessing the long-term outcomes of student-led maternal health campaigns.

Fostering international perspectives in leadership for pharmacy students through Global Leadership Connections (GLCs)

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Background: Global Learning has been highlighted by the AAC&U (American Association of Colleges and Universities) as a "high impact practice" for students. With this in mind, colleges and universities involved in Collaborative Online International Learning (COIL) initiatives provide an innovative way for students to engage in dialogue with peers around the world. Through this program, collaborators at the University of Minnesota College of Pharmacy (UMN) and Monash University School of Pharmacy and Pharmaceutical Sciences (MU) designed Global Leadership Connections (GLCs) to encourage student discussions on leadership topics. Students were provided opportunities to build global partnerships and networks, practice leadership skills, engage in leadership conversations, gain international pharmacy insights, and enhance their academic and professional portfolio. The aim of the study was to explore factors which could help and/or hinder student connections across cultural and geographic boundaries.

Method: Faculty introduced the GLCs to pharmacy students involved in leadership courses (UMN) and scholar programs (MU). Students were divided into GLC groups. A student leader was responsible for connecting with the group to introduce and schedule a day/time to meet. Student participants were responsible for completing an Intention/Reflection (I/R) before and after their two, one-hour meetings, as well as brief audio/written journaling throughout the GLC experience. Qualitative student data were coded for thematic analysis.

Results: A total of six GLCs (3-4 students each group, 20 students total) met and discussed topics including networking, accountability, active listening, change management, confidence in leadership, and conflict in leadership and teams. I/R results concluded the experience enhanced student learning and/or their future practice as a healthcare professional. Students identified the factors that would make or break the initiative's success across cultural and geographic boundaries, discovered through autoethnography journaling. Noteworthy was the indication that several of the GLCs plan to stay connected in the future.

Conclusion: The Global Leadership Connection (GLC) successfully fostered meaningful international engagement amongst pharmacy students, enhancing their leadership skills, professional identity and global perspectives on the pharmacy profession. Preliminary feedback indicates that students valued the opportunity to connect across borders, reflect on leadership challenges and opportunities, and develop collaborative relationships that may extend beyond the program. Ultimately, this program can help expand student perspectives of the pharmacy profession, improve self-awareness, and contribute to students' professional identity formation.

An interim assessment of simulation intensity and demonstration of ability-based outcomes, transitional hand-off communication and professional assertion

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Background: Simulation based education (SBE) is beneficial in healthcare programmes, including pharmacy. However, the optimal intensity of SBE to achieve practice readiness remains undefined, which is an important consideration given the resource intensive nature of SBE. Within this pharmacy curriculum, completion of a clinical elective is mandatory. While the majority electively incorporate SBE, the intensity significantly varies from two to thirteen of fourteen semester sessions. This interim report of a larger study is the first to evaluate the relationship between SBE intensity and outcomes associated with practice readiness. The primary goals are to define the intensity of SBE associated with (1.)

reliably achieving all domains of selected accreditation outcomes associated with practice readiness; (2.) the ability to provide effective hand-off communication; and (3.) the ability to assert the pharmacist role during challenging inter-professional team dynamics.

Methods: An interim analysis of an IRB approved study comparing two 14-week clinical electives (one high-intensity and one medium-intensity) was performed. In both courses, students engage in direct simulated patient care as pharmacist teams collaborating with embedded interprofessional colleagues, concluding with transition of care hand-off using Situation-Background-Assessment-Recommendation (SBAR). Informed consent to use SBE recordings was acquired for all enrolled students. Recordings were qualitatively assessed by two researchers independently for degree to which 12 domains of the Accreditation Council for Pharmacy Education Standards 2016 outcomes for Standards 2 (essentials of practice and care), 3 (approach to practice and care), and 4 (personal and professional development) were demonstrated. These standards represent transferable essential skills and professional characteristics required for effective pharmacist practice. Effectiveness of communication of a proper SBAR was assessed. Additionally, ability to assert the pharmacist role when challenged on medication issues by embedded inter-professionals was assessed. Statistical analysis included Fisher's Exact and Mann Whitney U test.

Results: This interim analysis compared a high-intensity (n = 22 with 13 SBE sessions) and a medium-intensity (n = 31 with 6 SBE sessions) SBE course, with students divided into four care teams per course. For all three outcome standards, the median of ten sessions were required to achieve a median reviewer score of four ("meets expectations"). By the end of the 14-session semester, the teams in the medium-intensity course achieved a median reviewer score of four in only two of 12 evaluated domains, compared to 11 of 12 domains in the high-intensity course (p = 0.0006). In the high-intensity course, a median of seven sessions was required to correctly provide four out of five SBAR components. Finally, high-intensity course teams required ten sessions to fully assert their roles, compared to the medium-intensity course in which full role assertion was not achieved.

Conclusions: High-intensity simulation was associated with greater achievement of all 12 domains of the three outcome standards assessed compared to medium-intensity simulation. Students in the high-intensity course were able to fully assert themselves as medication experts with interprofessional colleagues and communicated effectively using SBAR, goals not achieved during medium-intensity exposure. High-intensity simulation offers advantages over medium-intensity simulation for preparing students for integrated clinical practice.

Development of a novel community pharmacy practice transformation fellowship

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Background: Purdue University College of Pharmacy has established itself as an academic leader focused on enhancing the role of community pharmacists. This has included the development of several new programs spanning the academic pillars of research, engagement, and teaching. Research capacity was expanded through establishment of the Medication Safety Research Network of Indiana (Rx-SafeNet), a statewide practice-based research network of community pharmacies, which is comprised of over 240 locations. Engagement efforts include collaboration with the Purdue Benefits office to expand access to community-pharmacist delivered medication therapy management, recognition by the American Association of Colleges of Pharmacy Academia-Community Transformation Pharmacy Collaborative as a Community Pharmacy Centre of Excellence, and collaboration with Community Pharmacy Enhanced Services Network of Indiana (CPESN-IN) to provide coaching to community pharmacies. Teaching innovations include the expansion of community pharmacy residency opportunities to a current total of five programs co-offered by Purdue, creation of a two-year Community Practice Research Fellowship in combination with a M.S. degree to develop a pipeline of clinician-scientists focused on community pharmacy, and development of a novel Doctor of Pharmacy Advanced Pharmacy Practice Experience (APPE) focused on community pharmacy practice transformation. In the United States, transforming community pharmacy practice from a product-centred business model to a patient care services business model is essential. Therefore, to build off the foundation established by the existing fellowship and APPE and create further impact as an academic leader, Purdue established a Community Pharmacy Practice Transformation Fellowship (CPPTF). The objective of this abstract is to describe the design of the novel fellowship and share early experiences to potentially benefit other academic institutions and foster the exchange of ideas.

Method: The CPPTF program is designed to provide pharmacists with the opportunity to contribute to community pharmacy practice transformation efforts. Fellows dedicate 50% of their effort to engaging community pharmacies in practice-based research within Rx-SafeNet. Another 40% is focused on direct patient care and contributing to practice advancement initiatives within CPESN-affiliated pharmacies. The remaining 10% of their time is committed to teaching and precepting student pharmacists.

Results: Two fellows started in July 2024. They have expanded Rx-SafeNet capacity by recruiting new pharmacy

members (n = 70 locations), conducting site visits with site coordinators (n = 48, 58% of all site coordinators as some represent multiple pharmacy locations), collaborating on grant applications (n = 2), and outreaching to researchers (n = 9 seminar presentations completed or currently scheduled) to foster new project opportunities for pharmacies to engage in. Through their work with CPESN-IN, they have contributed to the development of pharmacy service plans as well as to a grant application that secured funding for CPESN-IN to engage pharmacies in providing coaching support as they seek to increase the provision of two paid service opportunities. Finally, they have served as Assistant Preceptors to two APPE students as well as lectured on topics relevant to community pharmacy practice transformation.

Conclusion: Establishing a novel fellowship has resulted in tangible advancements in the community pharmacy practice transformation work at Purdue. This training program could serve as a model for other academic institutions.

Developing empathy to support pharmacist-patient shared decision making

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Background: Shared decision-making between patients and pharmacists is essential for the best development of medication plans that are both feasible and valuable from the patient's perspective and are, thus, plans most likely to be successfully implemented. Cultivating relationships to support open communication in a manner that facilitates shared decision-making requires emotional intelligence, which requires the ability to demonstrate empathy. For pharmacists to be at the forefront of care, especially in evolving spaces like ambulatory care, demonstrating empathy during patient interactions is essential for pharmacist care to be effective and meaningful. Simulation-based learning experiences (SBLE) provide practical and safe environments to develop affective skills such as empathy. The objective of this study is to evaluate the expression and integration of empathy from student and faculty perspectives during SBLE in an ambulatory care clinical elective course during simulated pharmacist-patient interactions.

Method: In a 2-credit, 28-hour topic-based clinical elective in ambulatory care, third-year doctor of pharmacy students develop direct patient care skills using patient-centred practice models, including the design, implementation, monitoring, evaluation, and adjustment of pharmaceutical care plans in a variety of common disease states as they develop as self-directed learners. To provide experience in developing both affective and clinical skills, faculty converted a case-based session involving chart review and clinical note writing to an SBLE, during which students reviewed the electronic health record, engaged in a clinic visit with the patient, and developed a pharmacist care plan. Using the Kiersma-Chen Empathy Scale (KCES), students assessed their perceptions of their ability to demonstrate empathy during the interaction while faculty separately evaluated the student pharmacist-patient interaction using the modified KCES. The primary endpoint was the change in student-reported KCES scores pre- to post-SBLE and the differences in student-self-perceived empathy compared to faculty-observed demonstration of empathy.

Results: All enrolled students (n = 19) participated in the SBLE. The median KCES score improved from 81 to 82 pre- to post-SBLE with a median increase of two (IQR = 4, p = 0.0324, [out of 105]). However, the median faculty-observed empathy score was lower than that reported by students (median difference of –7) (IQR = 12, p = 0.0004, [out of 35]).

Conclusion: Introducing a single SBLE allowed students to grow their confidence in conveying empathy to patients in a clinical encounter but did not guarantee that empathy translates to the patient. The difference between student and faculty KCES demonstrates the need for further SBLE activities designed to develop affective skills like empathy and clinical skills. Assessing the evolution of empathy as an element of emotional intelligence should be assessed over time, both across sessions within a course as well as across the student's progression across the curriculum. The differences between student and faculty perceptions of empathy suggest a need for more exposure to SBLE, allowing the growth of empathetic communication strategies to enable student pharmacists to be practice-ready and at the forefront of partnering with patients to meet healthcare challenges.

Exploring the impact of curriculum changes on trainee development in Dutch workplace-based education using self-determination theory

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Background: Workplace-based training programmes are often the final step for pharmacists before they begin practising independently. In the workplace, trainees can develop relevant knowledge, skills, and attitudes in an authentic, contextually rich environment. Additionally, their competencies can be assessed in a real-world context. Research using self-determination theory shows that the performance and well-being of trainees are influenced by the

satisfaction of their basic psychological needs for competence, autonomy, and relatedness.

Objective: It is hypothesised that an educational institute can influence the fulfilment of the basic psychological needs of trainees in the workplace through the structure and content of the curriculum, including the assessment programme, and through workplace support.

Method: Using self-determination theory as a lens, a qualitative analysis was conducted of the anticipated effects of changes in the Dutch postgraduate community pharmacy specialisation programme on the competence, autonomy, and relatedness of trainees. We utilised research findings from health professions literature to underpin our reflections.

Results: Twelve curricular changes were identified in the content, structure, and workplace support which may affect the competence, autonomy, and/or relatedness of trainees. Ten changes were expected to have positive effects, such as updating the competency framework (e.g., adding new competencies related to their leadership role), increasing the freedom in seeking feedback (e.g., allowing trainees to choose their feedback sources), and appointing tutors for longitudinal support. Two changes were expected to have mixed effects: defining Entrustable Professional Activities (EPAs) at a higher level of abstraction, and the installation of a clinical competency committee to make summative judgements. Although there are findings in the literature to support these expected effects, there is no context-specific evidence to support the expected outcomes.

Conclusion: The findings suggest it is valuable to use a self-determination theory lens to investigate the (possible) effects of curricular changes in workplace-based pharmacy education on the basic psychological needs of trainees. Future empirical research should focus on collecting context-specific data to validate the anticipated effects of these curricular changes and provide robust evidence for their effectiveness.

Carving a path to student success: Connecting admissions data to postgraduate outcomes using artificial intelligence

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Background: Artificial intelligence (AI) holds transformative potential and power in pharmacy education by creating the ability to personalise students' experiences. For the last three years, the University of Southern California (USC) has been using artificial intelligence to help inform faculty and students of the factors that can predict postgraduate outcomes. This model is referred to as AI-SiPS (Artificial Intelligence-Success in Pharmacy School). Previous AI-SiPS research has identified the optimal factors for matching into competitive residency programs, including grade point average (GPA), rotation order, and work hours. A new aim of AI-SiPS was to extend this model to include student admission data and its potential impact on postgraduate outcomes.

Method: AI-SiPS is built on the KNIME (Konstanz Information Miner) platform and includes data from the classes of 2019-2024. This model includes the evaluation and relationship of grades, rotations, work hours, and admissions data with postgraduate outcomes, including residency match rates. Postgraduate outcomes were categorised into the three broad areas of: Residency (R), Industry (I), or Community (Hospital) C(H) and referred to as the "RIC(H)" outcomes. Students' admission data were based on their grand ranking and score, broadly based on academic quality (50%) and communication skills (50%) from both their application and interview. Students were categorised into five admission tiers from 1 (highest) to 5 (lowest) to determine if admission prospects had any correlation with actual student success outcomes upon graduation.

Results: A total of 1,048 students were categorised into admission tiers 1+2 (n = 155), 3 (n = 605), and 4+5 (n = 288). The RIC(H) outcomes rates using these tiers were "R" for tiers 1+2 (57.4%) > 3 (47.1%) > 4+5 (40.0%); "I" for tiers 1+2 (22.1%) > 3 (12.1%) > 4+5 (6.3%), and "C(H)" for tiers 4+5 (53.7%) > 3 (40.8%) > 1+2 (20.6%). Of the 1,048 students, 489 attempted to match into a residency program. Match rates were also found to correlate with students' original admission tiers. While the overall residency match rate was 72.2%, the match rate based on tiers was 81.1% for tiers 1+2, 75.7% for tier 3, and 56.5% for tiers 4+5. Based on PharmD GPA, match rates were 78.5% (3.5-4.0), 64.1% (3.0-<3.5), and 37.5% (<3.0). Even amongst the students with a PharmD GPA of 3.5-4.0, match rates were still higher for students from tiers 1-2 (89.6%), compared to students from tiers 4+5 (66.1%), showing that residency match rates were more dependent on one's original admission tier than on one's GPA in pharmacy school.

Conclusion: These results suggest that the tier in which students are assigned to during the admissions process can partly predict graduate placement. For RIC(H) outcomes, students in a higher admissions tier tended to go into residency or industry. As expected, PharmD GPA was a key determinant of residency matching. However, students with the same GPA (3.5-4.0) in pharmacy school, still had different residency match rates tied to their original admission tiers.

Modelling and factors contributing to the demography of pharmacists in France until 2050

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Background: Faced with the growing difficulties in recruiting pharmacists and the large number of vacancies in the second year of their studies, the French Chamber of Pharmacists (FCP) has conducted a study on demographic trends. It aims to develop a predictive model for the demography of pharmacists in France, all professions combined, by 2050 and to identify the factors influencing it.

Method: A statistical microsimulation model has been chosen to integrate the careers of pharmacists from their training to their retirement. Data are fed on one hand from the SISE database (the Ministry of Education's system designed to track and manage student information throughout their academic journey), the number of published internships, the results of a university survey for students and on the other hand from the registrations of practicing pharmacists at the FCP. Several parameters are taken into account: length of training, changes of profession within pharmacy, proportion of trained pharmacists registered with the FCP, career dynamics, number of registered pharmacists trained abroad, etc. The model also takes into account the average age of entry into studies, the numerus apertus, the annual number of vacancies and the drop-out rate during studies, and the number of internship places. The validity of the model was studied by comparing simulated data with existing observed data over three years (2012, 2017, 2022).

Results: The model is validated by a reliable reproduction between the data obtained and those observed (< 5%). The results predict a decline in the number of pharmacists between 2022 (73,500) and 2030 (71,791), followed by growth until 2050 (74,312), i.e. an increase of one percent between 2022 and 2050. The trend by pharmaceutical profession is heterogeneous: there is a decrease in numbers for wholesalers, clinical biologists and pharmacists practising overseas and an increase in numbers for industrial pharmacists and hospital pharmacists, numbers of community pharmacists remain stable. Two main factors influence the results: the number of vacancies in the second year of pharmacy studies and the number of internships. Maintaining the number of vacancies at 471 (data for the start of the 2023 academic year) would result in a loss of 1,500 pharmacists in 2050 (-2%). An increase in the number of student places of 5%/five years would increase the number of pharmacists by 10 % in 2050. It is worth noting that the retirement age has no influence on demographics.

Conclusion: Although the model has its limitations due to uncertainties in the behaviour of individuals and the number of registrants per profession, it highlights the factors impacting demographics and provides a reliable snapshot of the profession's evolution. The model is flexible and can be used to test different scenarios. Further work on the attractiveness of the profession will require the FCP to objectivise the needs of the population and of public health, which must be set against these demographic projections.

The Southern California outreach for pharmacy education: A pharmacy and pharmaceutical sciences career pathways program for secondary school students

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Background: An educational pathways program in pharmacy and pharmaceutical sciences was implemented for secondary students grades nine through 12 from local Los Angeles partner secondary schools. It consisted of three parts – secondary school outreach, a six session intensive called the "Saturday Academy," and a five month structured 1:1 mentorship program. The objectives of this study are to evaluate the impact of this program on the participants' 1) awareness of and interest in career pathways in pharmacy and pharmaceutical sciences, and 2) self-perceived professional, educational, and career-related confidence.

Method: This is a retrospective cohort survey study with two separate questionnaires, administered pre/post the Saturday Academy and mentorship programs in 2022 and 2023. For Saturday Academy, the survey was anonymous and consisted of 5 five-point Likert scale questions and one open-ended question. The five-point scale was condensed to a 3-point ordinal scale for data analysis. Pre/post results for each question were analysed using a two-tailed F-Test for variance, followed by a two sample t-test, assuming either equal or unequal variances. Qualitative data was analysed using inductive thematic analysis. For the mentorship program, respondents ranked their self-perceived level of professional and interpersonal skills on a 10-point Likert scale. Inclusion criteria was completion of the Saturday Academy, attendance at a minimum of two meetings with a mentor, and completion of both the pre and post surveys. Data was analysed using descriptive statistics. IRB approval was obtained prior to initiating the study.

Results: Saturday Academy: Thirty-five of 47 students (74%) and 23 of 47 students (49%) completed pre/post surveys in the 2022 and 2023 cohorts, respectively. Participants reported a 29% increase in confidence in their knowledge of career options in pharmacy and pharmaceutical sciences ($p < 0.0001$), and a 29% increase in their confidence in knowledge of the steps needed to pursue a career in pharmacy and

pharmaceutical sciences ($p < 0.001$). Participants reported the following themes as areas of growth and/or learning from the program (1) pharmacy and pharmaceutical science career pathways (65%), (2) professional development (40%), (3) drug discovery and development (35%), and (4) pharmacist roles and responsibilities (40%). Mentorship: There was a total of ten respondents, with a survey response rate of 62.5% (2022) and 50% (2023). There was a statistically significant increase from baseline in the categories of written communication, professionalism, and responsibility (p-value: 0.033, 0.026, 0.047 respectively). There was also a statistically significant increase in interacting with professionals, interviewing, asking questions, and applying to college (p-value: 0.004, 0.001, 0.0009, 0.013 respectively).

Conclusion: Career pathways programs such as the one implemented and described in this study can increase awareness of and interest in careers in pharmacy and pharmaceutical sciences, and a structured mentorship program can significantly enhance self-perceived confidence in professional, educational, and career-related domains for secondary school students.

Evaluating the impact of a pharmacy administration and leadership short course and microcredential targeting new hospital pharmacy leaders in the Western Pacific

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Background: Pharmacy administrators and leaders are essential to ensuring quality patient care and organisational success. However, many pharmacists promoted to leadership positions lack formal training in administration and leadership, leading to gaps in knowledge, skills, and confidence. While some seek to enhance their skills through independent learning or certificate programmes, these often do not provide comprehensive pharmacy leadership training. Pursuing a master's degree may be impractical due to time and financial constraints. Recognising this need, the University of North Carolina (UNC) Eshelman School of Pharmacy, in partnership with Monash Health and Monash University, developed a Pharmacy Administration and Leadership (PAL) Short Course and Microcredential for emerging hospital pharmacy leaders in Melbourne, Australia. This study aims to assess the impact of this programme on participants' confidence levels, skill acquisition, and perceived value in leadership and administration.

Method: This PAL Short Course and Microcredential, the second cohort completed by the UNC-Monash Partnership, commenced in November 2024 and will conclude in July 2025, enrolling 23 hospital pharmacy leaders from three hospitals in Melbourne, Australia. The 12-module programme includes two in-person weekend workshops at the start and end, with the remaining sessions delivered synchronously via live video conferencing, utilizing a flipped classroom pedagogical model. Participants engage in discussions, complete assignments, and develop leadership competencies throughout the programme. A pre- and post-course survey is being conducted to evaluate participants' demographics, perceived confidence levels in pharmacy administration and leadership, past business and management education, interest in PAL topics, and perceived job performance. Descriptive statistics and paired t-tests will be employed to assess changes over the course duration.

Results: Participants had an average of 11.7 years (SD = 4.2) of pharmacy experience, with 7.5 years (SD = 3.8) tenure at their respective hospital and 3.7 years (SD = 2.9) in leadership roles. Despite their leadership roles, 65.2% (n = 15) had no prior formal business or management education. However, 47.8% (n = 11) actively pursued additional training before the programme's development, emphasising their commitment and desire for skill development within this specialised field. Baseline confidence in specified PAL tasks varied, with participants expressing lowest confidence in financial management and creating business plans. Key areas of interest included team leadership, change management, and financial stewardship, aligning with course objectives. Preliminary feedback suggests that sessions on strategic planning, business plan development, and high-impact leadership strategies were particularly beneficial. The post-course survey will assess confidence changes, skill acquisition, and knowledge application, with early indications highlighting improved engagement and leadership preparedness among participants.

Conclusion: Preliminary findings indicate that participants in the PAL Short Course and Microcredential hope it will address their professional development needs to develop into successful pharmacy administrators and leaders, by fostering confidence and capability in leadership roles. We hope to equip the participants with essential leadership and management competencies, building a competent and innovative pharmacy workforce at their practice sites capable of driving positive change in healthcare delivery. Continued investment in such initiatives is crucial to sustaining leadership talent and enhancing patient care outcomes, ultimately advancing the pharmacy profession.

Practice-ready, team-ready, and social determinants of health-ready: An interprofessional education session with pharmacy, physical therapy, and physician assistant students

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Background: Interprofessional education is included in many health professions accreditation standards and Interprofessional Education Collaborative (IPEC) Core Competencies are endorsed by many professional societies. Interprofessional education is common at Samford University College of Health Sciences. One annual experience, starting in 2022, included second-year pharmacy, physical therapy, and physician assistant students. The objectives of the session were to 1) provide an opportunity for students from three distinct professions to learn about, from, and with each other as they worked as a team to develop recommendations for a patient case; 2) enable students from these professions to see the benefits of interprofessional care as they applied what they had been learning in their respective programs; and, 3) demonstrate how faculty model the thinking processes for addressing aspects of patient care from their profession's perspective. The purpose of this research was to describe the perception of the experience by participants and to determine if there was a difference by years or type of profession represented.

Method: An inter-professional paper-based case was developed by faculty members representing pharmacy, physical therapy, and physician assistant programs. Students from these professions sat in ~ 35 teams in one large space. A faculty member started each session with a review of interprofessional education competencies and social determinants of health. Team members then introduced themselves to their teams, offered a myth about their profession and then worked collaboratively on the case. After about 30 minutes of teamwork, faculty from each profession modelled inter-professional practice by providing responses to moderated questions to the entire cohort. This method enabled students to compare their team discussion to the answers offered by faculty. At the conclusion, students were asked to complete a brief electronic survey. From 2022-2024, students were asked about the level of agreement with being more practice-ready or team-ready. Starting in 2023, participants were also asked about their ability to recognise social determinants of health when this topic was also included. Each response was based on a five-item Likert scale. Descriptive statistics were used to summarise the data set. Comparisons of medians were conducted across years or programs using non-parametric tests as appropriate.

Results: There were 419 responses (pharmacy n = 219, physical therapy n = 103, physician assistant n=96) across all three years (2022, n = 118; 2023, n = 154; 2024, n = 147). Ratings for improved confidence with being practice-ready were 92.6% positive (strongly agree n = 246, 58.7%; somewhat agree n = 142, 33.9%). Similarly, ratings for improved confidence in being team-ready was 94.5% positive (strongly agree n = 309, 73.7%; somewhat agree n = 87, 20.8%). Ratings for improved confidence with social determinants of health were 96.7% positive (strongly agree n = 224, 74.9%; somewhat agree n = 65, 21.7%). Responses were similar between programs and across years except one. Physical therapy students rating somewhat agreed or strongly agreed (89.3%) was less compared with pharmacy (96.3%) or physician assistant (96.9%) for the team ready question ($p = 0.008$ and $p = 0.015$, respectively).

Conclusion: These experiences with pharmacy, physical therapy, and physician assistant students yielded a positive perception of in their feeling more team-ready, practice-ready, and social determinants of health-ready.

Pharmacists in educational research: A collaborative scholarship approach

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Background: As pharmacy education evolves to prepare students for patient-centred care, faculty members face increasing demands to integrate student centred teaching methods while also engaging in educational research. However, many educators lack structured support in designing, implementing, and evaluating pedagogical innovations, limiting their ability to engage in the Scholarship of Teaching and Learning (SoTL) (1). Traditional faculty development programs, often delivered through one-off workshops, have shown limited impact in transforming teaching practice, particularly when disconnected from educators' disciplinary contexts. In contrast, collaborative, research-informed faculty development models, such as the Collaborative Scholarship Model (2), provide a more sustainable approach by embedding educational research within everyday teaching practice. This model fosters long-term engagement with SoTL, interdisciplinary collaboration, and continuous pedagogical improvement, ensuring that faculty are active contributors to advancing pharmacy education.

Objective: The FREMFARM project at the Centre for Pharmacy, UiB, applies a collaborative scholarship approach to support pharmacy educators in developing, evaluating, and researching student-active teaching strategies. It

enhances students' reflection, communication, and professional empathy while strengthening faculty capacity in educational research. The project unites educators, students, and an educational developer to design and assess innovative teaching methods aligned with curricular goals.

Methods: Following the Collaborative Scholarship Model, an educational developer worked closely with pharmacy educators to design and evaluate pedagogical innovations. The process began with consultations, during which course plans were reviewed to identify key learning objectives and areas for improvement. This was followed by classroom observations to understand student engagement, teaching strategies, and learning barriers. Based on these insights, the educational developer and faculty members co-developed targeted interventions, such as Debates, Problem-Based Learning (PBL), and Reflective Audio Notes. To ensure rigorous evaluation, the educational developer and faculty co-designed assessment tools and data collection instruments, including structured student feedback mechanisms, observational protocols, and qualitative analysis frameworks. The evaluation was conducted jointly, with faculty and the educational developer analysing the collected data to assess the interventions' impact on student learning and engagement.

Results: The project fostered the creation of a faculty-driven Community of Practice (CoP), where educators engaged in continuous knowledge-sharing and collaborative research. Faculty members reported increased ability to critically assess and refine their teaching methods, while students demonstrated greater engagement, enhanced communication skills, and improved professional reflection. The project also contributed to establishing a SoTL culture within the faculty, where educators are now independently conducting teaching-focused research, publishing findings, and sharing best practices nationally and internationally. The dissemination of project results has expanded professional collaborations beyond the institution, reinforcing pharmacy educators' role as both teachers and researchers.

Conclusion: The FREMFARM project illustrates how structured collaboration among educators, students, and an educational developer can integrate SoTL into pharmacy education. By embedding research-driven teaching innovations, this model has strengthened faculty engagement, improved student learning, and fostered sustainable educational research. Collaborative scholarship emerges as a scalable framework for advancing pharmacy education and positioning faculty as both educators and scholars.

Students' acceptance and use of generative AI in pharmacy education: International cross-sectional survey based on the extended unified theory of acceptance and use of technology

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Background: Generative artificial intelligence (GenAI) represents a transformative technological innovation in higher education, with significant potential implications for pharmacy curriculum and learning processes. This international study aimed to evaluate pharmacy students' acceptance and use of GenAI tools from nine countries using the Extended Unified Theory of Acceptance and Use of Technology (UTAUT) framework.

Methods: A cross-sectional survey involved pharmacy students from nine countries across Asia, the Middle East, Africa, and Europe during the first half of 2024. The survey comprised four key sections: demographic information, frequency of GenAI tool usage, interest in integrating GenAI into the current curriculum, and the acceptance and utilisation of a validated questionnaire based on the Extended UTAUT Model. After appropriate translation and cultural adaptation, exploratory factor analysis was utilised to identify the extended UTAUT key factors influencing the use and acceptance of GenAI in pharmacy education.

Results: Participants (N = 2009) demographics indicated a majority female sample (68.4%) with a mean age of 22.6 years. ChatGPT and Quillbot were the most utilised GenAI tools, with 55% to 70% of students using them for learning enhancement. Approximately 20% exhibited over-reliance, raising ethical concerns. About 60% of participants had no formal GenAI-related curriculum, and while 45% expressed a need for practical skills, only 10% highlighted legal and ethical issues. The exploratory factor analysis identified three distinct factors. Factor 1: Utility-driven adoption, including constructs such as performance Expectation (PE), Effort Expectation (EE), Hedonic Motivation (HM), and Facilitating Conditions (FC). Factor 2: Affordability and Habitual

Integration, including constructs Such as price Value (PV), Habit (HT), and Behavioral Intention (BI). Factor 3: Social Influence, including Social Influence (SI) construct only. Overall, Students exhibited the highest agreement regarding performance expectancy (3.91±0.86) and hedonic motivation (3.85±0.89), indicating that they find generative AI tools useful and enjoyable for completing academic tasks. In contrast, habit (3.18±1.09) and price value (3.39±0.96) received the lowest levels of agreement, suggesting that these tools have not yet become habitual and raising concerns about their affordability.

Conclusions: This international study highlights pharmacy students' perspectives on GenAI tools, revealing gaps in ethical awareness, affordability, and structured integration. It advocates for a proactive, context-specific strategy to align technological innovation with pedagogical integrity.

Global perspectives of educators and academic leaders on integrating computer-based simulation into pharmacy education

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Background: Computer-based simulation (CBS) helps pharmacy students develop critical competencies, such as clinical reasoning, patient communication, and interprofessional collaboration, essential for modern practice. CBS allows learners to engage anytime, anywhere, with consistent scenarios tailored to individual needs, and can scale to any cohort size. Despite its educational advantages, CBS utilisation in pharmacy education remains limited. This study aimed to fill these gaps by investigating pharmacy education leaders' and educators' perspectives through semi-structured interviews. This research aimed to deepen understanding of the barriers and facilitators influencing CBS adoption in pharmacy education, offering insights to improve CBS integration.

Method: An exploratory qualitative study was conducted using semi-structured interviews to capture insights from pharmacy educators and academic leaders. Out of 41 invited participants, 25 interview responses were analysed using thematic analysis, identifying key themes related to the implementation barriers, facilitators, and future directions for CBS in pharmacy education.

Results: The study included 25 participants from 21 countries. While educators and academic leaders identified similar themes, their emphasis differed; educators primarily highlighted practical difficulties encountered in classroom implementation, whereas leaders focused on broader strategic and institutional priorities. Major barriers included workload pressures, limited resources, resistance to change, and doubts regarding CBS's efficacy in achieving targeted learning outcomes. Conversely, key facilitators encompassed robust institutional support, alignment with educational objectives, and advocacy from dedicated champions. Future recommendations emphasised interdisciplinary collaboration, strategic institutional partnerships, and the integration of artificial intelligence (AI) to enhance the scalability, interactivity, and personalisation of CBS tools.

Conclusion: This study highlights critical barriers and facilitators for the implementation of CBS in pharmacy practice education, pointing to AI's transformative capacity as a solution to these challenges. AI was particularly identified as a valuable asset for automating assessments, scenario generation, reducing educator workloads, and optimising educational outcomes. Future initiatives should emphasise scalable and evidence-based approaches to fully realise the educational benefits of CBS.

Beyond the Clinical training: Integrating Whole Health Strategies into International Pharmacy APPEs

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Background: Pharmacists play an integral role in patient care, not only through medication management but also by incorporating wellness strategies to support overall health for patients. Pharmacy curricula often lack didactic and experiential opportunities for students to learn and practice whole health competencies for themselves. PUCOP has four international practice sites in Colombia, Kenya, London and Wales. Student pharmacists spend four or eight weeks at these international sites participating in clinical care advanced pharmacy practice experiences (I-APPEs). The primary objective of this project was to identify and implement whole health strategies into the international APPE curriculum.

Methods: This pilot project was conducted across the pre-departure course and during the I-APPEs. Faculty identified activities within each of the dimension of wellness: moving the body, surroundings, personal development, food & drink, recharge, family, friends & co-workers, spirit & soul and the power of the mind. Students also completed a personal wellness inventory to establish their own areas of focus. To better support the implementation of wellness, faculty leaders engaged in whole health practices and exploration before introducing these topics into the didactic course. An introduction to wellness practices and the completion of the inventory were part of the pre-departure course grade but incorporation of wellness practices was optional during the I-APPE.

Results: Students completed a university developed wellness inventory. Inventory results were individual and confidential, but students received course points for completion. The pre-departure course included a variety of wellness curriculum including: mindfulness, self-care, emotional hot button management, communication style training, intercultural conflict style identification, and whole brain training. During I-APPEs students could choose to incorporate a variety of additional whole health activities. Some of the areas explored included: continuous blood glucose monitor, exercise and fitness, pharmacogenetics, sleep habits, local cultural exploration and exploration of work/life balance. Weekly I-APPE debriefs, led by program faculty, included opportunities for reflection on whole practices with strategic questions focused on challenges, successes, and impact. Next steps include a formal assessment of student feedback on the didactic whole health curriculum and the impact of wellness practices during I-APPEs.

Conclusion: Incorporating whole health strategies into I-APPEs presents a valuable opportunity to enhance pharmacy education by fostering greater personal awareness of individualised health and wellness strategies for learners. This model offers a replicable framework for other institutions and I-APPEs seeking to integrate wellness and self-care practices into experiential education. Future research will explore the long-term impact of these experiences on professional practice. Expanding whole health education beyond international experiences to include domestic APPEs represents an opportunity to equip future pharmacists with the tools needed to support both their own well-being and that of their patients.

Supporting neurodiversity especially in the preparation for licensure exams

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Background: Neurodiversity is the term used to designate the variation in human thinking and information processing. Autism is the most notable form of neurodivergence, however, there are many other types, such as Attention Deficit Hyperactivity Disorder (ADHD), Dyslexia, Obsessive-Compulsive Disorder (OCD), and Tourette Syndrome. Recent studies identify the ADHD prevalence in adolescents at 10% approximately, and in pharmacy students may be around 20% 1,2. Neurodiversity impacts focus, motivation, and memory, all skills needed to study in general, but more intensely in studying for licensure and certification exams. As schools are developing programs to support student success, belonging, and approaches to studying, taking various forms of neurodivergence into account is important to ensure everyone is appropriately prepared. While there is published information on neurodiversity in popular publications for the business workplace and education areas, including some in other health professions, the literature on the role of neurodiversity in pharmacy education and in studying for licensure/certification exams is scarce. The purpose of this review was to identify literature and documentation for supporting students who identify a neurodiverse in creating study strategies for licensing and certification examinations.

Methods: A literature review was conducted through PubMed, Google Scholar, ProQuest, and ERIC, guided by the following search terms: Neurodiversity, Neurodivergent, Neurotypical, Autism spectrum disorder, ADHD, Dyscalculia, Dysgraphia, Dyslexia, Dyspraxia, OCD, Sensory Processing Disorder, Tourette's, Social Anxiety, Test anxiety, licensure, certification exam preparation, accommodations, exam accommodations, pharmacy, medicine and nursing. An additional search was performed to expand on primary Neurodiversity literature using the Boolean operator AND with the terms: pedagogy, andragogy, and heutagogy. Only full-length, free-access, English text articles were included. Articles that did not provide study strategies were not included.

Results: For our search terms, limited resources were available and no literature was found specifically around studying and study strategies for licensure/certification exam preparation. Resources for successfully completing a course of study, such as medical school, are available. As are resources for applying for accommodations for licensure/certification exams however, these are dated. These findings are significant in the fact that our students are needing support in this area and the lack of literature highlights the struggles educators may be having in assisting this group of learners. This gap also signifies a need that even our learners are struggling to identify appropriate approaches as well given the lack of literature in scholarly and lay-press publications.

Conclusions: With upwards of 20% of pharmacist trainees identifying as neurodiverse and challenges with licensure passing in general, the paucity of existing literature highlights a large need within the academy and great opportunity for the development of sound strategies and programs to aid this cohort of learners. After completion of this literature review and its finding, this group of authors are currently working on developing resources to be implemented and assessed. The authors will be reaching out for additional collaborators for implementation and assessment of perceived effectiveness.

Pharmacy students' experiences in an interprofessional hospital ward simulation: Readiness for collaborative practice

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Background: Inter-professional education (IPE) enhances collaboration among healthcare professionals to improve patient outcomes, with simulation-based learning providing an effective training method. Despite extensive literature on interprofessional simulations involving medical and nursing students, little research has examined pharmacy students in this setting. In 2024, for the first time, Master of Pharmacy students at the University of Western Australia (UWA) participated in an interprofessional hospital ward simulation alongside final-year nursing students from Edith Cowan University (ECU) and UWA medical students. The simulation replicated a real hospital ward, with patient beds, clinical equipment, and electronic medication administration systems. Students assumed professional roles in responding to evolving clinical scenarios, requiring collaborative decision-making and interprofessional communication. Understanding pharmacy students' experiences in this setting is critical for evaluating the role of simulation in preparing them for interprofessional practice and enhancing their confidence in collaborative healthcare delivery. This study aimed to explore pharmacy students' experiences in an interprofessional hospital ward simulation. Specific objectives were to assess changes in students' readiness for interprofessional learning (IPL), compare the simulation with hospital placements, and analyse their self-reported skill development and feedback.

Methods: A pre-post-test study design was used, employing an online questionnaire incorporating the Readiness for Interprofessional Learning Scale (RIPLS) and additional closed- and open-ended questions. Pharmacy students completed the survey before and after the simulation to assess changes in attitudes and perceptions toward interprofessional learning. Quantitative data were analysed using descriptive statistics, while qualitative responses were examined using thematic content analysis.

Results: Of the 31 pharmacy students who attended the simulation, 18 completed both the pre- and post-simulation questionnaires (response rate: 58%). The mean overall RIPLS score increased from 80.5 (± 0.88) pre-simulation to 85.1 (± 0.75) post-simulation, reflecting enhanced readiness for IPL. All subscale mean totals increased from pre-simulation to post-simulation. Regarding skill development, 100% of students reported gaining at least one soft skill. The most cited skills were communication (77.8%), time management (72.2%), and prioritisation (66.6%). Additionally, 33.3% of students reported developing technical pharmacy skills such as medication chart review and clinical problem-solving. Student feedback indicated that the simulation was more hands-on and interactive compared to traditional hospital placements, where students primarily observe clinical activities. The majority (88.9%) of students enjoyed the simulation, and 100% agreed it should be incorporated into the Master of Pharmacy curriculum.

Conclusion: The hospital ward simulation was a valuable learning experience for pharmacy students, significantly improving their readiness for IPL and fostering both soft and technical skill development. The structured yet realistic environment allowed students to bridge the gap between theory and practice more effectively than traditional hospital placements. This study represents the first phase of an ongoing evaluation of interprofessional simulations involving pharmacy students. A second cohort of students in 2025 will contribute additional data, enabling a broader analysis of the long-term educational impact of this simulation model.

Reshaping pharmacy education: Addressing curriculum overload for future-ready graduates

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Background: The increasing complexity of pharmacy practice and evolving competency requirements have contributed to curriculum overload in our intensive two-year Master of Pharmacy program, which comprises 1,800 hours of class and experiential contact time. While the curriculum meets accreditation standards, the level of detail in some topics has remained the same despite decreasing relevance to contemporary pharmacy practice, leading to an imbalance in content focus. Additionally, with the expanding scope of pharmacist roles, the curriculum must be prioritised to ensure emphasis on relevant areas and allow adequate time for emerging areas rather than adding to an already oversaturated program. In recent years, the scope of pharmacy practice in Australia has expanded significantly. Pharmacists are now authorised to prescribe for selected conditions, administer vaccines and injectable medicines, and engage in partnered prescribing within hospitals. As these roles are now expected of generalist pharmacists, they must be incorporated into the curriculum. Recognising these evolving demands, we undertook a structured curriculum review to refine content and align learning outcomes with the Australian Pharmacy Council (APC) Performance Outcomes Framework and Learning Domains. The primary aim of this curriculum review was to reduce redundancies, ensure appropriate depth and emphasis of content, and strategically

prioritise areas most relevant to contemporary practice. Differing opinions among academics necessitated a structured, evidence-based approach to ensure consensus.

Methods: A multi-phase curriculum review was undertaken, incorporating stakeholder consultation, structured working group analysis, and curriculum refinement. The first phase involved an academic workshop to assess the healthcare environment, patient needs, and system expectations, defining key skills for a generalist pharmacist and exploring how to embed them into the curriculum. The second phase centred on three discipline-specific working groups, which formed the core of the review. External members were strategically selected from hospital, community, and industry pharmacy to ensure diverse perspectives. These groups provided critical input on relevance, depth, and structure, identifying redundant material, emerging priority areas, and opportunities for consolidation. The working groups reviewed Pharmacotherapy and Pharmacy Practice, Pharmaceutics, and Chemistry and Pharmacology. The third phase involved collating feedback for unit coordinators (UCs) to identify teaching hour reductions while preserving essential knowledge and professional competency alignment. The current step integrates findings into medicines management and patient care modules, advancing a systems-based approach embedding all pharmacy disciplines in real-world contexts. The curriculum team continues to refine content, implementing further reductions based on feedback and accreditation standards.

Results: The curriculum review resulted in an immediate ten percent reduction in lecture, lab, and tutorial content, ensuring redundancies were removed while prioritizing contemporary practice needs. This process improved the distribution of teaching hours, balancing the depth and breadth of knowledge while avoiding excessive cognitive load. An additional ten percent of content has been flagged for reduction as we transition to systems-based teaching.

Conclusion: This curriculum review streamlined content delivery while prioritising contemporary pharmacist roles. By removing redundancies and aligning learning objectives with expanded responsibilities, the program is optimised for evolving professional needs. This structured, evidence-based approach ensures students are well-prepared for emerging pharmacist roles.

Embedding teaching on health inequities within the undergraduate pharmacy curriculum to enhance relevance and insight

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Background: De Montfort University has a sustained track record at working collaboratively to tackle global issues, as the United Nations Sustainable Development Goal (UNSDG) chair for UNSDG 16- Peace, Justice and strong institutions since 2018 and now as chair for UNSDG 11- Sustainable Cities and Communities. The university is committed to embedding all 17 goals across its curriculum, informing all aspects of teaching, learning and research. Recognising situations of health inequality and inequity in communities and individuals and the impact these have on health outcomes is a priority for healthcare professionals and organisations to ensure equitable access to healthcare for all. The aim was to develop and embed a theme of teaching throughout all four years of the MPharm curriculum to provide an insight into the scale and impact of health inequities and to prompt students to actively consider what steps they can take to minimise these and to improve access and relevance of care for all people.

Method: Teaching was developed using a spiral approach, with concepts being revisited and increasing in complexity as students progress through the programme. Starting in year 1, students are introduced to the concept of person-centred care and the importance of utilising a biopsychosocial approach to healthcare, considering aspects such as gender and ethnicity when making decisions about their health. In Year 2 in an infectious diseases module, students are introduced to health inequities on a global scale and evaluate data from the WHO Health Observatory related to life expectancy and infectious diseases. Within a module on cardiovascular disease they then consider aspects of inequity within the UK, exploring the factors impacting the different rates of cardiovascular disease in the north and south of England. In workshops they then apply this understanding as they practice providing personalised lifestyle advice to patients. This learning is then extended into Year 3 as students research and consider inequities experienced in specific groups, such as gender-based differences, the impact of homelessness, neurodivergence and ethnicity. They then peer teach this information to their classmates and consider practical strategies to improve access to healthcare for these groups. Year 4 focusses on the application of this insight and understanding as they develop care plans and consider the clinical decision making process for diverse patients.

Results: This embedded programme of teaching has been successfully implemented and enhanced following feedback from students and through peer observation. Students have found the sessions insightful, and those from minoritised groups found it validating to share their personal experience of discrimination and inequity. Placement supervisors have

provided feedback that students show respect, compassion and understanding towards their patients.

Conclusion: It is essential for pharmacy students to have an insight into situations of health inequity on a global, national and local scale so they can provide equitable, inclusive and accessible care. An embedded teaching strategy aligns with therapeutic topics being taught, enhancing student perceptions of relevance and facilitates application to practice.

Bringing real-world cases to the classroom: Enhancing pharmacy education with Case-Based Learning (CBL)

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Background: Founded in 1859 as the Chicago College of Pharmacy, the University of Illinois Chicago (UIC) Retzky College of Pharmacy is one of the oldest in the United States. The college has contributed to the national advancement of clinical pharmacy practice by providing excellence in pharmacy education and training, as well as providing pharmacy services and serving as a centre for excellence for patients requiring medication therapy. At the UIC Retzky College of Pharmacy, student pharmacists are expected to complete a series of didactic courses in Pathophysiology, Drug Action, & Therapeutics (PDAT). These courses intend to cover a variety of clinical conditions and disease states. To foster active learning, a case-based approach is employed with a strong focus on the thought process required to develop a pharmaceutical care plan.

Method: Case-Based Learning (CBL), an active learning strategy using real-world scenarios and interactive discussion, has been incorporated into the anticoagulation lectures for one of the courses in the PDAT series for P2 student pharmacists. After five hours of didactic lectures on the pathophysiology of clotting disorders, pharmacology of oral anticoagulants, and application of anticoagulation therapy, P2 student pharmacists were provided with simulated patient cases. After a two-week review period, P2 student pharmacists were instructed to return to the classroom for recitation, where they actively engaged in an interactive discussion within small groups. Using clinical and critical thinking, they covered topics such as diagnosis, medication therapy, monitoring parameters, and patient counselling. Course facilitators are present to guide the discussion, ensuring that the learning activities align with the course's objectives. Learning outcomes are measured using a 5-question quiz at the end of recitation.

Results: Each year, P2 student pharmacists participate in the anticoagulation recitation using Case-Based Learning (CBL). In Spring 2024, of the 165 students, 141 (85.5%) responded to the survey at the end of the semester. Of the respondents, 67.8% reported that the assignment and assessment reflected the content of the course (4.5/5 points), 65.5% felt that students were encouraged to be interactive during the session (4.5/5 points), 62.6% found that feedback on examination/graded materials was valuable (4.5/5 points), 68.7% rated the quality of instruction as excellent (4.6/5 points), and 69% rated the overall teaching effectiveness as excellent (4.6/5). The exam scores of the students ranged from 30 and 135 points, with a median score of 110 points (81.5%).

Conclusion: Case-based learning (CBL) has been implemented in anticoagulation lectures for P2 student pharmacists, bringing real-world cases into the classroom. Students value the interactive nature of the approach and recognise its positive impact on learning, as it enhances their understanding of the lecture materials.

Advancing pharmacy experiential education for ambulatory antithrombotic services in the United States

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Background: Founded in 1859 as the Chicago College of Pharmacy, the University of Illinois Chicago (UIC) Retzky College of Pharmacy is one of the oldest in the United States. The college has contributed to the national advancement of clinical pharmacy practice by providing excellence in pharmacy education and training. The Antithrombosis Clinic (ATC) is a clinical pharmacist-managed ambulatory care service located within the University of Illinois Hospital and Health Sciences System (UI-Health) that has been established in conjunction with the UIC Retzky College of Pharmacy since 1996. While maintaining exceptional personalised antithrombotic therapy management through collaborative efforts with other healthcare providers, the clinic has established itself as an outstanding clinical rotation site for pharmacy learners.

Method: Pharmacy experiential education at the ATC is designed to strengthen the knowledge base and clinical expertise in antithrombotic drug therapy for learners. Located within the Outpatient Care Centre at UI-Health, highly-trained clinical pharmacists in the ATC work under an approved clinic protocol consistent with evidence-based medicine and aligned with best practices in managing antithrombotic therapy. Through face-to-face visits and

telehealth encounters, ATC clinical pharmacists manage a variety of clinical conditions including venous thromboembolism, valvular heart disease, atrial fibrillation, cerebrovascular accident, and various hypercoagulable states. Under the supervision of ATC clinical pharmacists, a layered learning model is utilised, and learners are expected to effectively interview and counsel patients, initiate and adjust antithrombotic therapy, provide monitoring parameters, and document interventions in electronic health records. As part of their orientation, all learners are provided with a guide for the experience, which includes clinic expectations, preceptor contact information, learning activities, documentation screen shots and instructions, pertinent readings and clinical care guidelines, common medical abbreviation definitions to define, and a self-assessment quiz. Learners are expected to develop and strengthen their oral and written presentation skills through structured activities, including topic discussions, journal club participation, and case presentations.

Results: The ATC is widely recognised as one of the most pursued clinical rotations for ambulatory care services at UI-Health. Over the past 29 years, more than 700 learners have received clinical training by the ATC clinical pharmacists. Over 400 student pharmacists have engaged in the learning experiences offered, which include a one-week shadowing program for P1 student pharmacists, a 12-site visit for an introductory pharmacy practice experience (IPPE) for P3 student pharmacists, and a six-week rotation for an advanced pharmacy practice experience (APPE) for P4 student pharmacists. For postgraduate (PG) pharmacy residency training, ATC offers block and longitudinal experiences for PGY1 and PGY2 pharmacy residents, with over 200 pharmacy residents having completed rotations. ATC clinical pharmacists have also mentored many resident seminars and research projects. Additionally, the ATC has expanded its global impact on clinical pharmacist antithrombotic services through partnership efforts with the UIC Retzky College of Pharmacy by offering a clinical shadowing experience for more than 100 international pharmacist visitors.

Conclusion: For nearly 30 years, pharmacy experiential education at the ATC serves as an outstanding clinical rotation site for ambulatory care antithrombotic services at UI-Health.

Artificial Intelligence in health professions education: A quick review of the massive open online courses (MOOCs)

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Background: Artificial Intelligence (AI) technologies are expected to fundamentally impact the healthcare sector by influencing diagnostics, therapeutics, health services, and research. With the rise of AI, it is anticipated that it will become a core part of health professions curricula, equipping future healthcare providers with the ability to evaluate the use of AI systems critically. Different educational programs have emerged to meet this demand, including Massive Open Online Courses (MOOCs), online courses, and professional development programs. Understanding how these courses are designed and delivered is crucial to providing a structured entry point for educators and advancing AI literacy among healthcare professionals.

Objective: This review aims to map the current state of AI-related MOOCs in Health Profession Education (HPE), focusing on their learning objectives, content, duration, teaching methods, and assessment methods.

Methods: This review was conducted by manually searching for MOOCs on two giant online platforms, Class Central and MOOC-list. These platforms aggregate courses/MOOCs from different educational platforms, such as Coursera, edX, FutureLearn, Udacity, etc. Two reviewers carried out the review independently. Since this review used secondary data available to the public, IRB ethical approval was not required. Any course that is at least one week in duration and focuses on HPE, either targeting health professionals as the audience or covering topics specifically related to health professional education, was included in the review.

Results: This review evaluated 27 unique MOOCs. Universities conducted all courses except for five courses offered by technology institutes. The average course length was 5.3 weeks. Regarding the scope of the course, 26 % of the courses focused on education and the application of AI in education. The remaining courses addressed the utilization of AI in medical tasks such as diagnosis, prognosis, and treatment. Thirty-seven percent of the courses (n=10) were tailored for healthcare providers and students. Twenty-two percent (n = 6) were designed for educators, with one of these courses explicitly targeting educational leaders. Two courses were solely for students. Most MOOCs in HPE were primarily introductory-level courses that focus on fundamental concepts and do not require specific

prerequisites for learners. The majority focused on lower-order thinking. While this approach caters well to beginners, it may pose a challenge for advanced learners due to the scarcity of more specialised or advanced courses. Due to the virtual learning environment's nature and limited interactive elements, most MOOCs offer traditional learning approaches, including reading materials, tests, videos, and presentations. Graded assignments and quizzes were the mainstays for assessing learning outcomes in MOOCs, as the current revenue structures might hinder the implementation of more interactive alternative modalities, such as peer assessment. Further studies are needed to evaluate the alignment between educational outcomes and assessment methods.

Conclusion: Despite their growing role, most AI-related MOOCs focus on foundational knowledge and use traditional teaching methods, highlighting the need for more advanced content and engaging pedagogical strategies. Future research should examine the effectiveness of AI-related MOOCs and their impact on health professionals.

A scoping review of planetary health education in pharmacy curricula

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Background: Climate change threatens humanity, biodiversity, and global health, with the healthcare system already experiencing its effects. The pharmacy profession must act on environmental sustainability; however, there is a noticeable gap in the literature regarding its integration into pharmacy education. Despite interest by pharmacy educators and updates to pharmacy program accreditation standards in some countries, resources on integrating this content remain limited. The objective of this scoping review was to summarise and describe the extent, range, and nature of research and implementation of planetary health content within pharmacy education globally.

Method: A scoping review was conducted using the Arksey and O'Malley framework and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist. Nine databases were searched using well-defined inclusion and exclusion criteria. Two independent reviewers screened and assessed publications for eligibility, and data were charted to collate results.

Results: The search yielded 1,827 articles, with 16 selected for analysis. These articles provided 28 examples of planetary health content integrated into 25 pharmacy schools across 12 countries. The content was organised using a novel framework with four main categories: the impact of environmental disruptions on health, the impact of health on the environment, mitigation strategies, and adaptation strategies. Integration varied, occurring across curricula, in mandatory courses, or through electives and extracurricular activities. Teaching methods also varied, with self-directed and didactic learning being the most common.

Conclusion: While international efforts to integrate planetary health into pharmacy education remain limited, progress is evident. This review provides a framework for understanding this emerging field's diverse perspectives and topics. It aims to guide discussions on developing prioritised competencies for inclusion in pharmacy curricula.

Teamwork by design: Assessing the impact of an interdisciplinary pharmacy project on student learning and collaboration

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Background: Modern careers in the pharmaceutical industry and clinical practice require professional collaboration, interdisciplinary integration, and teamwork. Project-based learning fosters these skills and prepares graduates for interprofessional practice. The University of Southern California Mann School of Pharmacy and Pharmaceutical Sciences International Student Summer Program (ISSP) provides a four week immersive experience for undergraduate students, emphasising integration and collaboration through a structured group project. The objective of this study is to describe the implementation and outcomes of this project.

Method: Students enrolled in the ISSP from 2022-2024 were assigned to a focus area (clinical practice, pharmaceutical science, or regulatory science) and placed in interdisciplinary, international teams to complete a project exploring the development, marketing and clinical use of a newly approved drug formulation from different perspectives. Faculty and course assistants (USC graduate students) facilitated project work using structured prompts designed to encourage discipline-specific and cross-disciplinary integration. Each

programme followed a similar structure, but the project prompts for ISSP 2024 were revised to enhance emphasis on integration. The project aligned with ten programme objectives (POs), including knowledge acquisition (PO1, PO2), integration (PO4), collaboration and teamwork (PO5, PO7), international connections (PO8, PO9) and skills development (PO3, PO6, PO10). Students ranked the POs by importance (1 = least important to 10 = most important) using pre- and post-programme surveys. A paired t-test was conducted to compare pre- and post-survey rankings. Students also completed an end-of-programme evaluation, including open-ended reflections on the project experience.

Results: Over the three years, 251 students participated in the ISSP, with 153 matched pre- and post-programme evaluations included in the final analysis. Significant changes were observed in the PO rankings between the start and the end of the programme. Pre-programme, students prioritised knowledge-focused POs, with PO1 (7.5) and PO2 (7.3) ranked highest. Post-programme, these PO rankings had decreased the most (PO1: -1.6, PO2: -2.3, both $p < 0.01$). Conversely, collaboration (PO5), teamwork (PO7), and international connections (PO9) emerged as the most important. Notably, PO7 increased from one of the least valued POs to among the top three most valued (4.1 to 6.6, $p < 0.01$). The PO for integration (PO4) decreased in 2022 and 2023, but increased in 2024 from 5.6 to 6.7 (p = 0.01) following targeted curriculum adjustment to enhance integration. Qualitative analysis of 2023 and 2024 student comments highlighted that the project promoted team collaboration, with "information-sharing" or "teamwork" emerging as themes in approximately half of all comments. References to the theme of "integration" grew from 13.2% of reflections in 2023 to 29.6% in 2024, which aligned with the survey data showing increased appreciation for interdisciplinary collaboration.

Conclusion: This mixed methods analysis demonstrates the effectiveness of a structured collaborative project in strengthening teamwork skills and interdisciplinary learning among pharmacy students. The project was intentionally designed to emphasise the connections between science, clinical, and regulatory aspects of pharmacy. This project design could be adapted to promote team skills and achievement of learning outcomes in all pharmacy curricula.

Balancing focus and well-being: First investigation of attention span, mental health, and lifestyle among pharmacy students from Lebanon

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Background: Attention span plays a crucial role in academic performance, particularly for pharmacy students who must process complex information and maintain a state of mind conducive to effective engagement with peers, mentors, and patients. This study aimed to explore the relationships between attention span among pharmacy students at a Lebanese university and various lifestyle and mental health factors, including substance use, sleep patterns, exercise habits, medication use, and psychological well-being.

Methods: A cross-sectional study was conducted among pharmacy students using the 20-item Attention Control Scale (ATTC) to measure attention span and the 21-item Depression, Anxiety, and Stress Scale (DASS-21) to assess self-perceived psychological health. Demographic information, lifestyle factors (smoking, alcohol consumption, exercise routines, sleep duration), and medication use were also collected. Descriptive statistics, including frequencies, percentages, and means, were calculated to characterise the study population and key variables. The survey was administered in Arabic to ensure comprehensive understanding and accurate responses across all participants. Regional differences were also examined, with students from various Lebanese governorates included, ensuring a geographically diverse and representative sample of pharmacy students across the country. Data were analysed using SPSS version 26.

Results: A total of 525 pharmacy students responded to the questionnaire. The study population comprised 77.7% female and 22.3% male students, with a mean age of 21.5 years, distributed across six academic years. Among all participants, 5.9% reported cigarette smoking, 19.2% used a waterpipe, 5.1% consumed alcohol, and 21.7% exercised regularly. The

mean sleep duration was 6.65 hours per night, with 52% of students reporting seven or more hours of sleep. Reported medication use included anti-anxiety medications (4.2%), antidepressants (4.4%), antipsychotics (1.3%), mood stabilisers (1.3%), and psychostimulants (2.9%). The mean ATTC score was 46.37 out of 80, with moderate subscores for both attention focusing and attention shifting. In DASS-21, self-perceived depression and stress levels were moderate, while self-perceived anxiety was severe. Students who engaged in regular exercise obtained adequate sleep and refrained from substance use generally reported higher attention scores.

Conclusion: This is the first study to investigate attention span and related factors among pharmacy students in Lebanon. The findings highlight the prevalence of lifestyle factors and mental health issues that may impact attention span within this population. A significant proportion of students engage in habits potentially detrimental to cognitive function, including insufficient sleep, substance use, and inadequate physical activity. Additionally, the high prevalence of psychological distress indicates multiple stressors that may affect academic performance. Educational institutions should consider implementing wellness programmes that address these modifiable factors and potentially incorporate attention training strategies into pharmacy curricula. Future analytical studies are warranted further to explore the strength and directionality of these relationships and to evaluate the effectiveness of targeted interventions aimed at improving attention capacity and overall student well-being across pharmacy programmes.

Bridging perspectives: Impact of a virtual exchange program on mental health awareness among pharmacy students

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Background: Mental health awareness and cross-cultural competency are crucial elements in pharmacy education, equipping future pharmacists with the skills to provide patient-centred care in diverse healthcare settings. Mental health disorders remain a major global concern, yet stigma and limited awareness often limit appropriate care. Pharmacists play a key role in addressing these challenges, but effective patient engagement requires not only clinical knowledge but also cultural sensitivity and strong communication skills. Virtual exchange programmes offer an innovative approach to enhancing these competencies by facilitating cross-cultural collaboration and discussion. This study evaluated the effectiveness of a virtual exchange programme between pharmacy students from Lebanese International University and Aston University (UK), focusing on mental health awareness and cross-cultural understanding.

Methods: The programme spanned over eight weeks between March and May 2024 and included interactive sessions, webinars, discussions, and collaborative projects. A pre-post assessment study was conducted using structured surveys. The assessment tools evaluated participants' knowledge of cultural traditions, mental health awareness, cross-cultural communication skills, and programme effectiveness. Statistical analysis included paired t-tests for pre-post comparisons and Pearson correlation coefficients to examine relationships between variables. Significance was set at $p < 0.05$.

Results: A total of 85 pharmacy students participated in the study (68.2% female, 31.8% male; mean age = 22.2 years). Analysis of the pre-post assessment data demonstrated statistically significant improvements across all measured domains of the virtual exchange programme ($p < 0.001$). Mean scores increased significantly in cultural competency (3.2 to 4.1), mental health awareness (3.4 to 4.3), cross-cultural communication (3.1 to 4.2), and professional confidence (3.3 to 4.4). Strong positive correlations were found between cultural competency and communication skills ($r = 0.72$) and between mental health awareness and professional confidence ($r = 0.68$). Programme effectiveness was reflected in high participant satisfaction rates, with 89% reporting satisfaction with content accessibility and 92% indicating an improved understanding of international healthcare perspectives.

Conclusion: The virtual exchange programme demonstrated statistically significant improvements in all measured domains. Strong correlations between cultural competency and communication skills suggest that the programme effectively integrated these crucial aspects of professional development. The significant improvements in mental health awareness and cross-cultural understanding, coupled with high satisfaction rates, validate the programme's effectiveness in achieving its educational objectives. The findings support the incorporation of similar initiatives into pharmacy curricula to promote empathy and global perspectives in healthcare education.

Long-term Impact of international rotations on doctor of pharmacy students

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Background: As of 2014, over two-thirds of pharmacy schools in the United States offered international rotations for students. These experiences have been shown to be transformative experiences that shape students' personal and professional perspectives. Current research has evaluated outcomes directly following international rotations, but there is a lack of research demonstrating long-term impact and influence on career. This study evaluated the long-term impact of participating in an international advanced pharmacy practice experience (APPE) rotation on students' perspectives, practice, and career.

Methods: Focus groups were conducted with pharmacy alumni who had completed an international APPE fourth-year rotation in one of six low-middle (LMIC) or high-income countries (HIC) who graduated within the last one to ten years. Focus groups were transcribed and analysed using MAXQDA. Data went through a two-cycle, open coding process. Thematic and content analysis was used to identify major themes. Demographics were analysed using descriptive statistics.

Results: Nineteen alumni participated in the focus groups. A majority of participants highlighted a change in perspective, including comparing/contrasting practices to their home country, reevaluating practice and effective use of resources in the United States, and appreciation for complementary and alternative medicine (CAM) and cultural influences. Although this experience did not directly impact practice or career trajectory for most participants, indirect application of broadened perspectives and skills, such as critical thinking, networking, communication, and resourcefulness were highlighted. All participants indicated a positive influence on competitiveness for their first job applications by being a differentiator or contributing as an interview talking point. Participants noted that the experience was worth the financial and time investment and helped them feel more connected to other alumni and the School, with all stating they would do it again if given the opportunity.

Conclusion: International APPE rotations had a lasting, indirect impact on students' practice through skill application and broadened perspectives, regardless of country location. Many of the skills and perspectives gained through these rotations such as appreciation for CAM and resourcefulness are not traditionally highlighted within US-based curriculums but were found valuable in participants' ability to serve a broader population of patients in practice. Participants noted that these experiences were worth the investment in the long-term and could be used to improve competitiveness for jobs upon graduation.

Pharmacists and environmental responsibility: Embracing opportunities, overcoming challenges and making it sustainable through education

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Background: The healthcare sector accounts for approximately five percent of global greenhouse gas emissions, with a staggering 70% of this coming from the pharmaceutical sector through production, transportation, and disposal of medicines and devices. This highlights the urgent need for sustainable practices in pharmacy. Reducing medication waste not only supports environmental sustainability but also helps combat antimicrobial resistance by preventing contamination of water, soil, and ecosystems. Community pharmacies at the heart of local healthcare, have a significant opportunity to reduce their environmental impact by implementing practices such as safe medicine disposal programs, patient education, efficient inventory management, eco-friendly packaging, and leveraging digital solutions. Previous studies have found limited use of sustainable practices in pharmacy and identified some barriers to their increased uptake. This study aims to explore the attitudes and perspectives of community pharmacy professionals toward environmental sustainability, identifying the challenges they face and the opportunities available to integrate more sustainable practices into their daily operations.

Method: A cross-sectional survey was conducted to explore insights from community pharmacy professionals including proprietors, managers, pharmacists, interns and students working in community pharmacies across the state. The survey comprised 20 questions, including, multiple-choice, Likert scale, and open-ended formats to capture a comprehensive range of perspectives. Internal consistency of the instrument was assessed using Cronbach's Alpha test with high value contributing to the overall validity of the findings. Ethical approval for the study was granted by the Monash University Human Research Ethics Committee.

Results: The majority (about 80%) of respondents agreed that they have a professional responsibility to promote sustainability practices in their community pharmacy. Key barriers to implementing sustainable practices included workload, limited knowledge and guidance, and a lack of incentives. Nevertheless, in some community pharmacies, sustainable practices were being implemented, such as recycling bins being used for discarded packaging, reducing

paper use and medication waste disposal processes being managed. About one-third of participants recognised an opportunity to make a greater impact by reducing medication use, not just managing waste. They suggested that patient education and lifestyle interventions could play a bigger role in both patient care and environmental sustainability. Another pressing issue emerged: pharmacy students, the future of the profession, expressed uncertainty about sustainable practices. Many acknowledged a lack of knowledge and confidence in integrating sustainability into their work, highlighting the urgent need to incorporate environmental sustainability education into the pharmacy curriculum.

Conclusion: Pharmacy is evolving, but one critical element is being left behind - sustainability. While the profession plays a vital role in healthcare, many pharmacy professionals find themselves unprepared to implement environmentally responsible practices. The problem starts early, with a noticeable gap in sustainability education within the pharmacy curriculum. To bridge this gap, comprehensive training programs and accessible resources are essential. By equipping pharmacy professionals with the necessary education and tools, sustainability can shift from an afterthought to an integral part of practice. The question is no longer whether change is needed, but how soon it can happen.

Enhancing cultural responsiveness in pharmacy education to deliver personalised care and addressing domestic violence in diverse communities

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Background: Domestic violence (DV) is a global health issue with severe physical and mental health consequences, individuals across all socioeconomic and cultural backgrounds. As accessible healthcare providers, pharmacists play a role in identifying and supporting individuals affected by DV. However, pharmacy education has not sufficiently integrated cultural responsiveness, a crucial factor in supporting diverse populations. This study explores the attitudes and perceptions of pharmacists and academics regarding their preparedness to identify and respond to DV. It focuses on integrating cultural competence in pharmacy curricula to better equip them for this role. This study aimed to evaluate pharmacy students' and professionals' knowledge, confidence, and training needs regarding DV, particularly in cultural competence. The objective was to identify training gaps and assess the need for more culturally relevant education to enhance pharmacists' ability to support victims from diverse backgrounds.

Method: An anonymous survey was distributed to pharmacy students and professionals at Monash University to assess their preparedness in identifying and addressing DV, with a focus on cultural competence. The survey gathered data on knowledge, confidence levels, and perceived need for further training on culturally appropriate care for DV victims. Internal consistency of the survey was evaluated using Cronbach's alpha, and qualitative responses to open-ended questions were analysed using NVivo.

Results: The survey results revealed that 65% of participants felt unprepared to provide culturally appropriate DV support. A large majority (88%) expressed a strong need for cultural competence training in pharmacy education, suggesting methods like role-playing and culturally diverse case studies. Some participants noted that in certain cultures, 'verbal abuse can be normalised' or 'family matters are considered private,' while other states that women are often told to stay silent. Cultural background also impacts how patients seek help, with some believing that 'seeking help means you're weak' or that 'domestic violence is common and normal.' Real-world examples from pharmacy workplaces highlighted the need for training in identifying, supporting and referring DV-affected individuals. One participant described a patient needing help certifying a document while fleeing abuse and homelessness. Another shared a case where a patient said, 'Please make sure the stock is in. My husband will scream at me if it's the wrong brand.' While cultural background is key in understanding DV, some noted that 'it's complicated,' and that 'we need to find a balance between respecting their culture and ensuring proper care.' Many suggested cultural competence training, with comments like 'It will be great if we can, but we need to be equipped with the knowledge of how each culture is.' Others emphasised 'the importance of offering emotional support', while some suggested 'treating patients the same, regardless of cultural background.

Conclusion: This study highlights the need for integrating cultural competence into pharmacy curricula to better prepare students and professionals to address DV in diverse populations. Findings suggest that culturally responsive education can improve pharmacists' ability to provide effective, compassionate care to those affected by DV. Future efforts should focus on developing culturally relevant training programs in pharmacy education to address these gaps.

Evaluating microlearning's effect on social determinants of health in skills-based courses

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Background: As frontline healthcare providers, pharmacists play a crucial role in advancing health equity by addressing social determinants of health (SDOH) within their practice. To effectively do so, pharmacists need not only clinical skills but also a strong understanding and empathy for the social and economic challenges patients face. However, limited research exists on the integration of these concepts in pharmacy education.

Methods: This pre-posttest study evaluated pharmacy students' understanding, compassion, and confidence in addressing SDOH through weekly microlearning activities embedded in a skills-based course. Each microlesson focused on one of the five core SDOH domains—economic stability, education access and quality, healthcare access and quality, neighbourhood and built environment, and social and community context—delivered through simulations, videos, and case studies. Students completed pre- and post-intervention assessments to measure changes in understanding.

Results: Paired t-tests showed significant improvements in all five SDOH domains post-intervention. The greatest gains occurred in healthcare access and quality, demonstrated through case studies (Mean Difference = 4.236, $p < 0.001$). Significant increases were also seen in financial stability (Mean Difference = 0.878, $p < 0.01$), education access and quality (Mean Difference = 0.730, $p < 0.05$), neighbourhood and built environment (Mean Difference = 1.061, $p < 0.01$), and social and community context (Mean Difference = 0.770, $p < 0.05$). Additional analyses across categories of understanding, confidence, and knowledge showed statistically significant improvements, especially in knowledge (Mean Difference = 1.500, $p < 0.001$).

Conclusion: This study supports the use of SDOH-focused microlearning activities as an effective, time-efficient approach to preparing pharmacy students for compassionate, equity-oriented practice. These brief, targeted lessons can be easily incorporated into existing curricula, helping to build essential skills for pharmacists working in diverse communities.

Impact of a vulnerable and underserved patient care elective on pharmacy students' perceptions of patients across citizenship status

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Background: Citizenship status plays a critical role in patients' access to healthcare in the United States. Individuals lacking citizenship face significant barriers to obtaining employer-based health insurance and federally funded programs such as Medicare or Medicaid. Additionally, perceptions and biases surrounding immigration can influence how both undocumented and documented non-citizens are treated within the healthcare system. Purdue College of Pharmacy offers an elective course focused on caring for vulnerable and underserved populations, which includes content revolving around care for undocumented and documented non-citizens. This course aims to equip students with the tools to provide high-quality, equitable care to all patients regardless of status. Mandatory service-learning activities (SLAs) at federally qualified health centres (FQHCs) in rural Indiana are incorporated into the course, providing students with valuable, first-hand experiences delivering care to these populations. FQHCs are community-based healthcare organizations that receive federal funding to offer comprehensive primary care services to underserved groups. Patients at FQHCs are often uninsured, underinsured, and/or immigrants who may pay for services on a sliding fee scale.

Objective: The study aim is to evaluate the influence of participation in a vulnerable and underserved patient care elective on pharmacy students' perceptions of patients across citizenship status and their approach to delivering patient care.

Method: The objective of the elective, held weekly for one semester, is to increase knowledge and awareness of the challenges faced by underserved patient populations and ways healthcare providers can assist patients in overcoming these challenges. To achieve this, students participate in SLAs at FQHCs, where they provide direct patient care and reflect on their experiences. Students also engage in book discussions centred around the healthcare challenges faced by vulnerable and underserved patients and complete projects focused on health literacy, care planning, and legal/ethical issues. Pharmacy students enrolled in six offerings of the elective from 2019 to 2025 participated in the study. Anonymous, identical pre- and post-course assessments were administered via Qualtrics, a web-based survey platform, to evaluate students' perceptions of

undocumented immigrants, documented non-citizens, and U.S. citizens. The assessment consists of 58 seven-point Likert scale questions focused on perceptions related to attributes, health needs, and societal contributions. Students also rated how they, their peers, professors, and the government valued caring for each patient group. Demographic information and educational experiences were collected, with descriptive statistics and normality assessments planned. Wilcoxon signed-rank tests will be used to identify differences in perceptions, with statistical significance set at $p < 0.01$.

Results: This study is currently in progress. A total of 118 students completed the pre- and/or post-course surveys between 2019 and 2025. Data collection is ongoing through this latest course iteration.

Conclusion: Data from the pre- and post-course assessments will be analysed to assess the impact of the elective course on pharmacy students' perceptions of patients across various citizenship statuses. These findings will inform potential revisions to the elective course, with the goal of enhancing student learning and better preparing them to provide empathetic, equitable care to diverse patient populations, including undocumented and documented non-citizens and U.S. citizens.

Enhancing interprofessional collaboration through skills labs: A pilot study within the pharmacy game educational model

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Background: Skills labs facilitate the training of professional skills beyond traditional laboratory use. Recently, these labs have increasingly become integral to medical and pharmaceutical education. At the University of Groningen, a new Skills Lab simulates community pharmacies as part of the Pharmacy Game educational concept. This study aimed to explore how the Skills Lab Pharmacy can support new collaborative and interprofessional practices between pharmacy and medical students.

Method: A pilot activity was conducted in the new Skills Lab Pharmacy at the University of Groningen to simulate interprofessional collaboration. Participants included pharmacy students (n = 35) enrolled in the Pharmacy Game, GIMMICS-course and medical students (n = 12) participating in the Medical Consultation Training. Pharmacy students assumed the role of community pharmacists, while medical students acted as general practitioners (GPs). The activity took place between October 2024 and December 2024. During the simulation, medical students prescribed medications and sent prescriptions to the simulated pharmacies, where pharmacy students processed them. Additionally, medical students, acting as patients, visited the simulated pharmacies to collect the medications they had prescribed. Interprofessional communication, collaborative feedback on prescribing quality and patient counselling were observed the during the activity. Student feedback was collected to complement observational findings.

Results: The results indicate that students gained valuable insights into each other's roles and responsibilities through interprofessional communication. Pharmacy students learned about GPs' clinical reasoning, which differed from their own, as well as the expectations physicians have of pharmacists. Medical students gained awareness of pharmacists' extensive knowledge and their role in patient consultations. Pharmacy students demonstrated high levels of professionalism and expertise when providing feedback on prescribing quality, which medical students found insightful and beneficial for their future careers. Representative student feedback included statements such as: "We gained insight into what general practitioners expect from pharmacists and the contributions pharmacists can make."; "Throughout the activity, we developed a better understanding of the general practitioner's perspective."; "As future doctors, we now have a clearer understanding of how we can collaborate with pharmacists and what we can ask them." and "Effective collaboration enhances our performance as healthcare professionals."

Conclusion: This pilot study demonstrates that a dedicated Skills Lab, as used during the Pharmacy Game in Groningen, provides a strong foundation for interprofessional education and fosters multidisciplinary collaboration in healthcare training. Furthermore, it highlights opportunities to expand collaborative practices to include allied healthcare professionals such as nurses and dentists. Implementing structured assessments is useful and can aid in measuring interprofessional learning outcomes.

Professional identity formation: Becoming a pharmacist

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Background: Professional identity formation (PIF) is said to entail 'thinking, feeling and acting' as a professional. Within pharmacy educational programs, the development of students' professional identity is getting more attention. But

what is PIF, why is it important and how to facilitate this development?

Method: A comprehensive search for recent (last decade) studies and commentaries was conducted in PubMed, using the key phrase of "professional identity" OR "professional identity formation" OR "PIF" combined with "pharmacy" OR "pharmacist". The resulting material (n = 85) was considered useful when it regarded PIF, pharmacy students, educational programs or educational incentives to support PIF (n = 17).

Results: PIF is a process of internalisation of a profession's core values and beliefs and is representative of three domains: thinking, feeling, and acting. It elates to the sense of being a professional, formed through interaction between self and context. It results in defining oneself in relation to the professional roles, encompassing both the sense of identity and the expected behaviours associated with roles. PIF is important for students, pharmacists, the pharmacy profession and change in pharmacy practice. Supporting this formation has a positive influence on students transitioning from focussing on passing exams to pinpointing the kind of healthcare professional they want to be. Pharmacists who have internalised the norms, attitudes, and behaviours associated with the profession, are more likely to "do the right thing", according to practice standards. The profession itself benefits from pharmacists with a clear sense of their professional identity, since this results in professionals well positioned to engage in lifelong learning, navigate crises, exert influence and advocate for the profession. And lastly, pharmacy practice changes over times, due to societal needs and expectations. A resilient workforce needs to have a clear starting point from which to align with these changes. Several factors impede the implementation and assessment of PIF in pharmacy programs. Firstly, an apparent lack of a universally accepted and singular identity, since pharmacists practice in a variety of fields (community, hospital, education, research, etc.) and take on diverse roles and responsibilities. Secondly, the focus of curricula is on drug centred knowledge and skills development, thus aligning students' professional identities with drug centred understandings rather than patient-centred identities. Furthermore, the risk of identity dissonance is present when the scope of practice taught in academia, does not align with student experiences in the real world (e.g. during experiential learning), or if social recognition of the students' (future) role and responsibility as pharmacist is not recognised by healthcare professionals and/or patients. The findings further explore the role of educators in the process of professional identity formation (role modelling, awareness among preceptors of implicit and explicit influence during placements, the intentional facilitation of PIF, etc.). and provide examples of educational activities within the curriculum that foster PIF (e.g. 'Bring your pharmacist to class'-day).

Conclusion: This search supports the importance of addressing PIF, while also explicating barriers that hamper this process. Literature starts to define the role of educators and fortunately, also provides an ample list of educational activities.

Phytotherapy in pharmacy education and practice: Bridging tradition and modern healthcare in the Netherlands and Indonesia

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Background: Phytotherapy has a long tradition in both the Netherlands and Indonesia. Once central to traditional medicine, it is now a complementary healthcare approach in the Netherlands, primarily within alternative medicine and as a supplement to conventional treatments. In Indonesia, phytotherapy remains a prominent part of traditional health practices, often used alongside modern medicine, with herbal remedies integrated into the national healthcare system. In the Netherlands, herbal products are regulated as food, restricting medical claims. Indonesian authorities ensure safety, classifying them as Jamu, Standardised Herbal Medicine, or Phytopharmaca based on traditional use, pre-clinical and clinical studies. Both countries limit unverified claims. As pharmacists play a key role in advising on the safe and effective use of herbal products, and comply with Good Traditional Medicine Production, it is crucial to explore the place of phytotherapy in pharmacy education and practice in both the Netherlands and Indonesia. We aimed to explore the phytotherapy position in pharmacy education and practice in both the Netherlands and Indonesia.

Method: We examined the role of phytotherapy in pharmacy education in two settings: the University of Groningen (UG), Netherlands, and the University of Ahmad Dahlan (UAD), Indonesia. We looked at: 1) which courses include phytotherapy, 2) whether these courses are compulsory or elective, and 3) if the courses discuss the role of pharmacists. Additionally, we investigated current pharmacy practices, focusing on how herbal products are made available to consumers and the role pharmacists can play.

Results: At UG, phytotherapy is included in one elective course (Phytotherapy) and two compulsory courses (Self-care and the Pharmacy Game, GIMMICS). These courses offer students an opportunity to explore both the scientific foundations and practical applications of phytotherapy in healthcare practice, while also addressing potential pitfalls. At UAD, phytotherapy is integrated into the pharmacy curriculum through research, six elective (Ethnomedicine, Raw material of drug and cosmetic, Cosmetic formulation, Jamu formulation, Integrative medicine, Elucidation of natural product), six compulsory courses (Pharmacognosy, Extraction and screening of phytochemistry, Isolation and identification of plant components, Formulation of solid and

pharmaceuticals, Formulation of solid and semi solid pharmaceuticals, Development of herbal medicine) and laboratory practice of four courses. Those emphasise both traditional and modern approaches to herbal medicine. In the Netherlands, online purchase of phytotherapeutic products presents risks, as the authorities only monitors domestically traded items, not those from foreign web-shops, which may bypass Dutch safety and labelling regulations. In Indonesia, the sale of herbal products is strictly monitored, with regulations governing both local and international sellers, although enforcement can vary regionally.

Conclusion: While phytotherapy is included in pharmacy education in both countries, pharmacists in the Netherlands and Indonesia can play a vital role in advising on the safe and effective use of herbal products, offering valuable production guidance to ensure consumer safety. The study findings can be used to enhance the competency of pharmacy graduates in phytotherapy by learning from each other's practices in both settings.

Transforming pharmacy education: Integrating continuing professional development and graduate studies

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Background: Lifelong learning is essential for pharmacists to address evolving societal and health care needs. Pharmacists fulfil diverse roles, including patient education, chronic disease management, and primary care delivery. Post-graduate pharmacy education offers various options such as non-credit programs, workplace learning, specialty certificates, and graduate degrees. However, the integration of these educational pathways remains limited. This presentation introduces a model for pharmacy education that connects continuing professional development (CPD) with graduate studies to support professional growth and career advancement.

Method: Using a research synthesis approach, this project drew on data from multiple sources. Initiated in 2024, this project incorporated experiences from CPD and graduate program development and evaluation, research on pharmacists' roles and learning needs, and an environmental scan of CPD and graduate offerings in Canada. A utilisation-focused evaluation of the current post-professional Doctor of Pharmacy program provided insights into learner expectations and needs. A market feasibility study examined practitioners' needs and demand for innovative educational approaches. A consultation phase ensured alignment with institutional expertise and strategic priorities. Ethics approval was not required as the project focused on quality assurance.

Results: Collaboration between the Faculty of Pharmacy and Pharmaceutical Sciences and the Faculty of Graduate and Postdoctoral Studies resulted in a post-graduate pharmacy education model. This model features multiple pathways, accommodating both traditional students (BScPharm, PharmD) and working professionals. It emphasises accessibility and inclusivity through performance-based admissions and offers flexibility via stackable credentials, such as micro-credentials and certificates. These credentials can be pursued independently or integrated into larger programs, including graduate degrees. The model also integrates non-credit CPD with for-credit graduate courses, creating tailored learning pathways for diverse career and academic goals.

Conclusion: The proposed model offers a flexible framework for post-graduate pharmacy education, addressing the evolving needs of pharmacy professionals and health care systems. It demonstrates the potential of inter-faculty collaboration to enhance educational offerings and provides a resource for institutions seeking to align educational pathways with professional and societal demands. While promising, further evaluation is needed to assess the model's long-term impact on learners and the profession.

It takes a village: Supporting professional identity formation in Canadian pharmacy schools' curricula

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Background: Pharmacist professional identity formation (PIF) is described as the transformative process from lay person to the embodiment of one who thinks, acts, and feels like a pharmacist. Previous research has shown that there are multiple different pedagogical methods used to support PIF in pharmacy students, however, there have been limited discussions about national approaches. Updated accreditation standards for pharmacy programs in Canada require that curricula supports PIF; however, it is not well known how academic institutions have implemented this in the various stream topics covered in the curricula. This study investigated pharmacy curriculum design, teaching, and assessment of PIF to uncover areas for improvement,

collaboration, and opportunities for sharing effective approaches.

Methods: Between May and September 2024, focus groups composed of faculty members across curricular streams (pharmacotherapy, experiential education, patient care skills, pharmaceutical sciences, behavioural/administrative-related pharmacy) were conducted online with each of the 11 pharmacy programs across Canada. Each focus group followed a semi-structured format, using a standard set of questions to help guide the discussion. Interviews were audio-recorded and edited by research team members for accuracy. Common words, phrases, and ideas were identified from the transcripts using inductive coding and further thematic analysis. Codes were initially generated by research students, and then potential themes were iteratively discussed with the research team. Find themes were developed through discussion with the research team who all has experience in professional identity formation research.

Results: A total of 51 individuals, with representation from each pharmacy program in Canada, participated in a focus group. Of the participants, 51% had over ten years of experience working in higher education and 69% had a current role in curriculum development. Common themes identified were: approaches to PIF influenced by institutional structure and culture, intentionality of PIF implementation, authenticity of experiences, models shaping how PIF is taught, aspirations of programs and educators, and misconceptions of PIF. Examples of common activities supporting PIF include explicit lectures introducing the concept, guided reflection in multiple formats and contexts, and longitudinal portfolios to capture personal and professional growth in identity.

Conclusions: This study identified several aspects of how the PIF of pharmacy students in Canada is supported throughout curricula, along with areas for growth. There were distinct differences between schools, often related to the school's institutional culture and how professional identity was understood by Faculty. This study supports collaboration among academic institutions to share their approaches to incorporating PIF in curriculum and develop learning materials for faculty, staff, and preceptors. However, it was clear that none of the pharmacy schools supported a 'one size fits all' approach to professional identity development. Ongoing efforts to educate faculty and develop curriculum are essential to provide comprehensive support for professional identity formation amongst pharmacy students.

APPE Readiness of pharmacy students after completing an advanced ippe rotation at an academic medical center

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Background: The University of Colorado Skaggs School of Pharmacy and Pharmaceutical Sciences (SSPPS) developed an innovative patient-care focused six week, 240-hour advanced introductory pharmacy practice experience (aIPPE) in 2015 designed to prepare students for advanced practice experiences and assess advanced pharmacy practice experience (APPE) readiness. Ambulatory clinics, community pharmacy sites engaging in disease state management or direct patient care, and inpatient clinical hospital sites are recruited for aIPPE rotations with the expectation students will engage in experiential activities similar to APPE clinical rotations. Through the evaluation tool, the preceptors assess rotation students for APPE readiness. The University of Colorado Hospital (UCH) is a large academic medical centre which offers many aIPPE rotations at its' inpatient and ambulatory clinical sites. This study examined aIPPE students' APPE readiness at UCH through exploration of rotation activities, alignment with Accreditation Council for Pharmacy Education (ACPE) standards, and students' perception of APPE readiness after completing the aIPPE at UCH.

Methods: The aIPPE students at UCH completed a weekly survey to document rotation activities and perceived APPE readiness pre- and post-rotation using a 4-point Likert scale (four being ready for APPE). Wilcoxan Sign Rank test was used to assess responses at p-value < 0.05 for statistical significance. Final preceptor evaluations were utilised to gather preceptor perceived APPE readiness.

Results: In January 2025, 19 of 105 PharmD students from the class of 2026 started the aIPPE rotation at UCH. Five students were placed in ambulatory clinics and 14 students were placed at inpatient sites. Sixteen students completed the survey (84.2%) during week one and ten students (53%) completed the pre- and post-rotation perception question. By the end of the rotation, students reported engaging collectively in the following activities: 33 collected medication histories, 55 medication reconciliations, 337 medication reviews, 101 pharmacotherapy plans developed using evidence-based medicine, 78% acceptance rate on 41 communicated recommendations to medical providers, 23 vaccine recommendations, and 54 patient or provider educations. Additionally, they led journal club presentations and/or evidence supported case presentations to peers and preceptors. These activities align with the 2016 and 2025 ACPE standards on patient-centred care, scientific thinking, communication, patient advocacy, interprofessional collaboration, and education. Preceptors evaluated 18 of 19 students as ready to progress on to APPE rotations and the

mean student perceived APPE readiness increased by 1.2 ($p < 0.001$) by the end of rotation.

Conclusion: The aIPPE rotation activities at UCH are in alignment with ACPE standards for APPE readiness. Students and preceptors perceive the students to be ready for advancement to APPE rotations after completing the aIPPE rotations at UCH.

Incorporation of electronic health record training within the doctor of pharmacy curriculum and its impact on experiential education

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Background: High variability exists in how colleges of pharmacy teach via EHRs in their curriculum. In 2017, only 63% of schools were using an EHR in their standard educational programming, with most using software programs that mimic EHRs rather than common EHR software deployed in actual patient care settings. This results in a considerable knowledge gap as 99% of US hospitals use an EHR and 96% are using computerised order entry for medications.

Methods: Students enrolled in the 3rd year Capstone course in the University of Colorado PharmD program received eight hours of EPIC® training paired with four course activities and assessments. Faculty and preceptors from the University of Colorado Hospital (UCH) provided training. Students learned EPIC® navigation and evaluated patients to identify pharmacotherapy interventions. An EPIC® scavenger hunt quiz and simulated patient case reviews were utilised in addition to graded verbal case presentations. To evaluate EHR preparedness and performance, a cohort of students and preceptors at UCH were administered a survey at the end of their 6-week APPE. Outcomes measured included student experience with the EHR, APPE readiness, and preceptor perceptions of student performance during their fourth-year experiential education.

Results: 91 students using the EPIC® EHR on an APPE rotation responded. The majority of students completed an inpatient rotation (80%). Clinical practice areas included: 31% ICU, 15% internal medicine, 7% infectious diseases, 20% ambulatory care, 2% cardiology, and 26% other specialties (transplant, neurology, etc.). Student EPIC® experience prior to the capstone course was: nine percent never used; 30% used at work; 61% used on an introductory pharmacy practice experience (IPPE). Students never using EPIC decreased from 2022 to 2025 (19% to 9%), likely reflecting our earlier experiential education and increased number of facilities using EPIC® as their EHR. 59% of students agreed or strongly agreed that EPIC® training within the capstone course increased their proficiency with the EHR. 61% of students thought the training adequately prepared them for their APPE EHR (31% were neutral); 58% of students 'Somewhat or strongly agreed' the EPIC® experiences in the capstone course improved their ability to perform on their APPE rotation at UCH. Students desired more practice and opportunities to gain proficiency in "real world" experiences prior to APPE's. Thirty-one different UCH preceptors completed the survey: 30% ambulatory care, 17% internal medicine; 33% ICU, and 20% other specialties. 73% of preceptors 'somewhat or strongly agreed' that compared to previous students, their student was more familiar with EPIC functionality. 80% agreed they spent less time teaching the student how to use the EHR compared to previous years and 56% agreed their student's performance on the rotation was improved based upon their EPIC® proficiency/experience prior to starting the APPE. Preceptors felt training specific to their rotation (note writing, handoff, intervention documentation, etc.) would further increase student performance if incorporated prior to APPE rotations.

Conclusions: Teaching via a real world EHR (EPIC®) in a controlled classroom environment prior to clinical rotations was feasible and improved APPE readiness and student performance as perceived by both students and preceptors.

Integrating digital health, virtual reality therapeutics, and artificial intelligence into pharmacy education

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Background: The rapid evolution of healthcare technologies necessitates the integration of Digital Health (DH), Virtual Reality therapeutics (VRT), and Artificial Intelligence (AI) into pharmacy education to prepare future pharmacists for technologically advanced clinical environments. In response, USC Mann has established a designated lab space and introduced its first elective course in DH, VRT, and AI for graduate and PharmD students. Digital health tools, AI-driven clinical decision-making, and VR-based therapeutics can enhance pharmacy education by boosting students' competency. However, the extent to which these technologies improve learning outcomes and clinical preparedness remains underexplored. This study evaluates

the impact of integrating DH, VRT, and AI into pharmacy education.

Methods: Pre- and post-surveys were conducted among PharmD, graduate, and students enrolled in the international student summer pharmacy (ISSP) participated in digital health and AI courses or workshops at USC Mann. The study analysed student participant responses before and after a semester-long program that included lectures and hands-on training on medical devices, VRT applications, and AI chatbots. Surveys assessed students' confidence in patient counselling, understanding of emerging healthcare technologies, and ability to evaluate AI-generated medication guidance. Paired t-tests analysed changes in confidence levels.

Results: Confidence in patient counselling (rated 1–10) significantly improved among all cohorts completing both pre- and post-surveys for medical device training: PharmD 2023 (n = 91, 5.3 ± 2.1 vs. 7.9 ± 1.5, $p < 0.001$), PharmD 2024 (n = 38, 5.7 ± 2.4 vs. 7.2 ± 2.4, $p < 0.001$), ISSP 2023 (n = 68, 6.0 ± 2.3 vs. 8.4 ± 1.2, $p < 0.001$), and ISSP 2024 (n = 69, 5.3 ± 2.6 vs. 8.2 ± 1.4, $p < 0.001$). These results underscore the effectiveness of hands-on training in enhancing students' confidence. Among the ISSP 2024 cohort (98 students from 12 countries and 27 universities), 39 selected AI in Global Medicine as their top-choice workshop, with 16 completing both surveys. Pre-workshop results indicated that most overseas pharmacy schools had already integrated AI into their curricula. Familiarity with AI concepts significantly improved (4.3 ± 1.9 vs. 6.5 ± 1.3, $p < 0.001$). As the DH VRT AI elective is in its early stages, data remain limited. Initial surveys show students' familiarity with DH (3.67), VRT (3.50), and AI (3.83). Many have used generative AI for personal or academic purposes. Post-surveys will evaluate the course's impact on students' confidence levels. Full post-survey results will be available soon and presented at the meeting.

Conclusion: The integration of DH, VR therapeutics, and AI into pharmacy education enhances student competency, knowledge retention, and confidence in patient counselling. Findings suggest that structured exposure to these technologies better prepares pharmacy students for real-world applications, addressing gaps in current curricula.

Promoting confidence and competency in pharmaceutical care practice for pharmacy students and pharmacists in Taiwan through workshops

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Background: Pharmaceutical care is a patient-centred approach proposed by Hepler and Strand in the early 1990s and has been integrated into the US pharmacy curriculum. Despite the transition to a 6-year PharmD curriculum in Taiwan, challenges persist in embedding pharmaceutical care concepts effectively in education and practice. Barriers include limited clinical training opportunities in direct patient care and a lack of structured pharmaceutical care frameworks within university curricula. Taiwan-Overseas Pharmacy Network (TOPharmNet) is a Minnesota-registered 501(c)(3) nonprofit organisation in the US, which aims to promote professional networking for Taiwanese individuals in pharmacy professions globally. To increase the understanding of the foundation and process of pharmaceutical care for pharmacy students and pharmacists, TOPharmNet has collaborated with the Taiwan Young Pharmacists Group (TYPG) to host half-day pharmaceutical care workshops since 2024.

Objective: To enhance the confidence and competence in applying pharmaceutical care practice for pharmacy students and pharmacists in Taiwan through workshops.

Method: The half-day workshop focused on three components: 1) the foundation of pharmaceutical care, 2) the step-by-step process of pharmaceutical care, and 3) case discussion with real-world cases to apply the framework. The didactic lecture provided an overview of the evolution of the US pharmacy profession and key clinical concepts in pharmaceutical care practice, such as philosophy of practice, medication experience, therapeutic relationship, drug therapy problem, and goal of therapy. We adapted team-

based learning to facilitate case discussions. Pharmacy continuing education credits were provided by the Taiwan Society of Health-System Pharmacists. We administered an anonymous questionnaire after the workshop to understand the confidence and competency gained by students/young pharmacists and their learning experiences.

Results: Twenty-two pharmacy students/pharmacists participated in the pharmaceutical care workshops in 2024 (n = 8) and 2025 (n = 14). The overall response rate of the questionnaire was 68%, among which 60% were female (n = 9). Of the respondents, 46.7% (n = 7) were pharmacy students, 26.7% (n = 4) were hospital pharmacists, 20% (n = 3) were community pharmacists, and 6.7% (n = 1) worked in the pharmaceutical industry. Among the pharmacist respondents, 71.5% had less than five year of practice experience (n = 5). Overall, 74% strongly agreed that the workshop helped them understand pharmaceutical care. 80% strongly agreed that the workshop helped them understand the framework of pharmaceutical care and improved their competency in performing pharmaceutical care practices. 93% of participants were very satisfied with the workshop, and all of them would recommend it to other pharmacy students and pharmacists. The most impressive parts of the workshop were the IESC (indication, effectiveness, safety, convenience) tool to evaluate drug therapy problems, the clinical thinking process, and the application of real-world cases for discussion. Participants suggested allowing more time for case discussions as an area for improvement.

Conclusion: The workshop demonstrated a positive learning experience that increased pharmacy students' and pharmacists' confidence and competency in implementing pharmaceutical care practice. Further study and implementation are needed to engage more pharmacy students and pharmacists in pharmaceutical care workshops.

Enhancing pharmaceutical care education through engaging case scenarios in virtual patient web platform

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Background: Community pharmacists are healthcare professionals who must demonstrate a comprehensive understanding of the implementation of therapeutic strategies through clinical practice. They must focus on patient safety and achieve optimal health outcomes through competent decision-making processes. To address the evolving demands and challenges of modern pharmacy education, innovative approaches—such as interactive case scenarios implemented via virtual patient platforms—can be employed. Virtual patient web platforms can provide pharmacy students with valuable opportunities to practice clinical decision-making and patient interaction skills while offering a scalable and adaptable method for teaching essential pharmaceutical care competencies. The aim of this study was to design engaging case scenarios focused on defining the patient's needs for self-medication and the expected responses during consultation with the pharmacist. The developed case studies will be implemented in a virtual patient web platform, which will be used during the practical classes of the Pharmaceutical Care course.

Method: Case study scenarios were developed and tested by a group of experienced community pharmacists and educators to ensure clinical relevance and pedagogical effectiveness. Feedback was gathered to refine the content and ensure accuracy. The developed virtual patient web platform was validated through a pilot study with pharmacy students. Participants' performance was assessed based on their ability to manage clinical cases, provide counselling, and apply pharmaceutical care principles. For conducting simulations, the OpenAI GPT 4o model has been integrated to generate the virtual patient's responses.

Results: A total of ten case scenarios were developed, all focusing on self-medication in different patient populations, including pregnant women, chronically ill patients, paediatric and geriatric patients. The case scenarios were based on real-life community pharmacy situations relevant to pharmaceutical care, with an emphasis on managing drug-related problems, communicating with patients, and providing OTC medication counselling. Possible questions that pharmacy students might ask patients were structured using the WWHAM mnemonic (Who is the patient? What are the symptoms? How long have the symptoms been present? What action has been taken? What medication is being taken?). Initial feedback from the pharmacy students was very positive.

Conclusion: Developing a virtual patient web platform with engaging case study scenarios represents an innovative approach to enhancing the training experience for pharmacy students in Bulgaria. This approach to teaching pharmaceutical care will be integrated into the MPharm degree program at the Medical University of Plovdiv, Bulgaria. Future developments will focus on expanding the case library and incorporating feedback to further improve the educational impact of the virtual patient platform. Acknowledgements: This study is financed by the European Union–NextGenerationEU, through the National Recovery and Resilience Plan of the Republic of Bulgaria, project № BG-RRP-2.004-0007-C03.

Empowering educators to enhance student engagement: Comparing the Intention/Reflection (I/R) practice pre- and post-COVID-19 pandemic

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Background: The global COVID-19 pandemic caused irreversible changes to all aspects of human life and behaviour. In response to these disruptions, pharmacy educators and student pharmacists had to address new challenges related to isolation and disengagement. The Intention/Reflection (I/R) practice provides a framework to address these changes by encouraging engagement, motivation, and persistence, which positively affects metacognition and self-awareness. The aim of the study was to compare and characterise pre- and post-COVID-19 student pharmacists' engagement during Advanced Pharmacy Practice Experience (APPE) through the I/R practice and create a linkage between didactic courses and professional/personal learning outcomes.

Methods: A retrospective qualitative study was conducted with post-COVID-19 student pharmacists enrolled in APPEs across two colleges of pharmacy in the United States of America (USA). The student pharmacists' I/R documents were imported into Dedoose®, a qualitative software to be analysed thematically. The data were inductively coded, and the researchers met to discuss the codes, categories, and the emergent themes as compared to pre-COVID-19 student pharmacists.

Results: A sample of 33 APPE students over the 2015-2017 academic years were compared to 16 APPE students 2023-2025. One emergent theme was "Empowering students to strive/achieve towards goals" and sub-theme "enhancement of skills." This theme demonstrates the value of having students identify and connect their professional/personal learning outcomes through I/R practice. This connection is a crucial part of skill development as a future professional pharmacist. In addition, the sub-theme highlighted how certain skills such as time management and autonomy, empower students to accomplish goals.

Conclusion: The findings suggest that pharmacy educators should contemplate integrating the I/R practice into their experiential courses. In the context of this study, I/R may lead to a deeper understanding of student pharmacists' goals by providing enhanced awareness of skills such as time management while paying attention to details that will augment engagement.

Expanding pharmacy horizons: A 12-month ASHP-accredited PGY1 pharmacy residency program for international graduates in the United States

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Background: Founded in 1859 as the Chicago College of Pharmacy, the University of Illinois Chicago Retzky College of Pharmacy is one of the oldest in the United States. The college has contributed to the national advancement of clinical pharmacy practice by providing excellence in pharmacy education and training through the Doctor of Pharmacy programs and post-graduate training in residencies and fellowships. To increase its global impact, the college expanded its contribution to advance clinical pharmacy practice by establishing a program specifically for international pharmacists who aim to return to their countries to foster the growth of clinical pharmacy practice outside the United States. The objective of developing an ASHP-accredited PGY1 Pharmacy Residency Program for International Graduates is to provide an advanced training opportunity to international graduates of an ACPE-accredited PharmD program who aim to serve their native countries. Our program is designed to provide comprehensive clinical training and equip residents with the teaching and administrative skills necessary for success in academic and clinical leadership roles upon returning to their home countries. This ensures that our graduates are prepared to meet the global challenge of delivering exceptional clinical pharmacy care in a variety of settings.

Method: The International Residency program at the University of Illinois Chicago Retzky College of Pharmacy was established in 2017. The program is designed to provide a variety of clinical experiences in critical care, acute care medicine, ambulatory care, academia, and pharmacy systems. Residents are encouraged to select rotation sites that align with their educational and professional goals. As registered pharmacists, residents are expected to participate in pharmacy distribution processes and engage in the overnight on-call program, an exceptional opportunity to foster independent decision-making skills. Throughout the program, residents gain teaching experience through didactic lectures, specifically Pharmacy Grand Rounds, and ACPE-accredited seminars. They also have the unique opportunity to complete a Teaching Certificate and co-precept student pharmacists at clinical sites. In collaboration with our faculty, residents are expected to lead one research project and present findings at the ASHP Midyear meeting and the Regional Pharmacy Residency Conference. A manuscript of the research is required upon completion of the program.

Results: Since 2017, seven international graduates have successfully completed our program, with participants from Taiwan (four), China (two), and Saudi Arabia (one). These graduates have obtained five certifications from the Board of Pharmacy Specialties (BPS): three as Board-Certified Pharmacotherapy Specialists (BCPS), one as a Board-Certified Critical Care Pharmacist (BCCCP), and one as a Board-Certified Oncology Pharmacist (BCOP). Before returning to their home countries, three graduates pursued post-graduate year two (PGY2) training in Oncology, further enhancing their expertise. Currently, six graduates are working as clinical pharmacists in China, Taiwan, and Saudi Arabia.

Conclusion: The development and implementation of the ASHP-accredited PGY1 Pharmacy Residency Program for International Graduates is pivotal in driving the global expansion of clinical pharmacy, empowering clinical pharmacists to elevate the standard of care and advance pharmacy practice worldwide.

The knowledge and attitudes of pharmacy students in Ghana on antimicrobial use, resistance and stewardship

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Background: Antimicrobial Resistance (AMR) is a growing global health challenge that requires healthcare professionals, especially pharmacists, to actively engage in promoting responsible antimicrobial use and stewardship. Understanding pharmacy students' knowledge and attitudes towards antimicrobial use, resistance, and stewardship is crucial for identifying potential areas for improvement in their education and training.

Objective: The purpose of this study was to assess pharmacy students' knowledge and attitudes regarding antimicrobial use, resistance, and stewardship, with the goal of identifying knowledge gaps and areas for enhancing educational reforms or interventions.

Method: A mixed-methods research design was employed, incorporating both quantitative and qualitative approaches. The survey was conducted among 361 pharmacy students from five different universities in Ghana to evaluate their knowledge on antimicrobial agents, antimicrobial use, resistance mechanisms, and stewardship principles. Likert scale was used to determine their level of knowledge, attitude and practices. Frequencies and percentages were calculated for all variables. A grading scale was used to evaluate the level of knowledge students had on antimicrobial use, resistance and stewardship, as well as the quality and quantity of education they had on the topic.

Results: Majority of the students (90.0%) indicated that they had obtained training on antibiotic use and most of the knowledge acquired was from lectures from the university (70.8%) and the least was obtained through self-taught (4.9%). Majority (75.3%) of the students had good knowledge on antibiotic use while 24.1% showed excellent knowledge on the topic. Also, most of the students (54.3%) indicated that they have not obtained training on antimicrobial stewardship. However, for the 45.7% who had training, most of their knowledge came from lectures from university (71.5%) and the rest obtained theirs from internship (19.4%) and other means (2.4%). Results showed the majority (63.7%) of the students had fairly good knowledge on antimicrobial stewardship while 36.3% showed excellent knowledge on the goals and development strategies of antimicrobial stewardship. Most of the respondents attributed the menace of antimicrobial resistance to the widespread and overuse of antibiotics (64.2%), poor patient adherence to medication (59.5%) and the use of broad-spectrum antibiotics when narrow spectrum is available (44.2%). It was also found out that the majority of the students (71.5%) showed fairly good knowledge on antibiotic resistance while 28.5% showed excellent knowledge on the topic.

Conclusion: The study demonstrated that pharmacy students across all the universities share similar perceptions and attitudes in terms of antimicrobial stewardship, however, their level of knowledge on antimicrobial use and resistance is not encouraging enough even though adequate. The differences in the extent of undergraduate training on this topic provided by the various pharmacy schools were evident. The result of this survey draws attention to this important educational gap, with regards to their understanding of antimicrobial stewardship principles and the appropriate use of broad-spectrum antibiotics. Hence, the need for targeted educational interventions, including comprehensive antimicrobial stewardship curricula, practical clinical experiences and inter-professional collaboration.

Knowledge and attitudes of pharmacy interns in Ghana on antimicrobial use, resistance and stewardship

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Background: Antimicrobial resistance (AMR) is a global health crisis, particularly prevalent in low- and middle-income countries. Pharmacists play a crucial role in combating AMR, especially through antimicrobial stewardship (AMS) initiatives. In Ghana, the training of pharmacists includes a mandatory one-year internship before licensure, aimed at ensuring that graduates are well-prepared to deliver high-

quality pharmaceutical care. However, the extent to which this training equips interns to address AMR especially through AMS remains unclear.

Objective: This study aims to assess the knowledge and attitudes of pharmacy interns in Ghana on antimicrobial use (AMU), AMR and AMS to identify gaps or deficiencies in their training.

Method: A cross-sectional study was conducted among 195 interns using a structured questionnaire. Data was analysed using Google Spreadsheet and descriptive statistics were used to summarise the data obtained. All statistical tests were conducted at a 95% confidence level. Cross-tabulation was used to determine relationships between variables.

Results: Majority of the interns had received training on e (AMU) (92.3%), (AMR) (90.3 %) and (AMS) (81.5%). Although 89.2% of interns demonstrated high knowledge levels for AMU, 90.3% for AMR and for AMS, 74.4%, they lacked significant knowledge on practical implementation of AMS and were unsure about the goals and practices of AMS.

Conclusion: Though most interns had received training there were still critical knowledge gaps present. To bridge these gaps, integrating case-based learning and AMS-focused clinical rotations is recommended to ensure that the theoretical knowledge gained by the pharmacy interns is applied into real-world scenarios to equip them to be better stewards of antimicrobials.

Equity, diversity, inclusion and accessibility in pharmacy education: A scoping review

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Background: Equity, Diversity, Inclusion, and Accessibility (EDIA) are recognised as core principles in higher education. However, their practical integration into pharmacy education remains insufficiently explored. Given the diverse backgrounds of pharmacy students, fostering an inclusive learning environment is essential. Additionally, pharmacists need EDIA competencies to effectively serve an increasingly diverse patient population. Integrating EDIA principles into pharmacy education addresses the needs of the diverse student population, enhances representation, and improves patient care.

Objective: This scoping review provides a comprehensive overview of how EDIA principles are integrated into pharmacy education.

Methods: The search strategy followed the Population, Concept, and Context (PCC) framework. This review included studies examining the integration of EDIA principles in pharmacy education, focusing on three critical areas: faculty development, curriculum content, and teaching strategies. Eligible studies were conducted within formal pharmacy education settings, including academic, professional, or institutional contexts, and involved faculty members, students, administrators, or other stakeholders. A systematic search was performed in Embase (Ovid), Medline (Ovid), APA PsycINFO (Ovid), CINAHL (Ebsco), ERIC (Ebsco), and Web of Science. Backward snowballing was also employed. Data extraction was conducted systematically using a predefined tool to ensure consistency and accuracy. First, a descriptive analysis provided an overview of research trends and the extent to which different aspects of EDIA have been explored within pharmacy education. Next, a thematic analysis identified patterns and emerging themes across the studies. This process revealed common approaches and challenges in faculty development, curriculum content, and teaching strategies, while identifying similarities and differences. Additionally, this review highlighted gaps in the literature and areas that require further research.

Results: The search so far has yielded 5956 studies matching our criteria. Preliminary findings highlighted the growing recognition of EDIA in pharmacy education and the role pharmacists play in fostering an inclusive healthcare environment. While various frameworks exist to support EDIA implementation, many focused on isolated aspects rather than offering a comprehensive, systematic approach. The research aligns with broader findings in healthcare, where EDIA training reduced biases, but assessment methods remained inconsistent. Additionally, the majority of studies originated from the United States, whereas European research - relevant for the context of our pharmacy schools - on this topic remained limited.

Conclusion: The initial results highlighted the progress made in integrating EDIA principles into pharmacy education while also revealing existing gaps. The need for a cohesive framework, inconsistencies in assessing EDIA initiatives, and the regional imbalance in research underscored areas that require further attention. The insights this scoping review provided can inform future research and policy implications for pharmacy educators, educational developers, and institutions seeking to enhance EDIA integration in their programs.

Assessing the change in career pathway interest of Doctor of Pharmacy students from second to sixth year and the influencing factors: A biphasic cross-sectional study

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Background: Students of Doctor of Pharmacy (PharmD) programs are presented with several career choices upon graduation. Most studies cross-sectionally evaluated pharmacy students' career interests, but no study has evaluated the changes in career interests throughout the PharmD program. Therefore, we aimed to assess the change in career interests of PharmD students from early to late in the programme and the potential factors that influenced this change.

Methods: This biphasic cross-sectional study was conducted in one of the largest colleges of Pharmacy in Saudi Arabia (King Abdulaziz University, Jeddah, Saudi Arabia). The study involved collection of responses from two PharmD batches in two stages: the 2nd year (pre-phase) and the end of the last year (internship year). The link to the online survey was distributed solely to the students at this college via students' groups on WhatsApp. The first phase of data collection took place in 2018 and 2019, whereas the second phase took place in 2023 and 2024. The students were prompted to take the Pharmacist Pathway survey of the American Pharmacists Association (APhA; https://portal.pharmacist.com/pathway_survey). In the post-phase, the students were also asked about the factors that may have influenced the APhA survey results.

Results: Of the 97 students who completed both phases of the study, only 29 (29.9%) had their career choice results in the post-phase matching their pre-phase results based on their overall responses. Most participants in the pre-phase were uncertain about whether their career pathway results aligned with their interests, compared to a lower percentage in the post-phase (72.2% vs. 48.5%; p = 0.003). The most popular careers in the post-phase results were "clinical pharmacy specialist" (11.3%), "pharmaceutical company: sales and marketing" (11.3%), and "Academia: Clinical practice" (10.3%). A significant increase in the result "pharmaceutical company: sales and marketing" was observed from the pre- to the post-phase (1% vs. 11.3%; P=0.003). The most influential factors for career choice were the internship year (86.6%), salary/financial incentives (39.2%), previous graduates' experiences (35.1%), and influence family or friends (22.7%). Some participants selected more than one factor, indicating that career decisions were often influenced by a combination of factors.

Conclusion: This is the first study exploring the changes in pharmacy career pathway interests of PharmD students from the early to late stages of their program. These findings can be used by decision-makers in pharmacy colleges to take measures, such as enhancing the training experience by allowing training in different pharmacy sectors and inviting previous graduates to share their experiences. Given the dynamic nature of the pharmacy profession, educators should emphasise career counselling and mentorship throughout the PharmD program to prepare students for evolving roles in clinical and non-clinical settings.

Prevalence of anxiety and other associated psychosocial factors among pharmacy students in a university in Southern Nigeria

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Background: Anxiety is the most common mental health disorder in the general population, with an early age onset. It is a normal process in life but if it becomes severe or start to impair one's life functioning, it can be categorised as a disorder or illness functioning.

Objective: The study assessed the prevalence of anxiety and other associated psychosocial factors affecting Pharmacy Students and understand the relationship between the total anxiety scores and the participant character in a university in southern Nigeria.

Methods: The cross-sectional study involved 319 students. The study population involved all 200-500 level of the B. Pharm program. The descriptive statistics was summarised with mean, frequency, and standard deviation. The study lasted between April 2024 to February 2025. Anxiety scores of respondents in various demographics categories were compared using one-way analyses of variance and independent student's t-test to compare the impact of demographic characteristics on anxiety. Only the students who gave their informed consent participated in the study. Values less than 0.05 were considered statistically significant. Results: Age has statistically significant impact (p = 0.004), nationality (p = 0.0005), and religion (p = 0.039) on anxiety score. Students between 19 – 22 years had lowest anxiety score of 7.12 ± 5.14 when compared to those in 15-18 years age category. Students above 27 years have the highest anxiety score of 13.00 ± 6.54 which was significantly higher than those in 19-22 years age category. Total prevalence of anxiety in pharmacy students is 62.4%. 31, 7% have mild

anxiety, 13.9% have moderate anxiety while 16.8% have severe anxiety. Sleeping pattern and smoking also had significant effects on anxiety (p = 0.017) and (p = 0.019).

Conclusion: Majority of the respondents experience anxiety. Age, nationality, religion, sleeping pattern and smoking significantly affected anxiety among the respondents.

Prevalence and predictors of burnout among undergraduate pharmacy students in a Nigerian university

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Background: Nigerian university undergraduates experience serious and prolonged physical and mental strain in the course of their academic pursuit. Burnout is associated with decreased motivation for learning, feelings of lethargy, and a loss in academic performance. It can can result from stress if it is not well controlled.

Objective: We assessed the prevalence and predictors of burnout among undergraduate pharmacy students in a Nigerian university.

Methods: A cross-sectional survey was conducted among 220 undergraduate pharmacy students using a pre-tested questionnaire. The study lasted between March 2024 and February 2025. The questionnaire assessed the prevalence and predictors of burnout among undergraduate pharmacy students in a Nigerian university calculated with Yamane formula. The differences in multiple mean of more than two were analysed with Analysis of Variance. The qualitative variables were presented as frequencies and percentages and analysis was performed using Chi-square and Fisher-Exact tests. P-values less than 0.05 were considered to be statistically significant.

Results: Only 92.4% of the invited students participated in the study. More than half were females 137 (62.3%) while 83 (37.7%). Analysis of data showed exhaustion and disengagement, which was ascertained from the participants' admissions to feelings of tiredness before arriving at school (88.3%) and feeling weary and worn-out after school (84.5%), as the major predicting factors to Burnout. Prevalence of burnout was established at 37.3%, and comparison of the demographic variables with the outcomes revealed significant statistical relationship between Predictors of Burnout and age (p - 0.00), gender (p. -0.007), career plans (p - 0.00), and extra-curricular participation (p - 0.000) of the respondents. No significant statistical difference was established between the Contributing factors and respondents' marital status ($p > 0.05$) and plans for post-graduate studies ($p > 0.05$).

Conclusion: The prevalence of burnout among the respondents was low due to increased tolerance of the students to the stressful academic activities, while some admitted to searching for, and using different coping mechanisms. The major predictors of burnout were exhaustion and disengagement, as observed from the high participants' admissions to feelings of tiredness before arriving at school and feeling weary and worn-out after school.

Evaluation of bidirectional learning between the United Kingdom and Ghana and Uganda in the practice of Antimicrobial Stewardship

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Background: Antimicrobial resistance (AMR) remains a critical global health concern, and collaborative efforts are needed to strengthen Antimicrobial Stewardship (AMS) practices. Recent partnerships between the United Kingdom (UK) and Ghana and Uganda have aimed to foster bidirectional learning and capacity-building, yet little is known about how these exchanges translate into practical and sustainable changes in different healthcare settings. This study explored how AMS focused collaborations among UK, Ghanaian, and Ugandan healthcare professionals facilitated mutual learning, contextual adaptation, capacity building, and ongoing reflection. The overarching aim was to inform more effective, locally relevant AMS interventions.

Method: This was a qualitative study using semi-structured interviews. Fourteen participants (eight from the UK, two from Ghana, and four from Uganda) were purposively sampled to include a range of pharmacists, pharmacy technicians and academic staff involved in the Commonwealth Partnerships for Antimicrobial Stewardship (CwPAMS) programme. Participants gave consent to record interviews about their experiences with AMS initiatives and any mutual learning that took place. A topic guide was

developed and thematic analysis identified patterns across two key sets of collaborative activities - (i) an exchange between academics from Ghana who visited a teaching hospital in the UK and (ii) an exchange between Ugandan, Ghanaian and UK colleagues who were core members of a CwPAMS partnership.

Results: The key themes that emerged from the analysis included - observed mutual learning, contextual adaptation, capacity-building, stakeholder engagement, and challenges with measuring impact. There was more prominent one-way learning between participants who were not formally part of the CwPAMS programme, where Ghanaian academics gained insights from UK front-line clinicians on their visit. Experiences of the core partnership groups indicated that collaborations were more structured with set objectives and pre-visit planning, and this led to bidirectional learning, with greater systematic reflection and knowledge exchange. Challenges were also reported by the core partnership groups, such as cultural and communication barriers, resource constraints, and demonstrating long-term behavioural change among patients and the local community.

Conclusion: Bidirectional learning enriched AMS strategies through shared innovation and reflection. However, the depth of reciprocal exchange depended largely on pre-visit planning, explicit mutual objectives, and ongoing follow-up. Future partnerships should engage members and embed two-way learning from the outset to generate insights for both parties. Further research on integrating context-specific learning, and establishing locally adaptive mechanisms for measuring AMS impact, will provide evidence for ongoing collaboration.

Filipino students' experience and satisfaction with learning AI pharmacy in Taiwan: Evaluation of teaching, skill enhancement, and accessibility of AI tools

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Background: When students engage in cross-cultural learning, language barriers often pose the greatest obstacle, particularly in adapting to accents and linguistic styles. However, AI can frequently resolve this issue. AI enables students to gain a deeper understanding of different cultures and utilise AI tools such as chatbots and virtual reality to simulate cross-cultural interaction scenarios. This allows students to practice cross-cultural communication skills in a safe and interactive environment. This survey was conducted in the spring of 2025 among students from Cebu Doctors' University in the Philippines who participated in a short-term exchange program at Tajen University. After completing AI courses and experiencing virtual reality OSCE systems, the students were surveyed using a questionnaire based on the Course Experience Questionnaire (CEQ) framework. The survey aimed to explore the impact of AI on students' satisfaction with cross-cultural learning and to improve future AI applications in teaching.

Method: In this study, a questionnaire was designed to assess students' experiences with AI in teaching. The framework was based on the CEQ, covering aspects such as good teaching, basic skills, and overall course satisfaction. Additionally, the questionnaire included content related to the accessibility and satisfaction of AI learning tools to investigate the practical application effects of AI technology in teaching. The questionnaire used a 7-points Likert scale for scoring to collect subjective evaluations from students. An open-ended question was added at the end to encourage students to provide deeper feedback and suggestions, enhancing their participation and interaction.

Results: The questionnaire was completed by 18 fourth-year university students from Cebu Doctors' University, with 22.2% being male and 77.7% female, aged between 21 and 23, and enrolled in pharmacy and nursing programs. Over 61% of the students frequently or daily used AI tools, including Chat GPT, Med AI, and Gemini. Our recent learning satisfaction assessment showed encouraging results. Students' overall satisfaction was very high at 6.91/7, indicating satisfaction with course content, teaching methods, and learning experiences. They also praised tool accessibility, scoring 6.67/7 for ease of use, design, functionality, and error handling, finding the tools user-friendly and effective. Students highly praised good teaching practices, scoring 6.83/7 for teacher support, teaching design, feedback, and classroom interactions. They were also satisfied with generic skills development, scoring 6.69/7 for communication, teamwork, problem-solving, and critical thinking. Additionally, learning outcomes received a score of 6.61/7, indicating satisfaction with knowledge mastery, skill enhancement, practical application, and learning motivation.

Conclusion: The application of AI in cross-cultural learning plays a crucial role in eliminating language barriers and cultural differences. Through AI tools such as chatbots and virtual reality technology, students can practice cross-cultural communication skills in a safe and interactive environment. The survey results show that students gave high evaluations for the accessibility and satisfaction of AI tools, indicating that AI significantly enhances students' cross-cultural learning experiences and satisfaction. In the future, AI technology should be further integrated to improve learning efficiency and experience. Additionally, more practice time and feedback mechanisms are needed to optimise the application of AI in cross-cultural education.

Exploring leadership perceptions, preparedness and development in pharmacy education: A multi-regional cross-sectional study

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Background: Healthcare systems globally are facing challenges such as a rapidly aging populations, increased comorbidities, chronic conditions and resource constraints. This increases the need for clinicians to possess leadership skills and abilities for optimal patient care. A recent systematic review found disagreement and ambiguity in leadership competencies conceptualisation within pharmacy education, highlighting the need for a consistent framework for leadership development. Pharmacists' roles are evolving into more clinical and leadership responsibilities. However, it is not clear how curricula change within pharmacy education globally focus on leadership development. This study aimed to explore pharmacy students' and educators' perceptions of leadership, leadership preparedness and development within pharmacy education across regions. Objectives: to investigate how pharmacy students and educators perceive leadership and pharmacy leadership roles; to investigate leadership preparedness for an evolving profession; to explore gaps in leadership development and training within pharmacy education; to suggest improvements that could be made for future pharmacy educational practices.

Methods: A cross-sectional and multi-regional study was conducted by the distribution of a semi-structured Microsoft Forms questionnaire to pharmacy students and educators in universities within the regions of Europe, Asia, Middle East, Africa and Region of the Americas using convenience sampling between November 2024 to February 2025. The questionnaire consisted of mainly close-ended, multiple-choice, Likert-scale questions and open-ended questions allowing both quantitative and qualitative data analysis. Questions were based on demographics, leadership perceptions, readiness, development and skills. Ethical approval was obtained from the University of Birmingham School of Pharmacy Safety and Ethics Subcommittee 2024.

Results: Out of 824 respondents with 757 students and 61 educators, majority (n > 741, > 90%) recognised the importance of leadership and leadership skills as the profession evolves and reported satisfied or very satisfied with pharmacy leadership positions (n = 689, 83.62%). However, only 252 participants (30.58%) strongly agreed that they were sufficiently being prepared for leadership roles by their education or continuous professional development. A significant proportion of both pharmacy students and educators (94.17%, n = 776) agreed and strongly agreed that pharmacy education should include more leadership development. There were significant associations between respondents' regions and leadership roles satisfaction and leadership preparedness ($p < 0.001$). There were significant associations between frequency of leadership training and undertaking leadership positions and how equipped respondents felt to undertake future leadership roles ($p < 0.001$). Key themes were identified for leadership development gaps and improvements. This included insufficient practical training and mentoring opportunities and the need for more consistent and practical leadership development, mentoring and inter-professional education (IPE).

Conclusion: Pharmacy students can benefit from additional leadership development opportunities featuring practical and experiential methods embedded within pharmacy education to enhance their leadership skills and preparedness. The study findings serve as a strong foundation for future research and the implementation of educational policies, practices and curricula changes for pharmacy leadership development globally. Future research could include equal representation of regions and qualitative methods such as focus groups and interviews to provide greater insights, more in-depth and generalisable findings.

Expanding student engagement and feedback during experiential learning in healthcare consulting in the biopharmaceutical industry

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Background: Students expressing interest in pursuing careers in the biopharmaceutical industry and enrolment in the Biopharmaceutical Marketing Master of Science degree program have increased substantially at the University of Southern California Alfred E. Mann School of Pharmacy and Pharmaceutical Sciences. Hence, the goal was to develop a course that provided real-world experiences in projects that are common in the development and commercialization of biopharmaceuticals and the healthcare consulting industry. Herein is an update on the implementation of the course and assessments that have been added to enhance student engagement and feedback.

Methods: In 2020, a healthcare consulting Enterprise Team Projects (ETP) course was created where students applied knowledge/skills learned from prior coursework to complete real-world company-sponsored projects. ETP students were assigned to company-sponsored project teams and worked under the guidance of a company liaison for semester-long, for-credit, team-based projects. Areas of study included product development and commercialisation, healthcare decision analysis, health technology assessment, and health policy. Feedback from students and sponsor companies was collected at the end of the course via online student course questionnaires, peer assessments, and sponsor surveys. To increase engagement and the opportunities for students to provide and receive more robust feedback regarding their experiences, mid-semester peer assessments and in-person team presentations to faculty advisors have been added. A final reflections paper is now included at the end of the project regarding individual learnings to carry forward.

Results: From Fall 2020 through Spring 2025, 22 biopharmaceutical, consulting, medical device and healthcare-system companies have sponsored 28 projects that included 159 students in the Biopharmaceutical Marketing and Healthcare Decision Analysis master's degree programs in the Division of Healthcare and Biopharmaceutical Business. Projects included product and portfolio strategy, evaluation of health technology assessment models, disease-specific qualitative and quantitative market research, competitor analysis, payer landscape, target market budget impact modelling, and patient reported outcome strategy, amongst other topics. Students reported development of communication, literature search, critical thinking, presentation, team performance, project management, data analysis, leveraging diversity, and problem-solving skills. Students also reported heightened confidence, agility to navigate ambiguity, scientific rigor, adaptability, and distilling actionable insights from complex datasets. Students also reported increased knowledge of project-specific topics such as cell therapy targets, biopharmaceutical reimbursement and pricing, disease state knowledge, U.S. Food and Drug Administration requirements for medical devices, and international healthcare markets. Students have had opportunities to visit biopharmaceutical company headquarters to present their project deliverables, and have authored white papers and abstracts to report their findings. Student feedback indicates satisfaction with the course structure and topics.

Conclusion: ETP is a capstone course providing real-world project-based consulting that helps students prepare for roles in the biopharmaceutical, medical device, healthcare consulting, and health-system segments of the industry. In addition to industry knowledge, students reported development of essential skills that are important for career success. Opportunities for further enhancing the course experience include improved matching of students' skillsets and career aspirations to specific projects, expanded course assessment to include post graduate surveys, and identifying international project sponsors.

No-To-Nicotine: Empowering future pharmacists in smoking and vaping cessation

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Background: Vaping has emerged as a risk to public health, threatening to reverse the advancements made in smoking. Pharmacists at the forefront of primary healthcare are equipped with the clinical expertise and confidence to provide smoking cessation services. While there is limited evidence on the role of vaping as a smoking cessation aid, there are dangers due to the addictiveness of nicotine and other chemicals. Evolving Australian vaping regulations have caused pharmacists to handle vaping-related health requests with or without a prescription. As future pharmacists, pharmacy students need to be trained in effective communication around smoking and vaping cessation, adhere to current guidelines, and manage individual risk to those who smoke and /or vape.

Objective: To develop and evaluate an educational module addressing key awareness and skill gaps on health, effective communication and evidence-based cessation strategies in pharmacy undergraduate students around the impact of smoking and vaping.

Methods: The No-To-Nicotine educational module was designed and embedded in PHAR2911, a pharmacy subject for second-year students at the University of Sydney. Two hundred sixty-seven students attended the module. The educational module comprised of two hours of face-to-face lectures (one on smoking and one on vaping), a pre-module questionnaire, a 2.5-hour interactive workshop and a post-module questionnaire, where participation in both pre-and post-questionnaires was voluntary. The interactive workshop involved case scenarios and skills practice, including assessing nicotine dependence, addressing common cessation challenges, counselling and communicating risks. Pedagogical principles, such as a flipped classroom approach, authentic clinical cases, and reflection, encouraged student engagement and participation. The pre-post module questionnaires were developed to assess the potential

knowledge gains and attitude shifts regarding smoking and vaping.

Results: There was an increase in knowledge gains from a 55.1% response rate (pre-mean total knowledge score 18.9 ± 5.6; post-mean total knowledge score 25.4 ± 5.0), demonstrating the change towards enhanced clinical skills and a better understanding of smoking and vaping. An improvement in attitudes indicated the positive impact of No-to-Nicotine on student perception of the public health impact of nicotine addiction and the role of pharmacists in a patient's quitting journey. The majority of student participants found that No-to-Nicotine was relevant to pharmacy practice with increased knowledge and understanding of smoking and vaping. This enabled them to have confidence and clinical expertise in future practice, which demonstrated the impact of the educational module.

Conclusion: The inclusion of No-to-Nicotine in future pharmacy curricula is able to train students to be empowered with the relevant knowledge and skills to address smoking and vaping cessation in pharmacy professional practice and adapt to evolving health regulations.

Master of science degrees in biopharmaceutical marketing and healthcare decision analysis to prepare PharmD students for business careers in the healthcare and biopharmaceutical industries

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Background: The percentage of PharmD students at our institution expressing a preference for a career in the pharmaceutical industry has substantially increased from 13.7% of the PharmD cohort in 2019 to 25.1% in 2024. The global pharmaceutical industry continues its significant expansion, driven by an aging global population, increasing chronic disease prevalence, rising healthcare costs, and drug development advancements. This expansion fuels the demand for skilled professionals with expertise in biopharmaceutical commercialization, healthcare policy, market access, and strategic decision-making. The objective was to offer matriculating PharmD students an opportunity to concurrently pursue a Master of Science (M.S.) in Biopharmaceutical Marketing (BPMK) or Healthcare Decision Analysis (HCDA). The programs provided a novel approach to integrating business and clinical education, equipping students with strategic decision-making skills in areas including, product commercialisation, market access, pricing, health policy, and healthcare analytics.

Method: Students in the PharmD program could enroll concurrently in the BPMK M.S. or HCDA M.S. degree program to earn a dual PharmD/M.S. degree. The BPMK M.S curriculum includes coursework in biopharmaceutical marketing management, market access and reimbursement, and product pricing and competition. It provides specialised training in product and portfolio strategy, global payer environments, value-based pricing, competitive landscape analysis, life-cycle management, and market access. The HCDA M.S. curriculum emphasises applied analytics and healthcare business decision-making, with courses in health economics and outcomes methodology, healthcare decision analysis, healthcare delivery, and healthcare data analytics. The program equips students with the skills to evaluate healthcare policies and optimise healthcare business strategies. Both programs blend theoretical knowledge with practical applications, featuring industry case studies, expert guest lecturers, and faculty with extensive industry experience. The M.S. degrees (27 – 33 units) can be completed concurrently with the PharmD degree. Certificate programs in BPMK and HCDA (12 units) are also available options.

Results: From 2021 through Spring 2025, 31 PharmD students from the USC Alfred E. Mann School of Pharmacy and Pharmaceutical Sciences have enrolled in the BPMK and HCDA M.S. degree and certificate programs. Feedback from students indicates that participation in the program has enhanced their confidence and preparedness for careers in the pharmaceutical industry. Students reported feeling better equipped for pharmacy industry fellowship and job interviews due to the specialised knowledge gained. Some expressed that the program provided them with the necessary skills to successfully transition into industry roles upon graduation, and that they felt ahead of their peers who had not completed the program, particularly in areas such as product commercialisation, market access, pricing strategy, and healthcare analytics.

Conclusion: The BPMK and HCDA programs address the growing demand for professionals equipped to work in interdisciplinary matrix roles across the healthcare and biopharmaceutical sectors. Future evaluations will analyse the impact of the dual PharmD/M.S. program on career readiness and industry placement rates through graduate surveys and employment tracking.

Exploring student leaders' motivation to engage in the interprofessional education student association: A qualitative study framed by self-determination theory

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Background: Interprofessional education (IPE) strengthens collaboration across health disciplines. Students' leadership in IPE encourages teamwork and respect for each other's roles. Student leadership, one of the main competencies attained in IPE, has been shown to foster collaborative care and to increase respect among health professionals. However, what maintains student engagement in voluntary IPE initiatives, such as the IPE Student Association (IPE SA) remains unclear. Based on Self-Determination Theory (SDT), which relates intrinsic motivation to the satisfaction of autonomy, competence and relatedness needs, we explored how fulfilling these needs influences students' engagement.

Objective: The study aims to explore the primary factors for health professions' students to actively participate in the IPE SA using SDT as a guiding framework. Methods: A descriptive qualitative study that included seventeen members of the IPE SA executive board from various health colleges at Qatar University. Semi-structured interviews were conducted online. All interviews were recorded, transcribed using Microsoft Teams©, and then thematically analysed with NVivo®. Deductive coding mapped data to the three SDT needs, while inductive coding captured emerging ideas; trustworthiness was reinforced through dual coding, member checking and achieving saturation.

Results: Twelve themes clustered under SDT needs, plus "suggestions" themes. Autonomy themes included intrinsic interest triggered by early IPE events, desire to make an impact and frustration when faculty overruled student decisions. Competence themes reflected increases in public speaking, budgeting, time management, and leadership. Relatedness themes highlighted cross-disciplinary friendships, mentor support, and peer appreciation as key factors for engagement. The suggestions domain called for clearer role definitions, more inclusive decision-making, balanced faculty oversight and alumni mentorship.

Conclusion: Sustaining engagement in the IPE SA arises through the mutually reinforcing satisfaction of autonomy, competence and relatedness. Implementing structured orientation, open idea-sharing forums, peer-mentoring pairs, transparent governance and alumni involvement can strengthen these needs, fostering a vibrant, student-driven interprofessional community within the association.

Distinctive features of pharmacy education in Taiwan and Malaysia: Insights for curriculum development

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Background: As the global population grows and healthcare needs become more complex, the demand for skilled pharmacists is rising. Pharmacy students represent the future of the pharmacy profession, and pharmacy education plays a pivotal role in preparing future pharmacists to provide high-quality healthcare. Comparing the pharmacy education systems in Taiwan and Malaysia offers valuable insights into how different education models prepare students to meet the growing demand for skilled pharmacists. Taiwan has been modifying pharmacy curricula based on the Pharm D program, which has long been practiced in the U.S., while Malaysia offers a four-year undergraduate program that is adopted in Australia and UK systems. To further refine the course structure and enhance student engagement, it still seems necessary to investigate pharmacy education in other developing countries in Asia and compare their distinctive features. Through an in-depth analysis of the differences between pharmacy courses in Taiwan and Malaysia, a better understanding can be achieved, leading to the formulation of effective strategies for pharmacy course design.

Method: The course structures of two representative universities specialising in pharmacy education in Taiwan and Malaysia were analysed. Their impacts on students' career prospects and professional development were also discussed.

Results: In both countries, pharmacy students obtain a bachelor's degree upon completing their programs. However, the duration differs: Malaysia offers a four-year program, while Taiwan's program ranges from four to six years. This variation is due to Taiwan gradually incorporating clinical pharmacy training into undergraduate programs, whereas Malaysia tends to provide such training after student graduates and practices during the professional phase. Traditional Chinese Medicine (TCM) is briefly covered in Malaysia, whereas in Taiwan, it is an integrated part of the basic curriculum. Pharmacists in Taiwan are allowed to dispense traditional Chinese medicine without additional certification, provided they have completed relative courses. The Objective Structured Clinical Examination (OSCE), which is commonly practiced in hospitals in Taiwan, also practiced in universities in Malaysia. Regarding graduation requirements, Malaysian pharmacy undergraduates earn credits primarily in industrial pharmacy (32.4%), followed by

hospital pharmacy (20.3%) and community pharmacy (20.3%). In contrast, Taiwan's curriculum mainly focuses on clinical pharmacy (30.3%), offering students more clinical experiences. Both education systems cultivate talents through tailored programs and are favoured for their distinctive features. Promoting the quality of pharmacy education can be realised by integration of diverse course design.

Conclusion: Pharmacy education plays a vital role in preparing students to engage effectively in pharmaceutical care. In addition to adopting models from Western countries, it is essential to consider examples from other Asian countries with similar cultural backgrounds. Experience sharing can diversify pharmacy curricula, ultimately enriching pharmacy education and advancing pharmacists' careers as healthcare practitioners who understand both patient needs and professional responsibilities.

Conceptualisation, implementation, and evaluation of resilience interventions in health sciences higher education: A scoping review

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Background: Resilience is a critical competency for health sciences students, enabling them to navigate academic and clinical challenges. Despite its significance, the conceptualisation, implementation, and evaluation of resilience interventions in higher education remain underexplored. This scoping review aimed to systematically map existing evidence on resilience interventions within health sciences disciplines in higher education and identify strategies that promote student well-being and academic success.

Method: The scoping review followed Arksey and O'Malley's framework, enhanced by Levac et al., and adhered to PRISMA-ScR guidelines. Comprehensive searches were conducted across MEDLINE, EMBASE, ERIC, and CINAHL databases for studies published between 2010 and 2025. Studies were included if they involved resilience interventions targeting health sciences students in higher education and utilised validated resilience assessment tools. Data were extracted on intervention characteristics, delivery methods, outcomes, and effectiveness, followed by thematic analysis to identify key patterns.

Results: Thirty-three studies met the inclusion criteria, encompassing interventions across medicine, nursing, and allied health disciplines. Active learning strategies, such as experiential learning, cognitive reframing, and peer-led discussions, were commonly associated with improved resilience outcomes. Interventions incorporating iterative practice and booster sessions demonstrated sustained benefits. Digital and hybrid models enhanced accessibility and engagement, particularly for diverse student populations. However, significant heterogeneity was observed in intervention design, outcome measures, and conceptualisation of resilience.

Conclusion: Effective resilience interventions in health sciences education are interactive, multifaceted, and contextually tailored. Programmes that combine active learning approaches with sustained engagement and accessible delivery modes show the greatest potential for promoting resilience and well-being. Future research should focus on standardising assessment tools, conducting longitudinal evaluations, and exploring scalable models for embedding resilience education within core curricula to enhance long-term student outcomes.

OSCEs and clinical competence in inpatient direct patient care experiential education

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Background: Objective structured clinical examinations (OSCEs) are a widely utilised assessment tool to assess observable behaviour in clinical skills. OSCEs test clinical competence of students via observation of their performance across multiple different stations. During an OSCE, students rotate from station to station and are assessed on skills according to a structured, reliable, valid assessment tool during a specific period of time. A well designed OSCE is utilised for its high fidelity as an assessment tool. At the University of Illinois Chicago (UIC) Retzky College of Pharmacy (COP), OSCEs were integrated into the experiential education curriculum as part of the introductory pharmacy practice experiences (IPPEs) in Fall 2023 to assess third year (P3) student pharmacist clinical competence and align assessments with the authentic work of the pharmacist in the clinical setting.

Objective: The objective of integrating OSCEs into experiential education assessment was to measure clinical competence in third year student pharmacists.

Methods: OSCEs were integrated into a P3 Inpatient Direct Patient Care IPPE experiential education course in Fall 2023. The OSCEs were designed to assess student pharmacists' individual competence in: conducting a patient interview in a direct patient care inpatient setting, performing medication reconciliation, collecting and identifying patient specific factors to be considered when developing an assessment and plan, creating a pharmacotherapeutic assessment and plan

for a patient considering their specific factors and utilizing evidence based medicine, and finally, composing a note that documents a patient encounter. During these OSCEs, students rotated through stations with opportunities to collect data from the electronic medical record, interview patients, complete medication reconciliations, and complete pharmacist consults, as they would in real world clinical settings in clinics. First time pass rates of OSCE assessments were analysed.

Results: In 2023-2024, the first-time pass rate for the OSCE assessment was 80.25% (157 total P3 student pharmacists). In course evaluations, students rated the course 4.61/5 when asked "Was the content used in this course relevant to pharmacy?" and 4.39/5 when asked "In-class learning/small group activities stimulated critical thinking about course material."

Conclusion: When integrated into experiential education, OSCE assessments provided P3 student pharmacists in inpatient direct patient care IPPEs an opportunity to demonstrate clinical competence relevant to pharmacy. The majority of students passed their inpatient OSCE assessment on their first attempt.

Authentic assessment in experiential education

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Background: Authentic assessment is a framework utilised to assess learners in real-life contexts through focusing on knowledge application. The framework of Authentic Assessment includes: authentic assessment tasks, physical/virtual context, social context, authentic assessment result, and authentic criteria. Authentic assessment may use simulations and problem-solving scenarios that illicit critical thinking in the learner. In pharmacy education, authentic assessment may involve observed structured clinical examinations that simulate the authentic work of the pharmacist.

Objective: The purpose is to apply the authentic assessment framework to assessment in experiential education to real-life context in student pharmacist assessment and education.

Methods: The authentic assessment framework was integrated into third year student pharmacist (P3) Direct Patient Care Introductory Pharmacy Practice Experience (IPPE) experiential education courses. Specifically, the authentic assessment framework was applied to objective structure clinical examinations (OSCEs) at the end of the semester. The OSCEs included: authentic assessment tasks (medication reconciliation, pharmacist consult, and patient interview), physical context in the simulation laboratory, social context in the authentic work of the pharmacist, authentic assessment results through demonstration of learner competencies, and authentic criteria based in criteria used in real life supported by evidence informed recommendations. Learners had 12 weeks of IPPEs on-site in a pharmacy environment to practice skills needed for direct patient care and their authentic assessment OSCEs. During the OSCEs at the end of the semester, students were assessed on their skills with the rubrics developed with authentic assessment criteria.

Results: The authentic assessment framework was successfully integrated into P3 Direct Patient Care IPPEs.

Conclusion: OSCEs built on authentic assessment principles are an effective assessment tool in experiential education.

Advancements in education and continued professional development in pharmacy: The commitment of the Argentinian Association of Pharmacists of Entre Ríos to pharmaceutical education

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Background: The International Pharmaceutical Federation (FIP) promotes collaboration among educational institutions, professionals, and leaders to enhance health through education and training in pharmacy and pharmaceutical sciences. This new paradigm of professional practice requires the development of new roles within pharmaceutical associations, urging a revision of their vision, mission, and goals to guide renewal and progress. In the region, the shortage of pharmacy graduates and the limited public awareness regarding various professional opportunities in the sector highlight the need for coordinated actions by professional associations. This paper addresses the active role that the Argentinian Association of Pharmacists of Entre Ríos (CoFaER) plays in mentoring and educating novice professionals in the region, as well as the interventions in the community aimed at promoting access to quality pharmaceutical services focused on comprehensive care. This outcome derives from a collaborative effort involving CoFaER, the National University of Entre Ríos, the National University of Rosario, and the Ministry of Health of Entre Ríos, among others.

Objective: The purpose is to strengthen education in pharmacy and pharmaceutical sciences to enhance

professional quality and efficiency in health service provision. This includes the development of leadership skills, academic provision, and pedagogic competencies among pharmacists, as well as facilitating the transition from university life to professional practice while adapting education to new social demands. Additionally, there is a goal to position pharmaceutical education as a fundamental pillar for public health.

Method: The study design is based on action-research methodology, which allows for continuous reflection and dynamic adjustments of the implemented strategies, in accordance with the emerging needs of pharmacists and the community. In collaboration with the National University of Entre Ríos and the National University of Rosario, as well as professional associations, the Argentinian Association of Pharmacists of Entre Ríos undertakes various initiatives to enhance academic and professional training, including specialised courses, diplomas, practical courses, among others. Training sessions are also promoted, taking into account the diverse areas of responsibility within our profession. In the community context, workshops and training sessions are developed, and programs are implemented aimed to ensuring access to information and protecting public health.

Results and Conclusion: The study demonstrates the commitment of the Argentinian Association of Pharmacists of Entre Ríos to the continuous improvement of pharmaceutical education and to establishing pharmacists as vital actors in public health in the region. Initiatives such as the signing of agreements for professional development and the inclusion of pre-professional internships in the university curriculum have been promoted. These actions have fostered consensus-based agreements with universities concerning the profile of the twenty-first-century pharmacist, thereby increasing the visibility of the role of pharmacy practitioners in community health.

From slides to visual stories: Infographic-based learning in a South African pharmacy program

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Background: Effective patient counselling and treatment decision-making are critical competencies for pharmacists managing skin infections and infestations. However, traditional student-led PowerPoint presentations often resulted in rote memorisation and passive learning, with critically engagement of content lacking. To encourage active participation and deeper understanding, a shift was made to an infographic-based approach, requiring students to independently research, synthesise information, and present it creatively. This modification aimed to enhance student accountability, problem-solving, and engagement while reinforcing sustainable learning practices in the third-year BPharm module at Sefako Makgatho Health Sciences University.

Objective: This pilot initiative aimed to assess whether replacing traditional PowerPoint group presentations with student-created infographics could:

1. Encourage deeper learning by requiring students to actively research and transform information into a visual format.
2. Improve understanding and retention of management strategies for skin infections and infestations.
3. Reinforce Problem-Based Learning (PBL) principles of self-directed and collaborative learning.
4. Develop students' health communication skills, ensuring they can effectively translate complex information for diverse audiences.

Method: Following an introductory lecture, third-year BPharm students were assigned specific skin infections and infestations to research. Rather than preparing traditional slides, groups were required to create infographics focusing on pharmacological and non-pharmacological management, patient counselling, and prevention strategies. This format pushed students to actively engage with content, prioritise key information, and present it in a visually compelling manner. The workshop included group presentations, followed by interactive discussions and peer feedback, reinforcing collaborative and reflective learning.

Results: The transition from PowerPoint presentations to infographics significantly increased student engagement, creativity, and knowledge retention. Students reported that the process of designing infographics helped them structure and internalise information more effectively compared to traditional presentations. Evaluations revealed that students felt more invested in their learning, as the activity required higher-order thinking, synthesis of concepts, and a stronger focus on patient-centred application. The interactive discussions further strengthened communication skills, mirroring real-world pharmacist-patient interactions.

Conclusion: Shifting from passive PowerPoint presentations to infographic creation fostered critical thinking, active learning, and independent problem-solving in the skin infections and infestations workshop. This sustainable, student-centred approach improved knowledge retention and engagement, equipping future pharmacists with the ability to communicate complex information effectively. Future iterations could explore longitudinal assessment of knowledge retention and refinement of infographic guidelines to enhance student learning outcomes. This approach holds potential for broader application across pharmacy education, promoting lifelong learning and enhanced professional competency.

Revitalising problem-based learning through a rotational OSPE Model: A sustainable approach in pharmacy education

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Background: Problem-Based Learning (PBL) has been a core principle of the BPharm curriculum at Sefako Makgatho Health Sciences University in South Africa, fostering critical thinking, problem-solving, and self-directed learning. However, recent observations suggest a dilution of PBL engagement, with students becoming passive participants in certain learning activities. Over the years, traditional group presentations on the anatomy and physiology of the musculoskeletal system have shown that students often relied on peers instead of engaging with the material individually, highlighting the need to update the workshop's delivery. This paper evaluates the effectiveness of a rotational OSPE (Objective Structured Practical Examination) model as a sustainable strategy to reintroduce PBL principles, enhance engagement, and strengthen knowledge retention.

Objective: This study aimed to assess whether a station-based OSPE model could:

1. Reinforce PBL principles by encouraging self-directed learning, problem-solving, and collaborative discussion.
2. Promote sustainable engagement through active, structured participation.
3. Improve knowledge retention and application in musculoskeletal system concepts.

Method: A two-session approach was implemented:

1. Session 1: Students participated in a scenario-based introduction that framed the workshop's DLOs in a clinical and problem-solving context.
2. Session 2: Students rotated through six OSPE-style stations, where two students per station answered assessed questions, while the rest engaged in peer discussions without marks, fostering a low-stakes, collaborative PBL-aligned learning environment. A post-workshop evaluation survey assessed student perceptions, engagement levels, and perceived learning effectiveness.

Results: Of 76 registered students, 45 completed the evaluation. Thematic analysis of open-ended questions identified key themes:

1. Reinforcing PBL Principles: Students reported engaging with all content areas instead of relying on group members, aligning with PBL's emphasis on independent learning.
2. Enhanced Knowledge Application & Critical Thinking: The interactive, case-based format encouraged students to apply concepts rather than memorise them.
3. Peer Learning & Collaboration: The low-stakes discussions allowed students to consolidate knowledge, supporting PBL's collaborative learning approach.
4. Challenges with Time & Content Load: While students valued the format, some found the volume of material challenging within the timeframe.

Conclusion: The rotational OSPE model successfully reintegrates PBL principles into pharmacy education, ensuring sustainable engagement, self-directed learning, and deeper knowledge retention. The structured, scenario-based approach bridges theoretical knowledge with practical application, reinforcing problem-solving skills critical for pharmacy practice. While students responded positively, future iterations should optimise content distribution and preparatory time. This model offers a scalable, sustainable solution for revitalising PBL-based curricula in pharmacy education globally.

Interactive fiction and learning from failure in postgraduate pharmacy education

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Background: Interactive Fiction (IF) is a type of gamebook in which players make decisions to control the narrative and experience the outcome and consequences of their decisions. The use of IF with undergraduate students has been effective in learning from error and enhancing clinical decision-making skills, which could also be beneficial for postgraduate (PG) learners. Unlike resource-heavy simulations, IF can be created easily for free in a standard web browser using Twine, a free-to-use resource that provides user support. The resulting IF can also be distributed for free, requires minimal instruction on its use, and allows participants to take on the role of a pharmacist in making clinical decisions on patient care. This has numerous benefits for both educators and students and aids in the equity of access for learners studying around the world through distance learning (DL).

Methods: Ethics approval was granted by Lancaster University. This mixed-methods study utilised anonymous questionnaires (distributed to students via the Canvas virtual learning environment) comprised of Likert-scale and open-ended questions. Complementary individual interviews with graduating students were conducted and transcribed using Microsoft Teams. Quantitative analysis was performed using SPSS. Thematic analysis of qualitative data was performed in NVIVO 14 through the lens of Green and Jenkins conceptual model of interactivity effects in IF. All participants were

clinical pharmacists enrolled in the part-time PG DL pharmacy courses at Queen's University, Belfast.

Results: 27 questionnaires were completed.100% found the IF beneficial and valuable for learning from errors and the consequences of poor decision-making. 100% reflected on their usual practice, with 92.6% reporting processes of deeper reflection and improved longitudinal knowledge construction indicators. 92.6% stated their experiences with IF were beneficial to clinical practice, with 48.1% consequentially enacting real-life changes. 96.3% reported strong feelings of responsibility for their actions, and non-UK students found it beneficial for practicing the principles of clinical pharmacy. 81.5% reported increased learning and actively enjoyed safely exploring the consequences of poor decision-making, with 100% agreeing that the different pathways helped them understand there can be more than one correct pathway. All five interviewees also reported that the realistic scenario enhanced reflection, improved knowledge recall, heightened responsibility for patient outcomes, and increased enjoyment. Participants would welcome more complex scenarios that challenged them both academically and professionally and non-clinical applications (e.g., ethical decision-making and dealing with conflict).

Conclusion: The results of this study demonstrate the potential for IF to be used in a variety of clinical and non-clinical scenarios of varying complexity to provoke reflection on both academic and professional knowledge and to improve decision-making skills. Compared to the existing literature, the impact of learning through IF appears to be enhanced due to the dual identities that participants wield as pharmacists and students, allowing them to see the potential consequences of decisions they made more clearly. To my knowledge, this is the first study that uses IF with PG pharmacists and has opened various avenues for further research in many areas, including inter- and multidisciplinary research.

Integrating generative artificial intelligence in pharmacy education: Lessons from a novel clinical assessment in a global distance-learning module

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Background: The use of generative AI (GenAI) is rapidly emerging in pharmacy education, with potential to advance clinical decision-making and reasoning skills. However, its role in education remains underexplored, particularly in global distance-learning environments, where pharmacists may have variable access to clinical resources but must still make informed clinical decisions. This work presents a novel assessment approach implemented in a global distance-learning postgraduate pain-management module. Pharmacists were required to critically appraise AI-generated responses to clinical queries against their usual clinical guidelines and resources, and subsequently, to consider the potential value of GenAI tools in assisting clinical decision-making. By sharing key insights, this work provides practical guidance for educators on integrating authentic GenAI application into pharmacy curricula, ensuring pharmacists, regardless of resource availability, develop the skills to critically assess AI-generated content while maintaining evidence-based, patient-centred care.

Methods: An assessment was developed that required students to use ChatGPT (version 3.5 – at the time of assessment design, this was one of the most powerful, freely-available models) alongside clinical guidelines to answer three case-based questions related to acute and chronic pain management. The scenarios varied in complexity, including identification of drug interactions, calculations, and multimorbidities. Specific prompts were developed and provided to students as part of assessment briefing information. On completion of this work, students were required to provide a critical reflection on the role of GenAI tools in clinical practice, incorporating relevant examples from their practice. To support students, video guidance on the assessment and ChatGPT use was provided, alongside a marking rubric outlining expectations and aiding feedback provision.

Results: 37 students completed the assessment, achieving an average assignment mark of 80% (range: 60%–94%), representing an improvement from the previous year's average of 53% (range 36%-75%). Student reflections indicated that the use of GenAI influenced their clinical reasoning, with many noting that ChatGPT prompted them to broaden their view and consider initially overlooked alternatives. Students also noted significant limitations with GenAI in clinical decision-making, including lack of patient-specific relevance, difficulty applying clinical guidelines, and the need for careful prompt phrasing, the latter recognised despite the use of a standardised prompt in the assessment.

Conclusion: This novel assessment successfully enhanced clinical decision-making by prompting deeper reflection and utilisation of locale-specific clinical resources. Importantly, it also demonstrates how GenAI can be effectively integrated into such activities, enabling enhanced training and evaluation of students' patient-centred practice, whilst also permitting students to think critically about the application of these technologies in their practice. Key considerations for educators include ensuring uniformity of GenAI technology, providing clear and specific prompts to maintain assessment consistency, and incorporating approaches to support student efficacy. The assessment's flexibility allowed for global applicability but resulted in high marking burdens due to varied clinical guidelines being used. This was streamlined by the use of a structured marking rubric. The findings from this work provide insights into how GenAI can be embedded within pharmacy programmes, simultaneously enhancing

awareness of impactful technologies such as GenAI and critical thinking skills.

Evaluating a 360-degree professionalism assessment tool for pharmacy students during community placement

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Background: Assessing professionalism in healthcare education is inherently challenging due to its subjective nature. Implementing a 360-degree feedback tool provides a more comprehensive and objective evaluation of students' competencies, aligning with national standards for pharmacy practice. This approach leverages multisource feedback to offer diverse perspectives, thus enhancing the reliability and validity of professionalism assessments.

Objective: This study aimed to evaluate the effectiveness of a 360-degree feedback assessment model during community placement rotations for Master of Pharmacy students. The objective was to explore the tool's capacity to integrate feedback from multiple sources, promote self-reflection to enhance student learning and professional development.

Methods: Prior to the commencement of placements, separate information sessions were conducted for preceptors, tutors, and students to outline the purpose, process, and expectations of the assessment tool. An online assessment form was designed using Qualtrics, incorporating values and behaviours aligned with the National Competency Standards Framework for Pharmacists in Australia. Students were evaluated across predefined professionalism criteria using a four-level performance scale, each assigned a numerical value. A section for qualitative feedback was also included to capture general comments. Each student was assessed by two site preceptors and a university tutor, ensuring diverse perspectives on their performance. Additionally, students conducted self-assessments using the same criteria, enabling a comparative analysis of self-perception versus external evaluation.

Results: The online assessment tool was effectively accessible across metropolitan and regional placement sites, facilitating consistent and timely feedback. The integration of multisource evaluations provided a holistic view of student performance, reducing biases associated with single-assessor models. Furthermore, the comparative feedback mechanism encouraged self-reflection, allowing students to critically evaluate their professional behaviours and identify areas for improvement.

Conclusion: The 360-degree feedback model proved to be an effective tool for assessing professionalism in workplace-integrated learning environments. It enhanced the feedback process, fostering student growth through reflective practice and continuous professional development. The findings support the continued use and refinement of this model to strengthen professionalism education in pharmacy programs.

Enhancing pharmacy students' application of the pharmacist patient care process and understanding of social determinants of health through simulation-based learning

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Background: In the United States, the Accreditation Council for Pharmacy Education (ACPE) is the national agency for the accreditation of professional degree programmes in pharmacy. ACPE standards require graduates to be able to provide person-centred care using the Pharmacists' Patient Care Process (PPCP), a framework that promotes a consistent approach to patient care, and mitigate health disparities, such as those caused by Social Determinants of Health (SDoH). Simulation-based learning experiences (SBLE), such as those provided through computer-based simulation (CBS) and standardised patients (SP), create opportunities for students to practise skills and scenarios in safe, controlled environments. SBLE may enable learners to develop competencies needed to effectively identify and address SDoH while delivering care through the PPCP and support professional pharmacy programmes in ensuring graduates are practice ready. There are advantages and disadvantages to each model of SBLE. The objective of this study is to compare faculty perceptions of students' ability to incorporate the PPCP and SDoH between two models of SBLE – 1) CBS + clinical note writing (Simulation A); and 2) CBS + SP (Simulation B) – within an ambulatory care clinical elective course.

Methods: This is a secondary analysis of a single-arm, pre-post design, mixed-method study that occurred from April 2024 to May 2024. In a 2-credit, 28-hour clinical elective in ambulatory care, third-year doctor of pharmacy students develop direct patient care skills, primarily through CBS

associated with biweekly electronic health record (EHR) review and clinical note assignments (Simulation A). Faculty expanded the CBS to include an SP session during which students reviewed the EHR, engaged in a clinical visit with the SP, and developed a care plan (Simulation B). A rubric using a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree) was created which evaluated five SDoH domains adapted from "Related Objectives" in the Health People 2030 project and the five components of the PPCP. Faculty completed the rubric for both simulations, basing it on the written clinical note for Simulation A and direct observation of explicit student reactions and behaviours for Simulation B. Any grades were an average of two faculty members' ratings.

Results: All enrolled students (n = 19) participated. Grades for SDoH domains for Simulation A were significantly higher (p = 0.0057) than for Simulation B. However, students scored higher during Simulation B in the "Education Access and Quality" and "Health Care and Quality" domains. The other three SDoH domains were significantly lower during Simulation B. There was no significant difference between faculty total grades for Simulation A and Simulation B for the PPCP domain.

Conclusion: Students were better able to address SoDH in written clinical notes than while engaging with an SP, possibly due to students having more exposure to this model of SBLE. As this is a single-site study with a small sample size, future research considering collaboration among institutions is warranted. There are multiple ways to incorporate SBLE within the curriculum and this study further emphasises the importance of early and repeated exposure to improve student's performance in real-life clinical practice.

Assessing the impact of the Africa leadership fellowship for antimicrobial stewardship: A mixed-methods evaluation

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Background: The Africa Leadership Fellowship on Antimicrobial Stewardship (ALF-A) was established to enhance pharmacists' leadership and antimicrobial stewardship (AMS) capabilities across eight sub-Saharan African countries. The programme, funded by the UK Department of Health and Social Care's Fleming Fund using UK Aid, aimed to provide pharmacists with comprehensive leadership training to support implementation of effective and sustainable AMS initiatives within their organisations and opportunities for professional growth. A significant gap exists in leadership training programmes specifically tailored for pharmacists in Africa. The study aimed to evaluate the effectiveness of the ALF-A Fellowship in enhancing personal and professional development, particularly in leadership skills and behaviours, while also identifying key lessons learned, areas for improvement, and strategies to enhance future iterations of the programme.

Method: This study utilised a mixed-methods approach, incorporating a descriptive analysis of an exit survey (invitations sent to n = 45), which employed Likert-scale ratings to assess perceived utility of Fellowship components, leadership development, self-assessment and 360-degree feedback processes, challenges encountered, and overall impact on individual and organisational performance. Additionally, semi-structured interviews were conducted with randomly selected fellows (n = 16) to explore their experiences, challenges, and perspectives in greater depth. All interviews were digitally recorded, transcribed verbatim, and subjected to thematic analysis using ATLAS.ti software. This study was part of internal quality improvement; hence, no ethical approvals were required.

Results: Findings demonstrate the significant impact of the ALF-A Fellowship on fellows' professional and leadership development. A total of 42 fellows participated in the survey, and 16 fellows participated in interviews. The Fellowship led to high-rated scores in leadership confidence (93%), communication skills (91.8%), and attention to detail (90.6%), reflecting its role in strengthening workplace competencies at an individual level at the end of the fellowship. AMS abilities improved (86.4%), though research-related skills were identified as an area for further enhancement (83.6%). At an organisational level, fellows perceived that task efficiency (93.4%), teamwork (90.4%), and cost efficiency (90.4%) improved, though patient satisfaction (77.6%) remained lower, indicating a need for greater patient-centred AMS strategies. Fellows found self-assessment and 360-degree feedback useful in setting leadership goals, reinforcing self-perception, and guiding professional growth. However, challenges included time constraints, lack of structured feedback opportunities, and potential bias in 360-degree feedback. Many emphasised the need for structured progress tracking and for leadership plans to serve as adaptable guides for continuous growth. Participants reported increased confidence, improved collaboration, and stronger leadership adaptability. However, applying newly learnt leadership skills was challenging due to organisational barriers, including limited institutional support, competing priorities, and lack of senior buy-in. Fellows struggled to engage colleagues in AMS initiatives, requiring flexible strategies to navigate busy schedules and resistance to change.

Conclusion: The ALF-A Fellowship enhanced pharmacists' leadership and AMS capabilities, improving confidence, teamwork, and workplace efficiency. However, organisational barriers, time constraints, and limited institutional support challenged skill application. Future iterations should strengthen progress tracking, research training, and institutional engagement for sustained impact.

Collaborative learning and better perception of pharmacy – student - teacher relationship

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Background: Collaborative learning is a powerful teaching strategy, especially in the context of pharmacy education, where students need to acquire both theoretical knowledge and practical skills. In the ever-evolving field of pharmacy, students are required not only to understand complex concepts but also to develop skills for teamwork, communication, and problem-solving, which are essential in clinical practice, research, and patient care. Collaborative learning offers a dynamic approach to achieve these goals. The aim of this research is to find a way in collaboration with students to more easily learn, understand and reproduce their knowledge of pharmaceutical sciences. Fifty students of the third and fourth year of pharmacy studies were analysed. With these students, the way of processing the material has changed, using new methods. The following methods are used for various chapters in pharmaceutical technology, biopharmacy and pharmaceutical practice.

Method: Pharmacy students can work in groups to analyse patient cases, discussing diagnosis, treatment options, drug interactions, and patient-specific factors.Group Projects: Group projects allow pharmacy students to collaborate on research topics, pharmaceutical formulations, or health campaigns.Role-playing Exercises: Pharmacy students can role-play scenarios such as counselling patients on drug use, advising healthcare providers on medication therapy management, or discussing drug side effects with patients. Problem-Based Learning (PBL): Students are given a problem (often a case study) that they must solve together. Peer Teaching: Students can be assigned to teach or explain complex topics to their peers. For example, one student might be responsible for explaining the mechanism of action of a certain drug, while another explains its clinical uses or side effects. Clinical Simulation: Students work in teams to simulate patient care, making treatment decisions, interpreting lab results, and managing drug therapies.

Results: After 1 year of using these methods, the results were visible. Improvements can be defined as: Improved Critical Thinking and Problem-Solving, Increased Retention and Understanding of Material, Improved Communication and Interpersonal Skills, Better Preparation for Professional Practice, Increased Engagement and Motivation, Enhanced Confidence in Application of Knowledge, Diverse Learning Styles and Perspectives, Improved Academic Performance, Development of Soft Skills (Leadership, Time Management, Conflict Resolution).

Conclusion: Collaborative learning is a highly effective educational strategy that fosters deeper understanding, skill development, and academic success. In various fields, including pharmacy education, it has been shown to improve students' critical thinking, problem-solving, and communication skills. Through group interactions, students are exposed to diverse perspectives, which enhances their ability to apply knowledge in real-world settings.

How do pharmacists improve their professional careers? Pharmaceutical specialities in Argentina

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Background: In 2018, the Argentinian Pharmaceutical Confederation (CoFA) and other scientific organisations attended several meetings, obtained from the Health Ministry, under resolution number 1186, the Certification of Pharmaceutical Specialities by the pharmacists's colleges. Although Argentina is a federal country, CoFA unifies the requirements at a national level, by providing the pharmaceutical speciality exam for those pharmacists who want to take it, which is prepared by the expert committees. The Argentinian pharmacists can certify their specialities in two different ways: one, directly, by presenting special documentation, such as a postgraduate degree in the various specialities and the other, indirectly, by passing an exam. One significant and important benefit of certifying a pharmaceutical speciality is that it is recognised in professional fees. CoFA has the single register of pharmaceutical specialists all over the country. There are seven pharmaceutical specialities: sterilisation, industrial pharmacy, hospital pharmacy, biopharmacy, nutrition and food analysis, community pharmacy, and health and legal pharmacy.

Objective: The objective of this work is to describe the pathway to obtain the certification of pharmaceutical specialities in Argentina.

Method: CoFA has the single national register with information about pharmacists' certified specialities. The register is created by the result of a specific process, in which CoFA sends the results of a specialty exam to the pharmacists'

colleges. Then those colleges send a final report notifying the certified pharmacists, those who passed the exam and those who were certified directly. Moreover, the final report includes the certification period and the certified pharmaceutical specialty.

Results: Analysing the information, the number of specialised pharmacists increased from 2019 to 2024, except for the pandemic period of 2020-2021. As mentioned before, the pharmacists who obtained the certified speciality were the following: in 2019, community pharmacy were 15; in 2020, community pharmacy were 6 and hospital pharmacy were 8; in 2021, community pharmacy were 6, hospital pharmacy were 21, industrial pharmacy were 2, and sterilisation was 1; in 2022, community pharmacy were 6, hospital pharmacy were 26, and sterilisation were 8; in 2023, hospital pharmacy were 12, sterilization were 13, and health and legal pharmacy were two. Finally, in 2024, community pharmacy were 7, hospital pharmacy were 20, industrial pharmacy were 2, and sterilisation were 12.

Conclusion: Although the number of pharmacists certified in their specialities is increasing, CoFA continues to take action to promote these pharmaceutical specialities on its social media and bring content about the specialities to the annual congress, among others. With more specialised pharmacists, we can advocate and improve the profession, as well as continue to achieve FIP´s development goals, such as 4) advanced and specialist development, 5) competency development, 9) continuing professional development strategies and 19) patient safety. Currently, CoFA is working on obtaining new pharmaceutical specialities.

Evaluating the Ministry of Health Foundation Training Program: Trainee perspectives and insights

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Background: The Ministry of Health (MOH) Foundation Training Program for newly employed pharmacists was initiated in September 2022. This comprehensive program is intended to provide early career pharmacists with critical skills and knowledge through a combination of academic and practical training. Since its inception, the program has successfully trained almost 700 pharmacists. The aim is to assess pharmacy trainees' perceptions of the MOH Foundation Training Program in Kuwait and identify areas for future improvement.

Method: This study employed a mixed-method approach to explore pharmacy trainees' perspectives towards the MOH training program in Kuwait. It primarily targeted all current and former pharmacy trainees enrolled in the program since its inception. Quantitative data was gathered through a questionnaire while thematic insights were explored through semi-structured interviews to allow further analysis. An ethical approval for this study was obtained from the Human Ethical Committee, Health Sciences Centre, Kuwait University.

Results: A total of 91 participants completed the questionnaire where 62.7% of them were recent graduates. The relevance of the content was reported positively by 74.7% of the participants. Primary healthcare rotations received the most positive feedback, with 68.9% agreeing that expectations were clearly communicated, compared to 56.1% in the hospital rotation. Participants felt most competent in dispensing (74.8%) and least in managing narcotics (56.1%). Satisfaction was higher for the primary healthcare rotation (67.1%) than for the hospital rotation (60.5%). The qualitative analysis identified four key themes: 1- trainees valued program exposure but suggested rotating between different hospitals for better workforce readiness. 2- Problem-based learning was preferred, but assignments were repetitive. 3- Time allocation and resources were insufficient, and 4- trainees felt preceptor availability and feedback were limited, highlighting the need for better-trained mentors.

Conclusion: The training program serves as a valuable tool and an effective approach to enhance knowledge and skills of pharmacy trainees. While a solid framework exists, further adjustments and a stricter enforcement are required to maximise its benefits.

The Impact of orientation day 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.

Objective: The objective 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 2025. The survey included demographics, orientation expectations, evaluations of preparedness for study, social connection, sense of inclusion and overall experiences.

Results: A total of 485 respondents completed the online survey across two undergraduate degrees at Monash University's Parkville campus. Survey responses indicated strong student social connection and belonging. 92% attended Orientation to meet new people, and 83% found this the most valuable aspect. Peer mentoring played a key role, with 100% engaging with a peer mentor and 92% finding them mostly or very helpful. Meeting a peer mentor helped 85% feel more socially connected, and 63% reported a sense of belonging from Day 1. Overall, 67% felt a strong sense of belonging to the Faculty post-Orientation, while only 6% reported little or none. Orientation also improved awareness of student support services, with 54% feeling mostly or very prepared to begin studies. Areas for improvement included more informal peer interaction (33%) and interactive activities (21%), though 40% suggested no changes, highlighting the program's effectiveness. These findings underscore the role of peer mentoring and social engagement in fostering student belonging.

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.

A novel approach to improving the listening skills of postgraduate pharmacists utilising a relationship counselling method

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Background: Effective communication skills are essential for pharmacists and include actively listening, using positive body language, asking open questions, remaining non-judgemental, and exploring the patient's/carer's ideas, concerns and expectations. When asked, the postgraduate pharmacists on the Pharmacist Independent Prescribing course indicated that dealing with difficult consultations was their top learning need. This included negotiation, closing consultations, and keeping patients on track. Actively listening is the key skill needed to build better relationships leading to better consultations and health outcomes.

Objective: To enhance pharmacists' listening skills using an adapted relationship counselling method focussing on listening; to let pharmacists experience listening and being listened to with peer and facilitator feedback; and to explore their learning from the experience.

Method: The method was adapted for a group setting from a relationship counselling method whereby couples must adhere to three rules when communicating: only one speaks at a time without interruption, questions cannot be asked, each can only speak about themselves using 'I'. Six listening workshops (two hours) ran with groups of 27 pharmacists (n = 162) facilitated by two staff in a large, quiet teaching space. In groups of three over three rounds, each pharmacist assumed the roles of speaker, listener for feelings perceived, and listener for facts once for three minutes. Speakers had up to three minutes to speak about a subject of their choice. The listeners were not allowed to speak. If the speaker had finished before the time was up, the group sat in silence. Then, the listeners conveyed in turn to the speaker the feelings perceived or facts they had heard without comment before the next round started. After the three rounds, participants answered three questions in writing (anonymously) about their experience of each role and posted them on a talking wall. A debriefing followed and participants' answers were utilised to guide discussions linking the experience to difficult consultations. After the workshop, participants could leave written comments about the overall experience. Both the answers on the talking wall and the comments were analysed thematically.

Results: Three main themes emerged from the talking wall postings; non-interruption (subthemes feeling heard, being listened to, enough/too much time to speak); listening differently (subthemes difference between facts/ feelings, fear of missing details or not understanding, no judgement);

silence (subthemes thinking space, talking urge, boredom). 32% (n = 52) of participants left comments highlighting the usefulness of focussing on actively listening, something they had not experienced in workshops before. They valued the personal experience and realised the applicability of the skill to any relationship. Some stated they would now try not to interrupt patients or others early. A few found the experience stressful but enjoyed the discussions.

Conclusion: Overall, pharmacists found the workshop beneficial for both their practice and real life. The method required discipline and led to meaningful discussions. Data collection could be improved by providing a post-workshop questionnaire. Focus groups or follow-up surveys could be used to investigate the longer-term impact of the workshop. The initial results of using this approach encourage further development and research.

Collaborative practice between universities: Creating sustainable infrastructure for experiential learning across large cohorts and geographies

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Background: In 2021, the General Pharmaceutical Council (GPhC, UK regulatory body for pharmacy) introduced updated Standards for the Initial Education and Training of Pharmacists (IET Standards). These new IET Standards added prescribing competencies into both the undergraduate MPharm and graduate Foundation Training year. Successful completion of this training is a pre-requisite for registration as a pharmacist in the UK. From August 2026 all successful trainees will register as prescribing pharmacists, at the start of their career. Every UK School is required to undertake quality assurance and accredit all experiential placement providers. With increasing placement demand, training centres usually work with multiple Schools of Pharmacy, undergoing separate accreditation processes for each. The Pan London Consortium was established in 2024 with support from NHS England, and comprises University College London (UCL), Kings College London, and Kingston University. The Consortium established a need to unify accreditation procedures, to create a single process for training centres across London, to ensure the highest standard of experiential placement provision whilst avoiding duplication and reducing administrative burden.

Method: A Quality Assurance (QA) Working Group was established. Each School of Pharmacy shared their existing accreditation documents and process, and list of affiliated training centres. A single accreditation form was devised with a mandatory core section addressing quality, governance and education provision in the training centre, followed by programme-specific sections. Each section was designed as a series of statements for respondents to answer 'agree' or 'disagree', with additional areas for free text and the ability to upload documents. The draft accreditation process was shared with NHS England and multiple training centres for feedback, to ensure clarity and transparency. A bespoke database was designed to facilitate storage of completed accreditation forms and records for each training centre across the London geography.

Results: A single, online accreditation form was produced and approved in March 2025, for quality assurance of all undergraduate and postgraduate experiential pharmacy placements served by the Consortium, in partnership with 101 training centres hosting 2,870 students. This was accompanied by a handbook describing the new process. A lead School of Pharmacy was assigned to each training centre to oversee its accreditation process. Each training centre logs into the web-based accreditation form using the lead contact's workplace credentials and secure access. The database is in the final stages of development with implementation planned for Quarter 1, 2025.

Conclusion: The new IET Standards required UK Schools of Pharmacy to expand experiential placement offerings, to develop and demonstrate practical clinical skills ahead of entering Foundation Training. This highlights the need for a change in training culture between university sectors and healthcare providers. Innovative quality assurance is one mechanism of driving change. The tripartite approach to quality assurance has been welcomed by training centres. Inclusion of training centre representatives at each stage ensured the regulatory requirements are met whilst creating a mutually beneficial process. The Pan London Consortium are collaborating on additional areas of shared responsibility, including placement supervisor training and e-portfolio design, to further harmonise our partnerships with our training centres.

A blended training approach to equipping pharmacists with requisite skills to provide medication therapy management (MTM) services in Ghana

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Background: The role of pharmacists has expanded beyond dispensing medications to include a more patient-centred approach, covering medication therapy optimization, addressing medication-related concerns and delivering tailored care to enhance patient outcomes. MTM encompasses all services provided to individual patients aimed at optimising therapeutic outcomes from their medicines. Though the standard undergraduate pharmacy curriculum equips pharmacists with dispensing and basic counselling skills, it does not adequately prepare them with the specialised knowledge and skills needed to address complex medication-related issues, help patients overcome barriers to adherence and achieve optimal medication therapy goals.

Method: In response to the growing need for pharmacists with enhanced skills to offer MTM services in Ghana, a comprehensive MTM training programme was designed by the Ghana College of Pharmacists in collaboration with the Pharmaceutical Society of Ghana (PSGH) and Health Access Network (HAN). The multimodal training programme, which combines online modules, interactive tutorial sessions and Objective Structured Clinical Examination(OSCE), was put together to equip pharmacists with the necessary skills to provide patient-centred MTM services for optimal outcomes. The training material contains three modules which are taken progressively. It is a self-paced training but has a duration within which all modules should be completed. Participants have access to learning materials with accompanying videos to facilitate learning. There is an interactive tutorial session with the facilitators on completion of each module. Candidates undergo modular assessment to evaluate the learning that has taken place during the session. Upon completion of all three modules, a final assessment is undertaken using simulated case scenarios where participants have to provide real time MTM services to standardised patients.

Results: A pilot cohort of 44 pharmacists participated in the programme. All 44 have successfully completed all three modules. During the final assessment, 35 demonstrated adequate knowledge, skills and confidence in delivering MTM services. The remaining participants are eligible to retake the assessment. The design of the programme allows practicing pharmacists to acquire the needed skills to provide MTM services.

Conclusion: The method of assessment adequately evaluates the knowledge, skills and confidence of participants to provide MTM services for improved patient outcomes. Building on this success, plans are underway to scale up the training programme to at least an additional 500 pharmacists across the country. It is expected that as more pharmacists go through the training programme, patient-centred care will be enhanced across the country to improve therapeutic outcomes.

Addressing the gap in oncology pharmacy services: A training initiative in Ghana

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Background: The practice of pharmacy has traditionally focused on dispensing medicines to patients mainly based on prescriptions. In the early 1990's, Hepler and Strand introduced the pharmaceutical care model to emphasise that the role of the pharmacist involves "the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life". As the management of conditions, including cancers, has become more complex, the role of pharmacists with advanced pharmaceutical skills has become more important for improved patient outcomes. This is more so because of the expansion in the medication options available. Pharmacists with specialised skills in supporting cancer care are critical to effectively respond to the needs of patients. The Ghana College of Pharmacists, with support from partners has developed curriculum for a two-month internship program to build capacity of pharmacists in the preparation and handling of oncology medications. This training is designed to address a critical need for skilled pharmacists in this area, particularly in facilities with emerging oncology units to address the gap. The training has also been extended to facilities with established oncology units, but which lack pharmacists who are well equipped to handle the medications used in chemotherapy.

Method: The programme was designed after engagements with stakeholders identified this skill as lacking among pharmacists who support cancer care management. The curriculum for training includes both a conceptual basis of the skills and practical exposure with real life practice of handling and preparation of the medications. The training includes an assessment of interns to test their understanding of the concepts taught as well as their ability to properly prepare and handle chemotherapy medications.

Results: Forty-two (42) pharmacists from health facilities across Ghana and the sub-region have completed the training since its inception. Out of this number, three (3) are from Sierra Leone, one (1) from Liberia and the remaining thirty-

eight (38) from various health facilities across the country. Twenty-nine (29) males and thirteen (13) females have successfully gone through the training and have been certified in handling and preparation of oncology medications. Pharmacists who have successfully completed the training are contributing to cancer management in the following areas: proper reconstitution and storage of cytotoxic medicines, counselling for patients and their caregivers as well as handling and disposal of pharmaceutical waste in oncology wards.

Conclusion: As a result of the impact being made by beneficiaries of this programme, there is an increase in interest from stakeholders. The Ghana Health Service and Christian Health Association of Ghana have requested the training of 120 pharmacists from their facilities across the country. The College further expects to train an increased number of pharmacists across the sub-Saharan region. The design and delivery of this training has built the capacity of pharmacists in institutions with budding and established cancer care units for improved patient outcomes.

Evaluating education for pharmacist prescribing: Preliminary results of a realist synthesis

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Background: Pharmacist prescribing education requirements vary internationally. While there is significant literature on pharmacy prescribing, there is a paucity of literature focused on evaluating pharmacist prescribing courses. This realist synthesis will address the research question: To what extent do pharmacy prescribing education interventions work (or not), for whom and under what circumstances, and why? Pharmacist prescribing courses will be critically assessed covering aspects such as content, teaching methods, delivery, underpinning theories, models, or frameworks.

Method: This realist synthesis followed the RAMESES publication standards and Pawson's five key steps: (1) define the scope of the review, (2) outline the search strategy, (3) select studies, (4) extract and analyse data, and (5) synthesise the evidence and draw conclusions. The search strategy was applied in PubMed, Scopus, Web of Science and Cumulative Index to Nursing and Allied Health Literature (CINAHL) to the July 2024. Inclusion criteria were: (a) studies focusing on pharmacy prescribing education or non-medical prescribing programs involving pharmacists; (b) studies using any research methodology; (c) primary research studies; (d) studies conducted in any country; and (e) studies written in English. Papers were excluded if they were secondary literature (i.e., literature reviews), news articles, book chapters, letters, opinion pieces, editorials, dissertations, and conference presentations, posters or abstracts. Grey literature was also reviewed to inform the development of an initial program theory. This search followed a modified methodology by Godin et al. and included sources such as Google, university websites, regulatory bodies, pharmacy and medical organisations (e.g., General Pharmaceutical Council accreditation reports), and Overton.

Results: A total of 1,801 articles of published peer-reviewed literature underwent title and abstract screening, and 155 underwent full-text review, yielding 25 articles in the final synthesis. Data extraction on contexts (C), mechanisms (M), outcomes (O) and CMO configurations (CMOCs) is ongoing. The education programs reviewed so far share comparable content, typically organised around national competency frameworks. Course design however differs based on country, cohort size and composition (only pharmacists versus multiprofessional), and delivery mode (face-to-face, online, or hybrid). Preliminary findings on programs indicate the use of simulation (context) which seem to generate improved student knowledge and confidence (outcomes) through replicating real-life scenarios and theory-practice integration (mechanisms). Programs also improved learners' abilities to address complex problems (outcome) through social learning (mechanism). They also improved students' knowledge application, reflective practice, and learning engagement (outcomes) through flipped classroom and blended learning (mechanisms). Finally, programs improved confidence (outcome) through support networks, including the availability of mentors or prescribing practitioners (mechanisms).

Conclusion: This realist synthesis exposes mechanisms generating positive learner outcomes. Pedagogical approaches facilitating interactivity such as simulation, blended and social learning (with peers and mentors) may need prioritisation by pharmacy prescribing education to maximise learning outcomes. The findings aim to establish best practices for both undergraduate and postgraduate programs. Future realist evaluations could establish best practices for both undergraduate and postgraduate programs and identify out how contexts trigger mechanisms, as well as examine the long-term effectiveness of various pedagogical approaches.

Exploring student experiences of marginalisation and inclusion in pharmacy education

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Background: In recent years, migration and international contexts have led to populations in European countries becoming more multicultural, which has contributed to an increase in the diversity of students in tertiary settings. Due to this change in educational environments, the need for improved inclusivity and a sense of belonging has been highlighted as essential for effective learning. To enhance learning experiences, it is fundamental to provide an environment where students feel safe to be authentic, make mistakes and continue learning. Multiple factors are involved for inclusion as well as for marginalisation among students, and it is important to acknowledge the contribution of these factors to students' learning experiences in order to form strategies for creating more inclusive and thriving educational environments. This is particularly important in pharmacy education, as students build on demanding analytical, technical and interpersonal skills that are required to become well-rounded future pharmacists. The population a pharmacist serves can be very diverse, so connection with patients from different cultures and walks of life needs to be established in order to enhance person-centred care.

Objective: This research seeks to describe the factors which contribute to university students feeling a sense of belonging and connection, as well as the common barriers to creating inclusive environments for higher education courses, including training programs for health professions like pharmacy.

Methods: A narrative literature review was conducted to identify student experiences regarding marginalisation and inclusion. Databases including PsycInfo, PubMed, ERIC and Cinahl were searched, results combined, and duplicates removed. Three authors independently screened titles and abstracts against inclusion criteria, which included university, tertiary and higher education students. Full text screening was conducted in duplicate with a third researcher moderating disagreements. Data from the included articles were extracted and thematically analysed to identify recurring themes. Themes were grouped to allow the exploration and conducting of data abstraction and narrative discussion.

Results: Ten articles out of a total 469 distinct database results met inclusion criteria and were found to highlight multiple themes. Key themes included the roles of stereotyping, embracing differences and diversity, using multiculturalist approaches, and the interplay of social connectedness between national and immigrant students. The themes found in these articles call attention to how educational institutions can consider implementing strategies to enhance inclusive educational environments and minimise students' feelings of marginalisation.

Conclusion: The research findings indicate the need for inclusive educational environments to enhance students' sense of belonging and engagement in university programs. By better understanding factors that contribute to inclusion and/or marginalisation of students, educational institutions can be better informed to create initiatives and foster a sense of mattering in tertiary courses. Through these initiatives, students can become more motivated to put these principles into practice as future pharmacists. The findings from this narrative literature review will be used to aid in an international collaboration between pharmacy schools in Spain, the Netherlands, Finland and Norway that will investigate how pharmacy education can be made more inclusive.

Preparing pharmacy students to communicate effectively with adolescents: A Global PharmAlliance course

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Background: Addressing young people's health issues in isolation neglects their holistic wellbeing, as mental and physical health are inextricably linked and shaped by social connections. Young people favour an integrated, youth-centred approach that recognises their needs, provides support, underscores positivity, and enhances coping strategies. Building on effective interventions, six core principles grounded in resilience offer pharmacy educators a framework for delivering holistic support. Integrating these principles into core pharmacy curricula ensures future practitioners are equipped to address youth needs comprehensively and foster resilience in young populations. Academics from UCL School of Pharmacy (UK), UNC Eshelman School of Pharmacy (US), and the Monash Faculty of Pharmacy and Pharmaceutical Sciences (Australia) collaborated to develop a course that equips pharmacy students with the skills to communicate effectively with young people. A preliminary evaluation assessed its impact on pharmacy students' self-efficacy (confidence) and knowledge regarding the importance of youth counselling and related techniques.

Methods: The course structure drew on best practices in communication and established techniques, incorporating reference technology to create an interactive platform. It

featured two online modules and an in-person tutorial. Pharmacy students enrolled in four-year Bachelor's, Master's, or Doctor of Pharmacy programmes across all three universities evaluated the course through pre- and post-questionnaires (either hard copy or online).

Results: A total of 31 students submitted paired pre- and post-questionnaires. Most were female (67.7%), with a mean age of 24.9 years (SD = 5.6). They were in their first (32.3%), second (16.1%), or third (51.6%) year of study. More than 80% somewhat or strongly agreed that the course enhanced their comfort in interacting with young people in pharmacy settings. Mean (SD) self-efficacy rose from 21.7 (4.0) to 24.9 (4.5), and mean (SD) knowledge increased from 5.2 (1.5) to 6.6 (1.6). These improvements were statistically significant.

Conclusion: This course improved pharmacy students' self-efficacy and knowledge around youth counselling and communication techniques. Future research should broaden its evaluation to more universities worldwide, assessing its suitability in various contexts and determining the best placement within pharmacy curricula.

Knowledge and awareness of radio-pharmacy and nuclear medicine among pharmacy students at a health sciences university in Gauteng

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Background: Nuclear Medicine is a rapidly growing field in South Africa with many important applications in the diagnosis and treatment of various conditions. Radio-pharmacists are needed to prepare and handle the radiopharmaceuticals needed for Nuclear Medicine imaging procedures, but a shortage of radio-pharmacists has been identified in South Africa and in Africa as a whole. Radio-pharmacy is a scarce skill in South Africa and there is a lack of information regarding the profession, which may limit it as a career choice for most pharmacy students. The lack of community service and internship positions in Radio-pharmacy at academic hospitals that have a Nuclear Medicine department also limits the growth of the profession in South Africa, as work is only available in specialist private or tertiary public sector hospitals and a few industry sites.

Objective: To determine the awareness and knowledge of Radiopharmacy and Nuclear Medicine among Pharmacy students at the Sefako Makgatho Health Science University.

Method: A total of 48 Pharmacy students from the Sefako Makgatho Health Sciences University participated in the study by answering 29 questions about their knowledge and awareness of Radio-pharmacy and Nuclear Medicine. The data was collected using a self-administered, structured questionnaire. All data was collected within a period of 8 weeks at SMU, from 20 September to 22 November 2021. The questionnaire was created on Google Forms and the link to the questionnaire was distributed via WhatsApp and email. To increase validity and reliability, each respondent was only allowed to complete the questionnaire once.

Results: The total number of participants were 48. In the study we found that the Pharmacy students have a fair level of knowledge on Radio-pharmacy. From the study, it was established that most of the participants gained their knowledge on Radio-pharmacy in their final year of BPharm studies at SMU during the Specialised Pharmacy module. A high percentage of the participants are aware of the responsibilities of a radio-pharmacist as 73% of them answered the relevant question correctly. The participants' definition of Radio-pharmacy was fair, with 63% of respondents stating that it is a speciality within the profession of pharmacy that focuses on the proper use of radiopharmaceuticals. The awareness of pharmacy students on the Radio-pharmacy field, especially in South Africa, was not as high as their knowledge on the speciality, as seen in the study. Most of the participants do not know the requirements to work as a radio-pharmacist in South Africa. In addition, there is a misconception on the number of registered radio-pharmacists in South Africa. Approximately a third of the participants (28%) assumed that there are 20 registered radio-pharmacists in South Africa, when in actual fact there are only two registered radio-pharmacists and only five radio-pharmacists overall practicing in the Radio-pharmacy field.

Conclusion: The results of our study reveal that there is a need to impart knowledge about Radiopharmacy/Nuclear Medicine to pharmacy students at SMU which will vastly improve their awareness of Radiopharmacy and Nuclear Medicine in South Africa.

Advancing pharmacy technology practice through an innovative model of applied education and training in the state of Qatar

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Background: The novel Bachelor of Science in Pharmacy Technology degree (BScPT) at the University of Doha for Science and Technology (UDST) is an innovative, patient-

centred programme integrating pharmaceutical manufacturing, regulatory affairs, digital health, pharmacy informatics, quality assurance, and applied research alongside drug compounding and drug distribution for patient care. This four-year applied degree prepares Pharmacy Technologists with advanced skills and competencies for clinical, community and industrial pharmacy practice settings. Guided by Qatar National Vision 2030, the programme prioritises human development, educational excellence, and healthcare advancement. Through its unique curriculum design and practical training, the programme exemplifies UDST's commitment to high-quality applied, technical, and vocational education, preparing graduates for rewarding careers in the State of Qatar and globally.

Methods: The BScPT curriculum aligns with key international pharmacy education standards. These include the International Pharmaceutical Federation/Fédération International Pharmaceutique (FIP) Development Goals, the National Association of Pharmacy Regulatory Authorities (NAPRA) in Canada, the World Health Organisation (WHO) Guidelines: Norms and Standards for Pharmaceuticals, the European Competence Framework for Industrial Pharmacy Practice in Biotechnology and WHO Global Strategy on Digital Health. The programme has received international accreditation from the Canadian Council for Accreditation of Pharmacy Programmes (CCAPP) and formal Scope of Practice approval from the Department of Healthcare Professions (DHP) in the State of Qatar. Developed in collaboration with key stakeholders, particularly Hamad Medical Corporation, Qatar's largest Healthcare Organisation, the curriculum integrates best practices, contemporary knowledge, and technology advancements in the field, as well as stakeholder operational needs. The Scope of Practice domains and associated competencies and performance criteria were structured and mapped to course learning outcomes, international pharmacy education standards, and operational requirements of key stakeholders. To enhance learning, the programme uses applied and digitally enabled instructional methods in its state-of-the-art laboratories. An advisory committee comprising leaders from the clinical, community and industrial pharmacy sectors in the State of Qatar ensures curriculum relevance and alignment with emerging healthcare and pharmacy practice trends in the State of Qatar and globally.

Results: Key achievements of the BScPT program includes:

1. 25+ graduates from the "Bridging" pathway for Pharmacy Technician Diploma holders
2. 100+ applications received since Fall 2023
3. International accreditation by CCAPP
4. Formal approval of the Scope of Practice by DHP in the State of Qatar
5. Strong support from key stakeholders across clinical, community and industrial pharmacy sectors.

Conclusion: The BScPT programme is an innovative and pioneering initiative that meets the growing demand for competent Pharmacy Technologists in clinical, community and industrial settings. Aligned with FIP, NAPRA, and WHO guidelines, it holds CCAPP accreditation and DHP approval. The programme is guided by Qatar National Vision 2030 and UDST's strategic goals, providing specialised expertise, extensive practical experience, and innovative skills to prepare graduates for impactful careers in the State of Qatar and beyond.

Reliability of entrustable professional activities in evaluating the effectiveness on pharmacist post-graduate year training

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Background: In recent years, international healthcare professional education has gradually shifted towards "Competency-Based Medical Education (CBME)," a training approach aimed at enhancing the preparedness of healthcare personnel for their societal roles, thereby improving the quality of healthcare services. Entrustable professional activities (EPAs), which effectively convert core competencies into practical clinical task descriptions, have gradually become a growing trend in the implementation of CBME. The introduction and establishment of EPAs in the training process for pharmacist start with the demonstration of pharmacists' professional clinical practice in medication counselling. However, it is also the most challenging for Pharmacist Post-graduate Year (PGY) who are just entering the workplace. Through the application and implementation of reliable professional activities in the two-year PGY education and training in the field of pharmacy, the core capabilities of pharmacists in clinical practice can be enhanced, thereby improving the quality of medical care.

Method:

1. The training program is referred to the template of the first edition of Entrustable Professional Activities (EPAs) for pharmacists in Taiwan announced by the Taiwan Society of Health-System Pharmacists (TSHP) in 2023, and adjustments will be made according to the operating standards of our hospital.
2. The study included PGY pharmacists starting at October 2023 and completing the basic training in outpatient, emergency and inpatient pharmacy training. They will be given prerequisite knowledge, attitude and health education skills of pharmacy (observation and learning).

3. From Jan to Oct 2024, implement trusted professional activities for “patient medication counselling in outpatient settings”and “medication consultations with healthcare professionals”, every four weeks, with a summative assessment after each session.
4. Use the ad hoc EPA post-evaluation form with the level of confidence as the primary analysis outcome.

Results and Discussion: In most "patient medication counselling in outpatient settings" assessment results, the trust level fell above Level 3 "teacher post-confirmation" trustworthiness, and pharmacists were considered to need direct supervision from teachers to perform entrustable professional activities in the early stages, which improved in the later stages. More than 90% of the task content can be achieved in line with the expected performance. The best trainee can reach Trust Level 4 by the 14th month. A total of 4 PGYs are included in the 「medication consultations with healthcare professionals」 and the best trainees can reach Trust Level 4 in the 16th month.

Conclusion: Through the training of entrustable professional activities, the trustworthiness of PGY pharmacists is graduallyincreasing. Although each trainee grows at a different pace, the results show that most PGY pharmacists have reached the criteria for post-faculty confirmation (Level 3). Compared with the traditional mini-CEX and DOPS assessment methods, EPA can be applied to more complex clinical situations and are distinguished by levels of trust rather than standardised item scoring, allowing for a more accurate assessment of pharmacists' clinical practice execution capabilities. We hope that by promoting these trusted professional activities in the future, we can enhance the core capabilities of pharmacists in clinical practice and thus improve the quality of medical care.

Digital competencies of pharmaceutical specialists abroad: trends in university education and employer expectations

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Background: The rapid digital transformation of the pharmaceutical sector – spanning drug discovery, clinical trials, manufacturing, and regulatory compliance – has increased the demand for digital competencies among pharmaceutical specialists globally. Digital tools such as artificial intelligence (AI), big data analytics, and health informatics are reshaping the industry, necessitating a workforce adept in both traditional pharmacology and modern technology. University curricula and employer expectations are pivotal in preparing and evaluating this workforce. However, gaps persist in aligning educational training with industry needs, particularly across diverse regions abroad. This thesis examines trends in digital competencies of pharmaceutical specialists over the past decade, focusing on university studies and employer requirements, drawing from PubMed literature and broader scientific discourse.

Method: A literature review was conducted using PubMed, analysing 18 peer-reviewed articles published between 2015 and March 13, 2025. Search terms included "digital competenc*," "pharmaceutical specialist*," "pharmacy education," and "employer expectations," with a focus on international contexts. Articles spanned regions including North America (6), Europe (7), Asia (3), and Africa (2), reflecting a global perspective. Studies were selected for relevance to university curricula or employer needs for pharmaceutical specialists, excluding those solely on patient-facing roles. Data were qualitatively synthesised to identify trends.

Results: By the late 2010s, programs in North America and Europe began integrating basic skills like data management and research software, spurred by frameworks like the EU’s Digital Competence Framework. Post-2020, the COVID-19 pandemic accelerated this shift, introducing tools for remote learning and emerging topics like computational drug design. By 2025, advanced skills (e.g., AI applications) appeared in select programs, primarily in high-income regions, while Asia and Africa lagged due to resource constraints. The trend reflects a slow transition toward digital inclusion, uneven across geographies. Employer expectations for digital skills among pharmaceutical specialists abroad evolved markedly over the decade. In 2015, demands centred on basic literacy, such as data entry and collaborative tools. By 2018–2020, North American and European employers sought intermediate skills like data analysis and cloud-based system proficiency, reflecting globalised operations. Post-2020, expectations escalated to advanced competencies—e.g., AI for drug discovery and cybersecurity—particularly in technologically advanced markets. By 2025, these demands intensified, though Asia and Africa focused more on foundational skills. The trend shows a progressive increase in skill complexity, with regional disparities mirroring technological development.

Conclusion: Between 2015 and 2025, digital competencies became increasingly vital for pharmaceutical specialists abroad. University education abroad, as evidenced by 18 PubMed articles from North America, Europe, Asia, and Africa, shifted slowly toward digital integration, while employer expectations rose sharply from basic to advanced skills. This evolution highlights a growing digital emphasis, tempered by uneven progress across regions, shaping the future of pharmaceutical expertise in a digital age.

The impact of university training on the development of digital competencies of pharmaceutical graduates

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Introduction: The rapid digitisation of the pharmaceutical industry has underscored the importance of digital competencies for professionals navigating an increasingly technology-driven landscape. As pharmaceutical practice evolves - spanning drug development, distribution, quality control, and pharmacovigilance - graduates from pharmaceutical faculties face growing expectations to master digital tools essential for their roles.

Objective: The objectives of this study are the analysis of the opinions of graduates from the pharmaceutical faculty regarding the impact of university training on the development of digital competencies necessary for professional activities and identification of key digital skills required by young specialists in various areas of the pharmaceutical industry.

Method: A sociological survey followed by content analysis of respondents' answers was conducted from March to December 2024. The study involved 80 graduates from the pharmaceutical faculty of RUDN University named after Patrice Lumumba. Among the respondents, graduates from 2023, 2020, and 2022 predominated (26%, 19%, and 15% respectively). The respondents were employed in pharmacy organizations (28.7%), pharmaceutical companies (21.2%), drug distribution (8.2%), quality control laboratories (2.7%), pharmacovigilance (1.4%), and drug manufacturing (1.4%). 2.7% of graduates were engaged in teaching; 8.2% of respondents were continuing their education in master's or postgraduate programs.

Results: A positive influence of university education on the development of digital skills among future pharmaceutical specialists was noted (80%). The most in-demand digital skills, according to respondents, are the ability to work with Microsoft Excel (33%), Microsoft Word (24%), and Microsoft Access (16%). Graduates employed in pharmacy organizations and pharmaceutical companies, as well as specialists whose current activities are not related to pharmacy, highlighted the ability to work with Microsoft Excel, Microsoft Word, and telecommunication systems as essential digital skills for successful professional activities. The ability to use artificial intelligence technologies in professional activities was identified as an important digital skill among respondents continuing their education and specialists employed in distribution (15% and 16% respectively). According to the respondents, university education and self-education equally contribute to the development of digital skills (30% and 31% respectively).

Conclusion: The effective implementation of digital technologies contributes to a better adaptation of various spheres of public life to the transition to an information society. The obtained data can contribute to the improvement of modern educational programs aimed at enhancing the digital literacy of students in pharmaceutical faculties, which will facilitate the professional adaptation of young specialists upon employment.

Differences in faculty and student perceptions of global engagement within pharmacy academia

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Background: Global engagement is increasingly recognised as an important component of pharmacy education. Existing literature highlights the growing demand for global experiences and the potential benefits for pharmacy students and faculty. Understanding how global engagement is perceived among pharmacy students and educators can help inform the development of more effective initiatives.

Methods: A qualitative study was conducted using structured interviews with faculty and students from pharmacy schools across the United States. Thematic and content analysis was used to examine how students and faculty defined global engagement, their expectations for global initiatives, and the value they place on it. To identify trends and differences, responses were categorised based on participant demographics, academic roles, and experience levels (low, moderate, or high).

Results: Seventeen individuals participated in the study (10 students, 7 faculty) across 10 schools of pharmacy in the United States. Students and faculty differed in their expectations for global engagement. Students primarily viewed global engagement as hands-on experiential learning, such as student exchange programs, mission trips, and direct patient care experiences in international settings. They valued these experiences to develop cultural awareness, broaden clinical perspectives, and enhance professional growth. In contrast, faculty placed greater emphasis on research collaborations, international networking, and institutional partnerships. Faculty valued global engagement as a way to enhance academic scholarship, expand professional influence, and establish long-term institutional relationships. Experience level also shaped perceptions and engagement. Participants with low experience, those with little to no prior involvement in global initiatives, often lacked awareness of available opportunities, expressed uncertainty

about the career relevance of global engagement, and perceived financial constraints as major barriers. Moderately experienced participants who had participated in at least one global initiative recognised the value of global engagement but often faced challenges in identifying structured pathways for involvement. They expressed a desire for clearer guidance, mentorship, and more accessible options, including virtual or low-cost alternatives. High-experience participants, including faculty and students actively engaged in multiple global initiatives, strongly advocated for incorporating global perspectives into pharmacy education. They emphasised the need for curricular integration of global topics, institutional support for faculty-led global programs, and stronger mentorship networks to guide students through international opportunities.

Conclusion: To strengthen global engagement in pharmacy education, institutions should develop structured pathways that align with the expectations of both students and faculty while addressing the challenges faced at different experience levels. Increasing program awareness through targeted outreach, integrating global engagement into pharmacy curricula, and providing financial and mentorship support can help bridge the gap between low- and moderate-experience participants and sustained involvement. Expanding global engagement strategies to include virtual exchange programs, collaborative research opportunities, and career-relevant global initiatives can enhance participation and impact. Future research should focus on standardizing global engagement initiatives, assessing their long-term effects on pharmacy education and practice, and identifying best practices for sustainable global collaboration in pharmacy academia.

Empowering pharmacists in ethical pharmaceutical entrepreneurship through the development of a training programme

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Background: Research shows that training in the area of pharmaceutical entrepreneurship is required for the successful advancement of pharmaceutical careers and innovative pharmaceutical processes, however there is a noticeable gap in entrepreneurship training in pharmacists' learning and a lack of consensus for entrepreneurship in pharmacy practice and education. Such training would help pharmacists cultivate knowledge and confidence to see beyond perceived limits and envisage themselves in unconventional roles and innovative aspirations.

Objective: To develop and validate a training programme for the advancement of ethical pharmaceutical entrepreneurship.

Method: The identification of established education and training, and responses gained through structured interviews held with local pharmaceutical entrepreneurs, formed a base for the development of an educational training programme for pharmaceutical entrepreneurship. Main areas to be included in the programme were identified. Content description, aims and learning outcomes for each of the main areas were developed. Learning outcomes were divided into knowledge and understanding, and skills. The training programme for pharmaceutical entrepreneurs was validated using a two-round Delphi method. Face and content validity were assessed using a five-point Likert scale. Round I of the Delphi study presented participants with the description, aims and learning outcomes for each module within the training programme. Following an analysis of the results obtained in Round I of the validation exercise, revisions and deletions were made within the training. In Round II of the Delphi study, updates to the training programme were submitted to the same panel of experts as that used in Round I.

Results: The examination of education and training led to the identification of 14 training aspects to be considered for inclusion in the training programme for pharmaceutical entrepreneurs. These aspects were discussed in interviews held with 12 local pharmaceutical entrepreneurs. Following results obtained in the interviews, amendments were made, leading to the development of a training programme consisting of thirteen modules. Seven experts (five females and two males) participated in programme validation. The panel of experts provided positive feedback regarding the training programme. Consensus was reached after two rounds of Delphi were performed. The validated training programme consists of 13 modules, with a total of 50 aims and 102 learning outcomes. The modules are related to: Communication Skills, Conflict Resolution, Financial Management, Human Resources, Innovation, Leadership, Market Research, Marketing, Negotiation Techniques, Project Management, Public Relations, Quality Improvement and Risk Management. The training programme aims to offer the necessary knowledge and skills to identify, create and pursue new opportunities and implement new ideas in a successful and sustainable manner, whilst nurturing an entrepreneurship spirit within pharmaceutical processes, and creates a balance between financial sustainability and patient benefits.

Conclusion: It is significant that the curriculum of the training programme evolving around these topics is related to the special considerations surrounding a pharmaceutical scenario. A unique pharmaceutical knowledge related to these priorities in a healthcare scenario, including vulnerabilities of patients and sustainability, where the fundamental principles of these thirteen specialities, needs to be taken into consideration.

Interprofessional education in healthcare: A simulation-based transdisciplinary model fostering trust and empathy

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Background: Inter-professional education (IPE) plays a crucial role in preparing healthcare students to communicate and collaborate effectively, ultimately enhancing patient safety. However, students are often trained in isolation, within their own disciplines, which restricts their awareness of the roles, boundaries, and collaborative practices of other healthcare professions. One of the major obstacles to implementing IPE is the logistical complexity of organising impactful inter-professional activities.

Objective: This proposal presents a transdisciplinary pedagogical model utilising telesimulation to overcome these challenges. The model focuses on developing attitudinal and emotional competencies, particularly trust and empathy, within multidisciplinary training for medical, nursing, and pharmacy students.

Method: A pilot project involving the three faculties (Pharmacy, Nursing and Medicine) has been established. The National interprofessional competency framework from CIHC was used as a basis for developing the activities. The telesimulation scenario features a collaborative, asynchronous patient management plan integrating all three professions. One group of professionals engages directly with the patient, while the other two observe the interaction, with an external perspective referred to as the "Interprofessional Window Model."1 During the scenario, the simulated patient prompts the active participants to clarify both their own roles and those of their colleagues who are not actively involved. A shared debriefing session conducted remotely and facilitated by instructors from all three professions, follows the scenario to reinforce learning and encourage reflection.

Results: A pilot project implementing this innovative model and involving 12 students was conducted in March 2025. Preliminary results show that students from Pharmacy, Nursing and Medicine programs appreciated the opportunity to observe their colleagues' interventions with a simulated patient and gained a better understanding of their respective roles. We will share detailed results from this pilot project. Additionally, we will present a conceptual analysis of the debriefing discussions, highlighting how transdisciplinary engagement fosters trust and empathy among healthcare students.

Conclusion: The "Inter-professional window model" offers significant potential for enhancing interprofessional education and improving collaborative practices in healthcare.

Building infection-specialist capacity of pharmacists: a cross sectional survey from 16 countries attending the multi-disciplinary European Society of Clinical Microbiology and Infectious Diseases Global conference

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Background: As highlighted in the FIP statement of policy "Mitigating antimicrobial resistance through antimicrobial stewardship as well as FIP Development Goal 17 (Antimicrobial stewardship) and 16 (Communicable disease) pharmacists play a key role to tackle antimicrobial resistance (AMR). Global infection conferences provide important capacity building for professionals. Historically they are predominantly attended by medical professionals. European Society of Clinical Microbiology and Infectious Diseases (ESCMID) Global conference (formerly ECCMID) and its Antimicrobial Stewardship subgroup (ESGAP) have, for several years, provided infectious diseases specialist pharmacists with valuable networking opportunities and educational resources.

Objective: This study evaluated the experiences and perceptions of pharmacists who attended the 2024 ESCMID Global conference, focusing on their motivations for attending, the impact on their clinical practice, and the perceived value of the conference.

Methods: A cross-sectional survey was conducted using a convenience sampling of pharmacist attendees. The survey was disseminated through informal mailing lists, social media, and text messaging. A semi-structured questionnaire designed on Google Forms was used.

Results: Sixty-eight participants from 16 countries responded to the survey. Most attendees identified benefits from attending the conference and had implemented their learning in clinical practice. These included opportunity to network with other healthcare professionals (58; 85%), informative presentations (67; 98.5%), collaborations led to networks that lasted over a year (53; 78%), opportunity to network with pharmacist (49;72.1%), visibility of pharmacists (35; 51.5%), and New skills attained (47; 69.1%). Six themes were identified from the learning points respondents stated they gained from the conference: use of AMR surveillance systems, advancing knowledge in antimicrobial medicines, AMS education, behaviour change, policy, and networking and collaboration. The top three factors considered extremely important in facilitating attendance included opportunities for learning and networking (60%), full funding available (47%),building relationships/networking (43%), opportunity to showcase research (34%), invited speaker or oral presentation (31%). On the other hand, the main barriers to attendance were travel cost (49%), accommodation expenses (43%), conference registration fees (40%), and personal commitments (21%).

Conclusion: Pharmacists reported a positive perception of the ESCMID Global conference as a valuable source of knowledge and networking. However, there is a need to address logistical challenges, enhance communication about the conference's benefits, provide tailored incentives towards early-career pharmacists, promote the conference as an inter-professional learning opportunity. These findings may apply to other conferences seeking to increase impact and pharmacists' participation.

Program directors' perceptions of characteristics of the online pharmacy programs in the US

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Background: Online pharmacy programs (also known as hybrid or distance pathways) have gained more popularity over the recent few years. However, their viability and sustainability have been questioned by many academicians. There is currently no literature reporting on online pharmacy programs, which affirms that this study will contribute a better understanding of online pharmacy program methods. Specifically, investigating varied characteristics, including admission capacity, curriculum, material delivery methods, and attrition rates, one could have a better understanding of possible future approaches or improvements that could be made to optimise online PharmD programs.

Objective: The objective of this study was to investigate the characteristics of these programs as perceived by the program directors and examine their attrition rates. We hypothesised that online programs' attrition rates are higher than traditional programs.

Methods: The study was based on a cross-sectional design. Following IRB approval, eight pharmacy online program directors were invited by email to participate in semi-structured interviews conducted via Zoom. General characteristics were measured, including admission, tuition, additional resources and personnel to start the online program, and, most importantly, attrition rate. The research was limited to US-based online pharmacy programs. Data was collected in 2024.

Results: Eight program directors agreed to participate in the study and completed the interview (response rate 100%). Increasing enrolment and meeting the high demand of prospective students were the primary goals of establishing online pathways. Tuition, experiential education, and admission requirements were generally similar to traditional programs. The first online program was Creighton University, which started in 2001, and the second program was LECOM in 2014. The rest of the programs were introduced in the last five years. Students enrolling in online programs were older compared to students in traditional programs. Most programs require on-campus attendance for a few days each academic year. Four out of eight interviewed programs were established within the past 12 months (July 2022 or newer). While many programs were too new to have attrition rates,

those with the data reported higher attrition rates than traditional programs.

Conclusion: After conducting this qualitative research study, one notable similarity was the consistency of curriculums between online and on-campus pathways, which supports the purpose of the online programs being mirrored to that of a traditional pathway. The only difference noted between the online and on-campus pathways was the methodology in which the material was presented to the online students. With the current rise in remote learning, it will be expected that more online PharmD programs will be offered due to both a decrease in enrolment and to tailor to non-traditional students. It has been shown that most non-traditional students enrolled and/or interested in online PharmD programs may have external factors affecting performance. Further areas of investigation will be focused on analysing attrition rates of recently established online PharmD programs to better understand which methods are best to follow. Despite challenges associated with distance education, online pharmacy programs are becoming more popular. However, substandard attrition rates might be a challenge for many of these programs.

Tracking pharmacy students' leadership traits using an established survey for preference and maturity

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Background: In 2021, a survey was conducted targeting leaders representing a variety of pharmacy industries to establish their perspectives on the essential skills require to drive the future of pharmacy practice, pharmaceutical science disciplines, and pharmacy education. The results indicated that leadership skills followed only patient management skills as the most critical aspect of pharmacy education (Papadopoulos doi: 10.3390/pharmacy9010059).

Objective: To develop our school's educational plan for leadership development, we measured the current leadership skills of novice leaders and compared these to 1) established pharmacy student leaders identified as high performing by their deans from across the State of California; and 2) self-identified leaders that voluntarily participated in a leadership development series. The insights identified from the differences in these groups will inform the development of our leadership training program.

Method: For the last two years, first-year pharmacy students (novices) took the Mattone Leadership Enneagram Inventory (MLEI) 60-question survey of their leadership trait preference, maturity using each leadership trait, and overall maturity. Afterwards, students reviewed their results with an executive leadership coach. This same process was completed by pharmacy students with advanced standing participating in the California Pharmacy Leadership seminar who were identified by deans from across the State of California (dean-identified) as being the best leaders from their institutions, and USC Mann pharmacy students with advanced standing that wanted to improve their leadership skills (self-identified).

Results: Data was collected from 232 novice pharmacy students, 34 dean-identified student leaders, and 11 self-identified student leaders. The MLEI defines nine different leadership styles and our 232 novice students consistently demonstrated preference for the Arbitrator trait, versus the dean-identified and self-identified groups had preference for the Entertainer trait. The Arbitrator followed by Activist were the traits with the highest maturity in the novices and dean-identified groups. Whereas the self-identified leaders were highest in Activist and Thinker. The overall maturity ratio was consistent among the novices (0.157) and self-selected (0.111) groups, whereas the dean-identified group had a much higher overall maturity ratio (0.207). All groups identified the Artist trait as their lowest maturity, with novice = -0.024; self-identified = -0.111 whereas dean-identified had developed this trait to the positive at 0.055.

Conclusion: Based on the results, we intend to develop graded and non-graded opportunities for novice students to strengthen their Arbitrator and Entertainer skills early on which will lead to improved teamwork, collaboration and allow them to effectively communicate their vision and goals. In addition, we will focus on helping all students develop their Artist maturity which will enhance innovation and creativity in their leadership.

Challenges with the use of ChatGPT

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Background: ChatGPT, which was released in November 2022, has shown promise in the fields of medicine and science research. It ranges from pulling specific information from vast amounts of information, to assisting clinical and laboratory diagnosis, to providing updates and information to healthcare professionals. Pharmacy and healthcare students can use ChatGPT to solve case simulation exercises, while patients can use it to better understand their symptoms, for general health information and to obtain suggestions on ways to enhance their wellbeing. While the majority of medical practitioners believe that ChatGPT can improve healthcare systems the credibility and source of information presented by Chatgpt remains a concern.

Objective: The aim of the study was to understand awareness, use, opportunities, and limitations associated with ChatGPT in healthcare and pharmacy education.

Method: A systematic literature search was conducted following PRISMA 2020 guidelines across five scientific databases including: PubMed, GoogleScholar, Scopus, ProQuest, and ResearchGate. The keywords: "ChatGPT", "Awareness", "Challenges", "Limitations", "Use", "Healthcare professionals", "Pharmacy Education" were used to extract relevant data. Peer-reviewed, open-sourced journal papers, published in English Language between November 2022 and November 2024 were included in the study.

Results: Literature search revealed 337 publications out of which 107 met the inclusion criteria. Applications of ChatGPT in direct patient care were reported in 42 articles. Cardiology (n=11), Ophthalmology (n = 9) and Radiology (n = 8) were found to be the most widely reported specialties with use of ChatGPT. Twenty-three reports documented limitations and ethical concerns on use of ChatGPT in healthcare and pharmacy education, among which the highest number of reports were concerning bias in ChatGPT generated responses (n = 8), false references (n = 6). Other reported limitations included data privacy (n = 5), and false or out-dated information (n = 4).

Conclusion: While ChatGPT can be beneficial for patient-centred care and learning, concerns about accuracy and ethics require robust regulation and further research for its safe and effective integration into education and healthcare. Updated and evidence-based sources of information should be used as training data for ChatGPT development, and professional oversight on all ChatGPT generated responses applied to help ensure integrity when used in scientific research. Developing competencies for pharmacy students on ethical, rationale use of generative AI is a means to ensure relevant education for current and future integration of AI in healthcare.

Hospital pharmacy content in the undergraduate pharmacy curricula of public universities in the Southeast region of Brazil: A documentary analysis

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Background: Hospital Pharmacy (HP) is a strategic area within healthcare systems, as it ensures access to medications and promotes their rational use in highly complex environments. The training of hospital pharmacists is a critical aspect for HP to achieve these objectives, especially in the Brazilian context, which includes more than 6,000 hospitals and is undergoing demographic and technological transitions. Moreover, the National Curriculum Guidelines for Pharmacy programs recommend that competencies and skills in Hospital Pharmacy be developed during undergraduate education. Therefore, HP-related content should be included in the curriculum to ensure adequate training.

Objective: To identify and characterise the presence of Hospital Pharmacy-related content in the curricular syllabi of undergraduate pharmacy programs at public universities in the Southeast region of Brazil.

Method: This study is a documentary, exploratory, cross-sectional analysis using mixed methods. It examines the curricula of pharmacy programs from public Higher Education Institutions (HEIs) in the Southeast region of Brazil. Data were collected from the official websites of these HEIs and organised into Excel spreadsheets. Subsequently, data processing was conducted using the Iramuteq software, version 0.7 alpha 2, through a Descending Hierarchical Classification (DHC) analysis.

Results: A total of 1,310 syllabi were analysed, of which 182 (14.0%) included topics related to HP. From 183 text segments (TS), the DHC generated six terminal classes: Class 1, with 19 TS (12.67%); Class 2, with 32 TS (21.33%); Class 3, with 23 TS (15.33%); Class 4, with 22 TS (14.67%); Class 5, with 31 TS (20.67%); and Class 6, with 23 TS (15.33%). Classes 1 and 4 shared themes related to pharmaceutical care and attention, both addressing pharmaceutical practice in direct patient contact. In contrast, Class 2 highlighted the practical aspects of student training in healthcare services through internships, while Class 3 focused on student education in drug policies, access, and rational use. Additionally, Class 5 emphasised topics related to the management of hospital pharmaceutical services. Finally, Class 6 featured theoretical and practical disciplines, covering Pharmacology and Pharmacokinetics content relevant to hospital pharmacy practice.

Conclusion: The results indicate that, although certain courses address specific aspects of hospital pharmacy and pharmaceutical care, there is still considerable variation in content among the analysed institutions. This heterogeneity in curriculum design may impact the training of future pharmacists, as a comprehensive education requires in-depth coverage of the knowledge, skills, and competencies essential for hospital pharmacy practice. Thus, the findings of this study highlight the need for greater standardization of HP-related content in pharmacy curricula.

What do students need to know in an era of artificial intelligence? A core concepts approach to pharmacotherapy education

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Background: Current university students have access to an immediate, almost infinite yet imperfect body of information, especially with rise in use and access to Generative AI. This has led educators in many disciplines to reconsider what graduates need to know. We argue that graduates who have developed, tested and refined their understanding of the most important concepts of the discipline will be equipped to succeed. This represents a shift away from large amounts of factual recall, and towards the knowledge and skills to apply core concepts in novel situations. A group of pharmacology educators have identified and unpacked a group of concepts that all students should remember to understand and to apply, and have explored student understanding and misconceptions of these core concepts.

Objective: The present study aims to take a similar approach to the domain of pharmacotherapy in the context of pharmacy education. Pharmacotherapy, an essential domain of learning and practice within pharmacy, faces the challenges of knowledge explosion.

Method: This preliminary study, conducted with over ten pharmacy educators from seven accredited Australian pharmacy schools, identified the "big ideas" that pharmacy students should possess and apply upon graduation to equip them with conceptual knowledge for the safe, rational, and effective use of medications, through textbook analysis using Natural Language Processing, Generative Artificial interpretation, brainstorming sessions and expert consultation.

Results: Twenty-five candidate core concepts and 11 potential skills/activities have emerged and been categorised under four overarching themes: 1. Evidence-based pharmacotherapy—the critical application of the best possible evidence for the safe and effective use of medicines for a patient; 2. Quality use of medicines for pharmacotherapy—encompassing the appropriate and judicious selection of management options, the suitability of that choice, and the safe use of medication in drug therapy for a patient; 3. Scientific concepts that underpin pharmacotherapy—the use of scientific knowledge from various disciplinary contexts to solve therapeutic problems and optimise patient care; 4. Skills and activities that enable pharmacotherapy—core skills and professional activities necessary to implement pharmacotherapy effectively.

Conclusion: The primary significance of this research lies in its ability to identify the core concepts that students need to understand and apply at graduation to become effective health professionals in pharmacotherapy. In the long term, acquiring this conceptual knowledge is required to promote the rational use of medicines and transfer this knowledge across different contexts.

Enhancing Canadian pharmacy education and interprofessional collaboration by using a simulated electronic health record platform

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Background: With an expanded scope of practice, Canadian pharmacists' role on the healthcare team has advanced. Electronic health records are critical enablers to team-based care, yet most healthcare professional (HCP) training programs continue to use "paper-based" patient cases. HCP programs also face challenges in integrating realistic and effective interprofessional education (IPE) into the curriculum. To address these challenges, the Association of Faculties of Pharmacy of Canada (AFPC), working with Canadian pharmacy schools, developed an academic electronic health record (aEHR) that simulates electronic charts used in primary care and institutional sites. The aEHR brings together a realistic, practice-based tool with teaching excellence, allowing for electronic charting and ordering, care plans, referrals and inter-professional collaboration.

Method: The bilingual aEHR platform was developed with Canadian government funding and with input from pharmacy and other HCP educators across the country. The goal was to design an agile, web-based software, connected to learning management systems that prioritises clinical rigour, team-based best-practices and ease of deployment by instructors. Development included a series of IPE cases, a simulated patient communication portal and rigorous pilot testing at the University of British Columbia (UBC). Pilot and evaluative work was a priority throughout development, including usability, educational comparisons to paper-based pedagogies and interprofessional use. In the UBC IPE pilot, students from different disciplines engaged in asynchronous activities (e.g., negotiated care priorities, posed virtual questions to the simulated patient and collaboratively constructed an interprofessional care plan). A synchronous debrief session was held, involving facilitators from each discipline, and an exemplary care plan was shared with the students. Surveys, interviews and workshop-based focus groups were used. Mixed methods were used throughout with a deductive approach to analysis. Pragmatic and agile

incorporation of findings was prioritised to enhance student and instructor experiences of the aEHR. The platform GitHub was used to identify issues, respond to feedback and build robust documentation throughout.

Results: The aEHR is realistic and intuitive, adaptable to various practice settings and allows for flexible learning modalities, including individual and small group work in lectures, tutorials and skills labs. Instructor tools in the aEHR are focused on data-driven pedagogy with future AI-integration capabilities, mapping of professional competencies and accreditation standards. It is used by all Canadian faculties of pharmacy as a critical alternative to paper-based patient cases and has been used by some universities for IPE. Evaluation of pilot testing was rigorous, and an action-based framework allowed for rapid iterative development cycles. The success of evaluation has informed a planned wide-spread expansion of use, aiming to increase adoption in other programs.

Conclusion: Electronic health records are a primary communication tool between healthcare providers. By using a software that simulates electronic charts, HCP students can gain real world practice that enhances clinical, documentation and communication skills. Using the aEHR offers unique pedagogical opportunities for pharmacy educators. It incorporates digital health competencies and skills in training, including IPE, and aligns with FIP Development Goal #20 (Digital Health), as it facilitates the development of a digitally literate workforce.

Integrated academic programs in education, research and advocacy advance pharmacy practice and improve healthcare

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Background: Historically, health care has been practiced and delivered in siloed models. The United States healthcare system is only partially a national system: Medicare, for mostly seniors, and Medicaid, for low-income patients. All other healthcare consists of 50 different subsystems regulated within each state. True integration of healthcare requires practitioners to collaborate as a cohesive team – comprising interprofessional education (IPE), advocating for policies promoting integrated care, and developing inter-professional clinical programs.

Objectives: Describe our "360-approach" to promote healthcare integration and advance pharmacy. Our objectives are to 1) provide a robust IPE program, 2) lead advocacy at the state level for policies promoting broader scope of pharmacy practice and payment for non-dispensing services, and 3) lead interprofessional teams to personalise pharmacotherapy and optimise healthcare.

Methods: The IPE program offers a longitudinal curriculum that includes 700 learners from six health professions to learn with, from, and about each other. To build cohesive teams, students are pre-assigned to integrated teams that include each health profession. They work in teams throughout the IPE curriculum to further their team cohesion and collaborative practice knowledge and skills. For eight years, our school has led legislative efforts that advocate for pharmacists to be recognised as providers and expand the scope of practice while becoming more integrated into value-based practices. Our school collaborated with campus and healthcare partners to employ 31 faculty members (equivalent to 19 full-time pharmacists) to provide patient care in primary care, specialty clinics, and acute care interprofessional settings. The Colorado Centre for Personalised Medicine (CCPM), in partnership with our health system, developed a nation-leading population-scale biobank, and leverages research and implementation science to establish a robust clinical personalised medicine enterprise.

Results: The longitudinal IPE curriculum integrates preclinical and clinical training for health profession students, fostering the learning of concepts and practical application of team-based practice and value-based patient care. Student survey data demonstrated that 96% of learners agreed that being a collaborative professional is important to their future practice. Legislative efforts created six statewide protocols (contraception, smoking cessation, HIV PEP/PrEP, statin therapy, and opioid use disorder) that expand the scope of pharmacy practice. Additional legislation allows pharmacists to diagnose and treat minor diseases that are self-limited, conditions not requiring a new diagnosis, test and treat conditions, and the ability to bill for non-dispensing services. Pharmacist faculty members practicing within inter-professional teams in primary and ambulatory care settings implement and modify drug therapy for chronic diseases (e.g., hypertension, hypercholesterolemia, diabetes). These services are billable under Medicaid and Medicare. Within CCPM we have translated and integrated basic science, implementation science, and clinical practice to personalise medication therapy; nearly 800,000 pharmacogenomic test results have been delivered to over 74,000 patients to optimise their pharmacotherapy.

Conclusion: Academic-led programs in integrated healthcare provide a roadmap for successful collaborations across healthcare professions in the domains of education, research, and novel practice. These collaborations yield better-integrated patient care to improve health outcomes. This model requires continual care and nurturing to influence healthcare in all settings moving forward.

Pharmacy education and community training: overcoming barriers to student placement in Jordan

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Background: Experiential training is a cornerstone of pharmacy education, providing students with essential skills for their professional careers. However, securing adequate training sites has become a global challenge, particularly in Jordan, where the increasing number of pharmacy students and limited training locations have intensified competition. Despite the critical role of community pharmacies in student training, the factors influencing pharmacists' willingness to accept trainees remain under-explored.

Objective: This study aims to investigate the challenges faced by pharmacy schools in securing training sites and identify the motivators that influence pharmacists to accept students for training in Jordan. To our knowledge, this is the first study to comprehensively examine these issues within the Jordanian context.

Method: A cross-sectional survey was conducted among pharmacists working in community pharmacies across Jordan. Data was collected regarding pharmacists' demographics, barriers to accepting trainees, and factors that motivate them to provide training. Statistical analyses were performed to identify significant associations between these factors and pharmacists' willingness to accept students.

Results: Among 406 surveyed pharmacists, 87.7% reported training pharmacy students. The main barriers to accepting trainees included concerns about pharmacy confidentiality (60.1%), perceptions that students lack seriousness (55.2%), high workload (54.7%), and limited physical space (50.2%). A significant proportion (44.3%) cited prior negative experiences with trainees as a deterrent. Conversely, key motivators for accepting students included viewing trainees as potential future employees (82.3%), staying up to date with scientific knowledge through student engagement (81.8%), and receiving assistance with pharmacy tasks (65.5%). Social responsibility toward future colleagues was the strongest motivator, with 80.5% of participants agreeing on its importance. Additional motivators included incentives from universities or the Pharmacists' Syndicate, and the prestige of being an approved training site. Notably, financial incentives were less influential, as 75.1% of respondents opposed direct payments from students.

Conclusion: This study highlights the complex interplay of barriers and motivators affecting pharmacists' decisions to accept students for training. While confidentiality concerns, student behaviour, and high workload serve as major barriers, pharmacists are motivated by professional development, workforce expansion, and social responsibility. Universities must address pharmacists' concerns by fostering structured training agreements, ensuring better student preparation, fostering professionalism, and offering incentives such as continued education opportunities. Given the growing demand for training placements, collaborative efforts between academia, regulatory bodies, and pharmacy owners are essential to sustaining and enhancing experiential training opportunities. This study is the first to address these challenges comprehensively in Jordan, providing insights applicable to pharmacy education worldwide.

Advancing capacity to manage antimicrobial stewardship interventions in a low-income country: Pharmacist champion training in three hospitals and three community pharmacies in Sierra Leone

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Background: Antimicrobial resistance (AMR) is a critical global health threat, projected to cause up to ten million deaths annually by 2050 and result in a $100 trillion economic burden In Sierra Leone, the situation is exacerbated by limited resources, improper antimicrobial use, and gaps in healthcare infrastructure, including technical human resource which accelerate AMR's spread. Antimicrobial Stewardship (AMS) programs are vital to improving the use of antimicrobial agents, enhancing patient outcomes, and reducing AMR risks. Globally, AMS initiatives have shown success in optimising prescribing practices, reducing misuse, and curbing resistance. However, Sierra Leone faces challenges in implementing AMS due to a lack of financial and human support, inadequate leadership training for healthcare workers, and underdeveloped infrastructure for AMR surveillance and prescribing guidelines.

Objective: To capacitate pharmacists with advanced knowledge, skills, and leadership capacities necessary to advocate for, implement, and sustain antimicrobial stewardship practices in their workplaces and communities, contributing to the reduction of AMR in Sierra Leone.

Methods: The AMS champion training used a blended learning approach; theoretical sessions (lectures, interactive sessions, mentorship) and practical exercises (case studies and participation in the Global Point Prevalence Survey (G-PPS) and awareness campaigns through workshops, outreach, and radio programs). Assessments of participants' knowledge and competencies included pre- and post-tests, Objective Structured Clinical Examinations (OSCE), and logbooks and focus group discussions.

Results: A total of 12 Pharmacist Champions from three healthcare facilities and three community pharmacies were trained. The average attendance rate is 87% in both theory and practical mentoring sessions.: The mean attendance rate 83% theory sessions and 91% practical mentoring sessions. Knowledge scores on AMS principles increased significantly from (76%) (pre-test) to 91% (post-test).

Conclusion: The AMS training and demonstrated significant progress in participants' knowledge, skills, and engagement. Pre- and post-assessments showed notable improvements, particularly with online Commonwealth Pharmacist Association (CPA) Continuous Professional Development (CPD) modules, highlighting the effectiveness of self-paced learning. Participants expressed increased confidence and motivation to lead AMS efforts though focus group discussions showing the program's potential for scalability. Despite successes in success in conducting the champions training, challenges such as resource limitations were highlighted. To ensure sustainability, AMS training should be integrated into continuous professional development and hospital workflows. Through participating in the GPPS the champions learnt that there is high usage of watch antibiotics in their hospitals and that there is an ongoing need for them to engage in AMS interventions to address this. Expanding the program with online modules or customised approaches for different healthcare settings can enhance its reach.

Development and validation of an interprofessional and collaborative competencies framework for primary health care: A Brazilian perspective

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Background: Inter-professional education is reognised as an essential strategy for comprehensive care and better health outcomes. There was an expansion of the Primary Health Care (PHC) workforce in Brazil. Almost 15,000 pharmacists and 100,000 doctors work in PHC facilities of the public health system. However, significant barriers for the workforce training remain, including uniprofessional training approaches and poorly integrated curricula. The lack of a reference framework for interprofessional competencies has an impact on training and workflow, compromising professional qualifications and teamwork.

Objective: This study describes the development and validation of a framework of interprofessional and collaborative competencies for PHC within the context of the Brazilian health system.

Method: The framework was developed in three stages. In Stage 1, the initial version was created based on a comprehensive literature review of national and international frameworks on interprofessional competencies in health. In Stage 2, two workshops brought together experienced experts in interprofessional education and PHC from various professional categories and regions of the country, including from Ministry-of-Health, to review the domains and competencies of the first draft, suggesting adjustments, additions, deletions, and reallocations. The revised version was then validated online in Stage 3, using a Likert scale. The Content Validity Index (CVI) was calculated, and competencies with ≥ 80% agreement were included in the final framework. The study was approved by the Ethics Committee.

Results: The workshops (Stage 2) included 20 specialists in the first session and 37 in the second. Following these workshops, significant modifications were proposed, including revisions to wording, as well as the addition and removal of domains and competencies. In Stage 3, 18 experts from the previous stages assessed the competencies in the revised framework. All items achieved a CVI ≥ 0.8 and were included in the final framework. The framework now comprises 12 domains and 74 competencies. The domains are: 'Ethics, Bioethics, and Human Rights'; 'Communication'; 'Decision-Making'; 'Conflict Management and Resolution';

'Collaborative Leadership'; 'Roles and Responsibilities'; 'Working in accordance with PHC principles and guidelines of the Brazilian health system'; 'Individual, Family, and Community-Centred Care'; 'Continuing Education'; 'Social Participation'; 'Innovation in Health Practices'; and 'Digital Health Technologies'.

Conclusion: The developed framework is a proposal created in a nationwide participatory manner, intended to provide reference for training, evaluating, and organizing the work of PHC teams. It aligns with globally established references. However, it advances by incorporating specific domains that directly address the realities of the Brazilian health system, including the domains of 'Continuing Education' and 'Patients Advocacy'. It also includes domains that reflect technological advances in health and the need for innovation, such as 'Innovation in Health Practices' and 'Digital Health Technologies'. By establishing a structured competency framework, the outcome of this study contributes to defining roles and responsibilities within interprofessional teams. Incorporating its competencies into the curricula of undergraduate and postgraduate programs, as well as in continuing education strategies, can foster educational practices that promote interprofessional collaboration, with clear roles, shared responsibilities, effective communication, and practices rooted in the social and health needs of local communities.

Development and implementation of a quality assurance system in a PharmD program in Saudi Arabia to achieve NCAAA accreditation

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Background: In line with Saudi Vision 2030, the National Commission for Academic Accreditation and Assessment (NCAAA) has set stringent standards to enhance the quality of higher education. The College of Pharmacy at King Khalid University (KKU) undertook a two-year process to achieve NCAAA accreditation by developing a robust Quality Assurance (QA) system. The QA framework aimed to improve academic and administrative functions, ensuring alignment with national and international benchmarks in pharmacy education. This study aims to outline the development and implementation of a QA system at the College of Pharmacy, KKU, and evaluate its impact on academic performance, stakeholder satisfaction, and accreditation outcomes.

Methods: The study followed a document review methodology, analysing reports, course files, action plans, self-study reports (SSR), and self-evaluation scales (SES). Data was collected from 2019 to 2023 through faculty committees, student feedback, and external reviews. Performance indicators were tracked using the Saudi Arabian Qualification Framework (SAQF) and key performance indicators (KPIs). The results were compared with pre-accreditation performance data to assess improvements in educational quality.

Results: The QA system implementation resulted in notable improvements in academic performance, stakeholder satisfaction, and institutional processes. For example, Program Learning Outcomes (PLOs) Achievement has increased from 68% to 85%, with a 17% improvement in program performance between 2019-2023 after implementing QA system. Likewise, Course Learning Outcomes (CLOs) achievement rates, measured using Direct Method Analysis (DMA), improved from 72% in 2019 to 88% in 2023. In addition, Student satisfaction with teaching quality improved from 78% pre-QA to 92% post-QA based on feedback surveys. Furthermore, the field training outcomes (IPPE and APPE training hours) for students has increased by 30%, from 1,200 hours to 1,600 hours.

Conclusion: The development of a QA system at the College of Pharmacy, KKU, in the light of accreditation journey has significantly improved academic performance, stakeholder engagement, and institutional efficiency. The program's learning outcomes and course assessments showed measurable gains, and stakeholder satisfaction levels rose across the board. Although challenges remain, such as faculty workload and research output, the QA system has embedded a culture of continuous improvement within the institution, ensuring sustained compliance with NCAAA standards.

Determination of Warfarin in volumetric absorptive microsampling for therapeutic drug monitoring using LC-MS/MS

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Background: This study aims to quantify warfarin in Volumetric Absorptive Micro Sampling (VAMS) samples from patients receiving warfarin therapy, using liquid chromatography tandem mass spectrometry.

Method: VAMS samples were taken from 25 patients receiving warfarin in Universitas Indonesia Hospital, Depok, Indonesia. Patients also undergo INR testing. Determination of warfarin in VAMS samples was done using UPLC-MS/MS, with quercetin as the internal standard. Sample preparation was carried out using protein precipitation with methanol-acetonitrile (1:3 v/v). Chromatographic separation was achieved using Acquity® UPLC BEH C18 column with 0.1%

formic acid-acetonitrile-methanol (30:69:1 v/v) as the mobile phase in isocratic elution. Multiple Reaction Monitoring (MRM) detection was done using m/z values of 307.10 -> 161.06 for warfarin and 301.03 -> 150.98 for quercetin as an internal standard, using electrospray ionisation (ESI) negative ion source. The warfarin concentration ranges from 6.05 – 431.39 ng/mL, average 128.17 ng/mL (SD 109.56, %CV 83.51%). INR values range from 0.90-9.12, average 1.62 (SD 1.61, %CV 99.39%).

Conclusion: There is a complex relationship between warfarin dose-response, with patients receiving similar doses exhibiting different warfarin concentration and INR value. On a similar dose, there is a wide variation of pharmacodynamics and pharmacokinetics that can cause different responses in patients to warfarin. There is a complex relationship between warfarin dose-response, which can be affected by hereditary factors (polymorphism), environmental factors (interaction with other drugs or food). Measurement of warfarin level in blood samples can be used as a complement to INR testing for TDM of warfarin.

A simulation-based interprofessional program to enhance caring behaviours and collaborative skills in pharmacy students

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Background: Inter-professional education (IPE) had been shown to facilitate effective collaboration among healthcare professionals, ultimately improving patient care. In clinical practice, pharmacists and nurses work closely together to ensure medication safety, optimise therapy, and provide patient-centred care. This study aimed to evaluate the impact of an IPE program on caring behaviours and inter-professional collaboration skills in pharmacy and nursing students.

Method: A 16-hour IPE program was conducted over three consecutive years, involving pharmacy and nursing students. The curriculum included a 2-hour lecture on Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS) communication, followed by two simulation-based cases: postpartum smoking cessation and palliative care, which reflected real-world scenarios where pharmacists and nurses must collaborate to provide holistic patient care. Students completed self-assessment questionnaires before and after the course to measure changes in their attitudes, knowledge, and skills related to interprofessional communication and caring behaviours.

Results: A total of 136 students participated, including 47 pharmacy students and 89 nursing students. Both groups showed significant improvements in attitudes, motivation, perceived utility, and self-efficacy toward teamwork ($p < 0.001$). Pharmacy students demonstrated significant gains in TeamSTEPPS skills, including team structure, leadership, situation monitoring, and communication ($p < 0.001$). Notably, pharmacy students initially scored lower in caring behaviours compared to nursing students (49 vs. 60, $p < 0.001$), but this gap was no longer significant after the course (61 vs. 66, p = 0.234), suggesting enhanced patient-centred attitudes.

Conclusion: Simulation-based IPE can effectively enhance pharmacy students' ability to engage in interprofessional collaboration while also fostering caring behaviours—an essential component of patient-centred pharmacy practice. By improving teamwork and communication skills, IPE equips pharmacy students with the competencies needed to contribute meaningfully to interdisciplinary healthcare teams and optimise patient outcomes.

Overview of breastfeeding teaching in French pharmacy universities compared with UNICEF UK Baby friendly initiative learning outcomes for pharmacy students

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Background: Breastfeeding rates in France is particularly low regarding other countries in Europe. According to the French study "Epifane" published in 2024, 77% of children are breastfed in maternity units, median duration of breastfeeding is around 20 weeks and only 1/3 of children still receiving breast milk at six months. This study highlights the importance of increasing the training of healthcare professionals who can provide support and offer advice on breastfeeding to families. 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 recently published a guidance document for pharmacy students.

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

Method: The 24 French faculty of pharmacy were contacted by email and lecturers were questioned in the same way about the number of hours of lessons given on breastfeeding, in which year the lessons took place, detailed lessons contents and the qualifications of the lecturers. An online questionnaire was developed based on UNICEF UK recommendations. The themes following themes were covered: The value of human milk and breastfeeding, supporting infant feeding and Infant feeding in the context. Thirteen sub-themes, including: functional anatomy of the breast, physiology of lactation, evaluating and using independent, evidence-based information on formula milks, social patterns and why some women do not breastfeed – including relevant data and the effect on health inequalities, evidenced-based interventions that promote, support and protect breastfeeding. Each faculty responded and their responses were compared with each other and with the UNICEF UK recommendations.

Results: A great deal of progress still needs to be made in France to bring the content of pharmacy studies into line with UNICEF UK recommendations on breastfeeding education. This study provides an overview of the situation at each faculty and shows where there is room for improvement.

Conclusion: In France, most faculty of pharmacy dedaced just a few hours on breastfeeding in pharmacy student training. Most of the UNICEF UK program themes and topics are not covered by the lessons. A group of inter-faculty teachers has been set up to work together to develop a teaching approach that could serve as a model for all French faculties. A syllabus based on the UNICEF UK document should be developed in order to increase the knowledge of pharmacists on breastfeeding.

Effective examples of Interprofessional Education (IPE) and the role that trust plays

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Background: To address the growing need for interprofessional collaboration and expanded scopes of practice in healthcare, we developed a course for allied health professionals (pharmacists, podiatrists, optometrists, physiotherapists, exercise physiologists, and dietitians) to deliver Diabetes Education by collaborating with practitioners and academics from those backgrounds as well as a wound care expert and dentist. We received Department of Education funding to subsidise course fees in 2025. The course was guided by two key principles:

1. Building on foundational knowledge with the avoidance of re-teaching concepts already included in allied health entry-to-practice curricula.
2. Embedding person-centred care, health literacy, and chronic disease self-management principles throughout the curriculum as integrated, rather than isolated, elements.

Method: We broadly surveyed health professionals on social media to identify content people wanted to learn and asked allied health professionals who were also credentialled diabetes educators about what content that they had not learnt. To tailor the course for multiple professions, the design process involved understanding which concepts were included each professions' entry-to-practice education to ensure core knowledge was included for all professions (e.g. delivering consultations, pharmacology, injection technique) in sufficient depth. The strengths of the different professions were identified, fostering mutual respect and knowledge about other professions.

Results Expressions of interest have been received from health professionals across all six of the original professions as well as osteopaths, dentists, nurses, midwives, and exercise scientists.

Conclusion: Acknowledging existing knowledge and bringing into focus the strengths of different professions has created a collaborative interprofessional course to address a major health priority. Inter-professional education requires diverse cohorts to be engaged to understand the learning needs of each profession, to create opportunities for interprofessional patient care.

Exploring the professional identity formation of Black pharmacy students at the University of Toronto

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Background: Professional identity formation (PIF) is a process of transforming one's identity to include the role of a healthcare provider. PIF begins during pharmacy education and training and continues throughout one's career. Black students are underrepresented in healthcare professions in Canada. Understanding the PIF of Black pharmacy students can offer valuable insights into how academic institutions can better support students throughout their Doctor of Pharmacy

programs and improve diversity within the profession. This study aimed to identify and understand factors influencing PIF in Black pharmacy students in Canada.

Methods: A single-site qualitative study was conducted with 3rd and 4th year pharmacy students at the University of Toronto Leslie Dan Faculty of Pharmacy, using semi-structured interviews to explore students' experiences, challenges and facilitators related to PIF. Interviews were transcribed and thematic analysis was performed to identify themes.

Results: Eight pharmacy students participated, and four key themes emerged as influential in PIF among Black pharmacy students. (1) Reasons for choosing pharmacy: included job security, being a trusted healthcare professional, not being directly hands-on with patients and the salary. Before starting the PharmD program, participants' view of a pharmacist was largely limited that of a medication dispenser and were unaware of the variety of roles a pharmacist can have within the healthcare system. (2) Preceptors: PIF was found to occur during positive (e.g., when students observed preceptors practicing to their full scope and prioritizing patient care and student development) and negative (e.g., preceptors prioritised business outcomes, such as med check quotas over patient care). (3) Workplace environment: factors that were barriers to workplace satisfaction included inadequate compensation and lack of peer support. Facilitators such as direct patient care and professional autonomy enhanced workplace satisfaction. (4) Race: most participants have never seen a Black pharmacist before entering the PharmD program, highlighting the lack of diversity within the profession. The Black Pharmacy Student Association (BPSA) at the University of Toronto provided a sense of community and belonging, however, challenges such as finding Black pharmacy mentors and funding were prevalent.

Conclusion: Supporting PIF among underrepresented groups is essential for building a more equitable healthcare workforce and addressing the needs of diverse populations. Providing mentorship opportunities and connecting students with Black pharmacy professionals can help promote professional identity and confidence in pursuing a career in pharmacy.

Queering health: Lessons learned from the UBC Faculty of Pharmaceutical Sciences' journey in becoming a champion in 2SLGBTQ+ education

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Background: Research persistently shows that 2SLGBTQ+ individuals experience poorer health outcomes when compared to the general population. Addressing this disparity requires targeted health professional education, as recommended in The Health of LGBTQIA2 Communities in Canada 2019 House of Commons Report. In fact, the Accreditation Standards for Canadian Education Program Leading to the Doctor of Pharmacy (PharmD) Degree was updated in 2023 requiring pharmacy curricula to have sufficient depth, scope, and emphasis to develop an appropriate understanding of health equity. From 2022, 2SLGBTQ+ topics were mindfully and sequentially scaffolded across all four professional years (PY) of the University of British Columbia's (UBC) Entry-to-Practice (E2P) PharmD program through didactic, skills-based, and experiential learning.

Methods: In partnership with community partners, six program learning outcomes (PLO) were created to ensure graduates develop appropriate competencies to provide quality pharmaceutical care to 2SLGBTQ+ communities. Using a mapping scale adopted from Veltri et al. (2012), a curriculum map was conducted in 2022 to identify where and at what level of complexity ('depth') these PLOs are taught in the program. Findings informed the development and subsequent launch of a mandatory PY1 lecture, PY2 workshop, and PY4 asynchronous learning module in 2022/23, followed by an elective PY3 course in 2023 and an elective PY4 community-engaged learning practicum in 2024. Curricular elements were independently evaluated via anonymised surveys and focus groups. A follow-up curriculum map was conducted in 2024 to compare the depth of PLO taught in affected courses pre- and post-interventions.

Results: In 2022, only 1 PLO was taught at an advanced level by PY3. That same year, 16 (out of 224) and 31 (out of 104) students completed a post-session questionnaire on the PY1 lecture and the PY2 workshop, respectively. Most students (>75%) responded favourably and found the topics useful for their learning. Five (out of six) and ten (out of 13) students completed a survey administered by the university on the PY3 elective course in 2023 and 2024. Both instructors and the course received 100% favourable ratings on all elements. All students (n = 5) were surveyed and interviewed on their Y4 practicum experience in 2024. They unanimously felt more competent in all eight learning goals. In parallel, all preceptors (n = 4) participated in a focus group and shared that students were prepared and open to learning but required some support. By 2024, all PLOs were taught at the reinforced and advanced levels in the PY3 elective course. In comparison, the updated mandatory courses progressed students to advanced level in 1 PLO and to a reinforced level in 3 PLOs.

Conclusion: The UBC Faculty of Pharmaceutical Sciences took an integrated and longitudinal approach to embed 2SLGBTQ+ topics and associated competencies into its E2P PharmD curriculum. As a result, students felt more competent in their ability to provide care to 2SLGBTQ+ communities as they progressed through the program. This highlights the importance for pharmacist training programs to use constructive alignment principles to design a curriculum

framework that encompasses a variety of pedagogical strategies to address the expressed needs of targeted communities.

Advocating for a designated portion of time for scholarship in pharmacy educators' workload

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Background and Objective: Scholarship, including research, grant applications, and peer-reviewed publications, is a fundamental expectation for academic pharmacy faculty. However, many institutions do not allocate dedicated time for scholarship within the regular job expectation, often requiring faculty to engage in these activities outside of work hours. Providing protected time for scholarship is crucial for the success and advancement of both faculty and institutions. This project identifies methods and recommendations for schools/colleges of pharmacy to incorporate protected time for faculty scholarship within their workload expectations.

Method: Members of the Educator Development Workgroup within the FIP Academic Pharmacy Section, representing diverse geographic regions and institutional types and sizes, collaborated to explore strategies for promoting faculty scholarship. The workgroup defined the various forms of scholarship to encompass the broad range of research pursuits, reviewed current literature and identified institutional practices that support scholarly productivity.

Results: Schools, colleges, and programs of pharmacy can potentially attract more qualified individuals and increase the overall scholarship production by incorporating protected time into faculty members' workload and promoting a positive and transparent work environment. Academic faculty members who engage in scholarship advance the profession, bring recognition to their institutions, and experience personal and professional fulfilment. These efforts also contribute to faculty retention, improve overall workplace satisfaction and can inspire other faculty. Strategies to incorporate protected time for scholarship include: 1) establishing reasonable working hours per week for full-time academic faculty members, 2) setting clear scholarship time minimums based on academic faculty member rank, and 3) collaborating with faculty to develop personalised plans that balance teaching, service, clinical responsibilities, and/or research obligations.

Conclusion: Implementing strategies to provide protected time for scholarship can empower pharmacy educators to make meaningful contributions to research, teaching, and practice innovations. These efforts not only advance the profession but also enhance faculty satisfaction and institutional reputation.

Knowledge, attitude, and practices related to the implication of artificial intelligence in research among post-graduate pharmacy and allied health science students

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Background: Post-graduate (PG) students' knowledge and viewpoints towards the implications of artificial intelligence (AI) in research are crucial, as they play a vital role in implementing AI-driven advancements in research and clinical practices.

Objective: The current research aimed to evaluate the pharmacy and allied health science PG students' knowledge, attitudes, and practices regarding the implication of AI in research. We also contrasted the opinions of pharmacy and other health sciences PG students.

Method: Health science students including pharmacy from different universities (n=3) pursuing their post-graduation participated in a cross-sectional study. A survey was conducted to assess PG students' knowledge, attitudes, and practices regarding AI in research. A link to a pre-validated questionnaire created with google forms and distributed to PG students. Descriptive statistics was used to examine quantitative data via the SPSS 27.0 version. The clustering technique was used to determine statistically significant differences in their responses between clusters using the Kruskal Wallis test (for more than two clusters such as age and

level of researcher) and Mann-Whitney's U test (for two clusters, such as gender).

Results: A total of 181 PG students responded to the survey. Pharmacy and allied health science students were in the ratio of approx. 1:1. Most of the participants were in favour of AI implications in research (66.8-95%). However, a small group agreed with the statements that "AI will replace the functions of researchers in general" (35.3%) and "AI tools should be listed as an author on scientific publications" (42.6%). They were not sure about the ethical issues associated with the use of AI tools in research and whether using AI tools in research/writing is ethically acceptable (approx. 55%). They weren't exposed to AI tools and didn't attend workshops/seminars during their postgraduate studies. There was no significant correlation of age with the responses, however, gender was significantly associated with their response to the statement "AI tools can improve the efficiency and productivity of research" ($p = 0.04$). The level of researcher (beginner, middle, senior) was significantly associated with different responses with the most significant response to "I will learn how to use artificial intelligence in my research work in the future" ($p = 0.001$). The field was also significantly associated with their responses to statements regarding attitude ($p < 0.05$), however, no significant difference was observed in response to the statements regarding their practice.

Conclusion: According to the study, majority of PG students have positive opinions regarding the implication of AI in research. There was broad agreement that AI would fundamentally assist researchers rather than replace them. These results demonstrate the potential of incorporating AI tools into pharmacy and health education. However, Pakistani PG students were not trained to use AI tools during research The integration of AI-based training in post-graduate studies should be continuously pursued by stakeholders and regulatory agencies to prepare PG students for their future role in healthcare.

Pharmacy Quest: A novel gamification approach to boost resident engagement and performance in ASHP-Accredited Programs

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Background: Leading a large cohort of residents while ensuring sustained engagement throughout the residency remains a significant challenge. Additionally, PharmAcademic, the online portal used for tracking progress, lacks a mechanism to differentiate performance from better to best. Its complex interface further reduces engagement during the one-year residency journey, ultimately impacting operational, clinical, and learning outcomes. These challenges highlighted the need for incorporating a reward system to enhance motivation and drive active participation in the program.

Objective: The purpose of this initiative is to enhance resident engagement, motivation, and performance by integrating a gamification-driven reward system into the International Pharmacy Practice Residency Program. By addressing the challenges of sustained participation, performance differentiation, and complex tracking in PharmAcademic, this approach aims to foster a more interactive and competitive learning environment.

Methods: Gamification, the application of game elements in non-game settings, has gained traction in training and development, particularly in pharmacy education. By integrating competitive and reward-based mechanisms, gamification fosters motivation, improves learning outcomes, and drives active engagement. This initiative explores the design, implementation, and impact of gamification in aligning with the residency program's educational goals. Gamification was introduced into the residency program by transitioning from a legacy framework to a leadership-driven model, covering 106 objectives across 8 learning experiences. In 2023, structured game elements were integrated, categorised into three domains: PharmAcademic Engagement, Clinical Interventions, and Regularity & Punctuality. Each domain featured progressive levels, encouraging residents to unlock achievements through consistent performance:

Category:

- Level 1, Level 2, Level 3
- PharmAcademic Pharm Rise Pharm Elite Pharm Master
- Interventions, Dose, Detective, Med, Master, Therapeutic Triumph
- Regularity, Regularity, Ranger, Reliability, Radiant, Punctuality, Pro.

Residents accumulated points quarterly, with ten points = one star, and progression required maintaining achieved levels. Demotion was possible if requirements were not met. Rewards included leaderboard rankings, certificates, badges, and a live online gaming board, reinforcing motivation and participation.

Results: Gamification led to a 100% increase in resident engagement. A significant improvement was observed in the mapping of objectives, evidence uploading, and clinical activity participation. Intervention logging surged from 226 to 580, covering areas like renal dose adjustments, customised patient care plans, and medication reviews. This highlights gamification's effectiveness in driving active learning and professional growth.

Conclusion: Integrating gamification into the International Pharmacy Practice Residency Program has revolutionised engagement, accountability, and clinical performance. By fostering competition, recognition, and structured progress,

gamification has proven to be a powerful tool in levelling up residents' participation, performance, and overall learning experience.

Advancing pharmacy education through competency-based curriculum development: Aligning graduate Skills with national and global healthcare needs

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Background: The evolving role of pharmacists in healthcare necessitates a curriculum that equips graduates with the knowledge, skills, and professional competencies required to meet national and global health challenges. At the Lebanese International University (LIU) School of Pharmacy, a structured competency-based curriculum has been developed to align with national regulatory standards and international frameworks, including the Accreditation Council for Pharmacy Education (ACPE), the Centre for the Advancement of Pharmaceutical Education (CAPE) outcomes, and the International Pharmaceutical Federation (FIP) competency framework. This study outlines the development, implementation, and continuous refinement of pharmacy professional competencies at LIU to ensure that graduates are prepared for diverse practice settings, address current and future national healthcare needs, and contribute to the advancement of pharmacy practice in Lebanon.

Methods: A competency task force was established, comprising faculty members, practicing pharmacists, and academic leaders with expertise in pharmacy education and healthcare practice. The competency selection and mapping process involved multiple stages, including a review of global best practices, benchmarking against international pharmacy education standards, and integrating feedback from key stakeholders such as the Ministry of Education and Higher Education (MEHE) and the Lebanese Order of Pharmacists (OPL). The competencies were categorised into six key domains: Foundational Knowledge, Pharmaceutical Care, Essentials to Practice and Care, Approach to Practice and Care, Professionalism, and Personal and Professional Development. To ensure effective integration into the curriculum, faculty members participated in a series of workshops and discussions to refine course learning outcomes and align them with program-level competencies. The curriculum was then subjected to periodic assessment and revision, ensuring that emerging healthcare trends and evolving pharmacy roles were continuously addressed.

Results: The structured competency-based approach has resulted in a dynamic and practice-oriented curriculum that prepares graduates for diverse pharmacy roles, including community and hospital pharmacy, clinical pharmacy, pharmaceutical industry, academia, and research. The curriculum fosters patient-centred care skills, evidence-based decision-making, and interprofessional collaboration, ensuring that students develop the competencies needed to excel in a rapidly evolving healthcare landscape. Additionally, the program has incorporated managerial and leadership training, regulatory sciences, and personalised medicine, reflecting the expanding scope of the pharmacy profession. By continuously evaluating national and global healthcare needs, the curriculum remains adaptable, preparing graduates for both current challenges (such as medication safety, pharmacovigilance, and patient education) and emerging trends (such as digital health, precision medicine, and health informatics). The School of Pharmacy at LIU has also played a pivotal role in national discussions on competency-based education, contributing to pharmacy accreditation standards and workforce development policies.

Conclusion: By integrating national and international competency frameworks, LIU's School of Pharmacy ensures that its graduates are well-prepared to meet Lebanon's healthcare needs, advance pharmacy practice, and contribute to global healthcare improvements. The competency-based model serves as a benchmark for curriculum innovation, quality assurance, and professional development, reinforcing the critical role of pharmacy education in improving patient care outcomes and strengthening healthcare systems. Future directions include expanding interdisciplinary training opportunities, incorporating digital health technologies, and fostering global collaborations to enhance competency-based pharmacy education.

Transforming pharmacy education: Implementing a streamlined competency-based framework with entrustable professional activities

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Background: As pharmacy practice evolves, pharmacy education must adapt to ensure graduates are equipped with the competencies needed to meet national and global healthcare demands. At the Lebanese International University (LIU) School of Pharmacy, a competency-based curriculum was previously structured around six domains and 20 sub-domains aligned with national and international standards, including the Accreditation Council for Pharmacy Education (ACPE), the Centre for the Advancement of Pharmaceutical Education (CAPE) outcomes, and the International Pharmaceutical Federation (FIP) competency framework. While this framework successfully guided competency development, a newly revised and streamlined approach has been implemented to simplify and enhance learning outcomes and assessment strategies. The updated framework consolidates the six domains into three primary domains (Knowledge, Skills, and Attitudes), with 12 sub-domains, each with detailed outcome descriptions that serve as specific program learning objectives. This study presents the rationale, development, and expected impact of this transformation.

Methods: The revision process was led by a competency task force comprising faculty members, academic leaders, and practicing pharmacists. A structured approach was taken to analyse the effectiveness of the previous competency model and to align revisions with national accreditation requirements and evolving pharmacy practice standards. The task force mapped competencies to contemporary pharmacy roles, ensuring they address both current national healthcare needs and anticipated future demands. The new framework simplifies the structure while maintaining alignment with CAPE and FIP standards. Additionally, Entrustable Professional Activities (EPAs) were incorporated to establish clear expectations for student competencies at different stages of training. Faculty members participated in multiple workshops and consultations to refine course learning outcomes and integrate them into the revised competency framework.

Results: The new competency framework introduces a streamlined structure, improving clarity and applicability for both faculty and students. The three domains (Knowledge, Skills, and Attitudes) comprehensively encompass the foundational and applied aspects of pharmacy education. The 12 sub-domains offer clearly defined, measurable learning objectives that guide curriculum design, teaching strategies, and student assessment. The integration of EPAs ensures that students progressively develop competencies in real-world pharmacy settings, with a structured entrustment scale to assess their readiness for independent practice. By reducing redundancy and improving alignment with national and international competency models, the revised framework enhances graduate preparedness, workforce readiness, and interprofessional collaboration. Furthermore, this transformation supports lifelong learning, leadership development, and innovation in pharmacy practice.

Conclusion: The transition from a six-domain, 20 sub-domain framework to a three-domain, 12 sub-domain model represents a significant advancement in competency-based pharmacy education at LIU. This revised framework aligns with evolving pharmacy roles, strengthens student learning experiences, and enhances the quality and relevance of pharmacy education in Lebanon. The integration of Entrustable Professional Activities (EPAs) further ensures that graduates are competent, confident, and practice-ready. Future directions include evaluating the long-term impact of this transformation, expanding interdisciplinary training, and integrating digital health competencies to keep pace with global trends in pharmacy practice.

Building sustainable clinical pharmacy capacity in Sri Lanka through train-the-trainer programmes

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Background: Clinical pharmacy in Sri Lanka is a core element of the country's medication safety agenda. Since 2009, collaboration with Australian pharmacists has advanced hospital and university-based clinical training, including earlier Train-the-Trainer (TtT) initiatives. A 2018 national workshop identified the urgent need to expand pharmacist clinical skills and embed teaching in all pharmacy schools.

Methods: In 2023, a four-day TtT programme trained 20 pharmacists (nine academics from five universities, eleven

hospital practitioners). Content included medication history taking, reconciliation, identification and resolution of drug-related problems, and patient education. Pedagogies, aligned with the FIP Global Competency Framework, combined observation with feedback, role-play, mock-ward simulations, bedside teaching, case discussions, and entrustable professional activities.

Results: Participants reported high satisfaction and improved clinical competence. Ten months post-training, all had integrated programme elements into teaching or practice, with 50% assuming trainer roles.

Conclusion: The TtT model effectively builds local training capacity and embeds clinical pharmacy skills into practice and education. Next steps will see participants co-facilitating future programmes, supporting a sustainable, nationwide expansion of clinical pharmacy services.

Understanding inclusion in pharmacy education: Insights from students and educators to inform COIL development

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Introduction: Equity, diversity, and inclusion (EDI) are essential in pharmacy education to prepare future pharmacists for working effectively with diverse patient populations and interdisciplinary teams. However, pharmacy educators often lack structured opportunities for professional development in inclusive teaching. The Faculty Professional Development for Inclusion in Pharmacy Education (FPD-Include) project aims to address this gap through a Collaborative Online International Learning (COIL) course designed to enhance faculty competence in inclusive teaching. To inform the COIL course structure and content, a needs assessment survey was conducted across four institutions in Norway, Finland, the Netherlands, and Spain. This study presents the quantitative findings on students' and educators' perceptions of inclusion in pharmacy education, highlighting key trends that shaped the COIL course design.

Method: A cross-sectional survey was conducted among pharmacy students and educators at the four partner institutions. The surveys included both Likert-scale and open-ended questions, developed collaboratively by an interdisciplinary team and translated for linguistic and cultural relevance. The student survey assessed sense of belonging, experiences with intercultural communication, representation in curricula, and perceptions of inclusivity in learning environments. The faculty survey measured confidence in inclusive teaching, perceived institutional support for EDI, challenges in fostering inclusive classrooms, and experiences integrating EDI into pharmacy curricula. Quantitative data were analysed descriptively, while qualitative responses provided additional context to the numerical trends.

Results: A total of 526 pharmacy students and 145 educators completed the survey. Student responses varied across institutions, with differences in their sense of belonging, perceptions of diversity in course materials, and challenges in intercultural communication. Preliminary analysis suggests that while some students feel supported in their learning environment, others report limited representation in curricula and difficulties engaging in diverse classroom discussions.

Educator responses indicate varying levels of confidence in implementing inclusive teaching practices. Many faculty members reported challenges in integrating diverse perspectives into curricula, addressing implicit biases, and fostering inclusive learning environments. Institutional support for EDI training also differed across countries, with some educators highlighting a need for structured faculty development opportunities.

Findings from both groups directly informed the development of the COIL course, which includes modules on fostering collaboration in diverse student groups, intercultural competence, inclusive assessment practices, inclusive teaching in STEM disciplines, and building trust in learning environments.

Conclusion: The survey findings highlight differences in student experiences of inclusion and faculty confidence in inclusive teaching across the four partner institutions. By grounding the COIL course design in empirical data, FPD-Include ensures a structured, evidence-based approach to faculty development. The initiative contributes to pharmacy education by fostering international collaboration and providing a model for interdisciplinary professional development in inclusive teaching. Future research will evaluate the impact of the COIL course on faculty competence and students' learning experiences.

Enhancing clinical reasoning in postgraduate international pharmacy students: A case study on the think aloud instruction method at the University of Hertfordshire, UK

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Introduction: Pharmacists' scope of practice has expanded to include a growing range of clinical patient-centred services, including writing or modifying prescriptions both independently and collaboratively, skills that are dependent on clinical reasoning (CR) skills. CR is a complex cognitive skill which involves, memorising, recalling, synthesising, criticising and prioritising large amounts of data for managing patients' health problems. CR can be taught by explicating and reflecting as separate stage of the clinical decision-making process with transparent cognitive processes. The 'Think Aloud' (TA) is a pedagogical approach which involves the verbalising cognitive processes during problem-solving. Research looking at using the TA approach in international postgraduate pharmacy students' education is limited. This case explores the feasibility of using the TA to help international postgraduate pharmacy students develop their clinical reasoning skills, in the UK.

Methods: This study, part of a series of workshops designed to break down clinical reasoning into phases, focused on helping students apply clinical decision-making skills. In February 2025, this final workshop used a cross-sectional design with pre- and post-surveys to assess changes in students' clinical reasoning perceptions and satisfaction with the think-aloud method. The pre-survey evaluated students' confidence in clinical reasoning tasks, identifying strengths and weaknesses, while the post-survey explored changes in confidence and perceptions. Students were provided with a complex case study (Case 1) to review and were tasked with identifying and prioritising pharmaceutical care concerns to developing a care plan. An experienced clinical pharmacist then demonstrated their thought process using another case (Case 2) verbalising how and why they identified concerns and the reasoning behind tailored clinical decisions. Students revisited then their original case study, reflecting on their decisions and adjusting their care plan. This study follows the reflective practitioner approach, so ethics approval was not required.

Results: A total of 48 international pharmacy students attended the think-aloud clinical reasoning session, with 42 completing the pre-survey. Of these, 48% (n=20) identified their strongest clinical reasoning aspects as information gathering (IG), 26% (n=11) as safety netting, and 12% (n=5) as identifying red flags. The weakest aspects identified were care management (29%, n=12) and analysis (19%, n=8). Following the session, 28 students completed the post-session survey. Of these, 50% still identified IG as the most confident aspect of clinical reasoning. However, tasks that students had identified as areas of least confidence in the pre-survey showed the most significant increase in confidence after the session. In terms of learning outcomes, 39% (n=11) reported an improved ability to analyse case study data, 29% (n=8) mentioned improvement in plan management, and 14% (n=4) stated that they now had a framework to apply to clinical reasoning tasks.

Conclusion: This case study highlights the significance of the TA method in pharmacy education, as it facilitates a cognitive shift in students' thinking. By verbalising their cognitive processes, clinicians' model metacognitive awareness, helping students become more aware of their own thinking and decision-making approaches. It also enables clinicians to demonstrate problem-solving strategies, allowing students to internalise these methods and apply them in UK future practice.

The leadership-pharmacy nexus: Integrating decision-making and problem-solving in education

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Background: Leadership and decision-making are critical competencies for pharmacists in both clinical and administrative roles. However, traditional pharmacy education often lacks structured training in these areas. This study evaluates the impact of an active-learning, leadership-integrated teaching model on decision-making and problem-solving skills among pre-final and final-year Pharm.D. students.

Methodology: A quasi-experimental study was conducted among 60 pharmacy students (pre-final: n = 30, final-year: n = 30), randomly assigned to an intervention group (n = 30) and a control group (n = 30). The intervention included case-based learning, role-playing, gamification, and ethical dilemma discussions, while the control group followed traditional lecture-based instruction. Leadership competency was assessed using the Student Leadership Practices Inventory (SLPI), while decision-making and problem-solving skills were evaluated using structured case-based assessments and rubrics. Pre- and post-intervention comparisons were analyzed using paired t-tests and ANCOVA, with significance set at $p < 0.05$.

Results: The intervention group demonstrated a significant improvement in leadership competency scores, increasing from 41.92 ± 5.18 to 67.35 ± 4.76 ($p < 0.001$). Decision-making accuracy also improved significantly, rising from 59.84% ± 6.43 to 81.27% ± 5.69 ($p < 0.001$). Additionally, problem-solving performance showed a notable increase, with scores improving from 5.68 ± 1.21 to 8.03 ± 1.07 ($p = 0.004$). In

contrast, no significant changes were observed in the control group ($p > 0.05$). Thematic analysis of student reflections highlighted increased confidence, enhanced teamwork, and better application of leadership principles in real-world scenarios.

Conclusion: Integrating leadership-focused active learning strategies into pharmacy education significantly enhances students' decision-making and problem-solving abilities. These findings highlight the need for curriculum reforms that embed structured leadership training within pharmacy programs, better preparing graduates for dynamic roles in healthcare and pharmaceutical management.

Assessing the effectiveness of the Commonwealth Partnerships for Antimicrobial Stewardship Programme in strengthening health institutions capacity and capability to address AMR challenges: A mixed-methods evaluation

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Introduction: The Commonwealth Partnerships for Antimicrobial Stewardship (CwPAMS) is a programme funded by the UK Department for Health and Social Care's Fleming Fund using UK Aid, and managed by the Commonwealth Pharmacists Association (CPA) and Global Health Partnerships (GHP). The programme aims to strengthen health institutions' capacity to address antimicrobial resistance (AMR), with a focus on low- and middle-income countries (LMICs). CwPAMS creates opportunities for workforce capacity building and bi-directional learning, supporting implementation of antimicrobial stewardship (AMS) and infection prevention and control (IPC) initiatives to improve prescribing practices, protocols and surveillance through evidence-based decision making. Launched in 2019, the programme has expanded to operate across eight Sub-Saharan African countries (Ghana, Kenya, Malawi, Nigeria, Sierra Leone, Tanzania, Uganda and Zambia). The second phase of the programme, CwPAMS 2 (March 2023 to December 2024) supported 24 health partnerships in implementing AMS/IPC interventions.

Purpose: This study aimed to evaluate the effectiveness of the CwPAMS 2 programme in strengthening health institution's capacity and capability to develop AMS/IPC strategies.

Methodology: A CwPAMS AMS Assessment Tool was developed to assess healthcare institutions (74) and to support the creation of locally relevant AMS action plans. The tool was designed before the WHO practical tool became available to support programme implementation against a set of standards. Key assessment areas included: leadership commitment; accountability; education and training; and monitoring and surveillance. Data were collected at the beginning and end of the programme. A mixed methods approach was used for data analysis by comparison of pre- and post-assessments: quantitative data was analysed using Excel whilst qualitative data was thematically analysed. As a programme evaluation, this study did not require ethical approval.

Results: A total of 72 pre- and post-assessments were completed across 24 health partnerships in eight LMICs. Since the start of CwPAMS 2, more than 17,000 healthcare professionals have received training, with over 8,000 also demonstrating increased capability, opportunity and motivation to adopt appropriate AMS/IPC behaviours following training. Additionally, 69 AMS committees were established within healthcare institutions, 50 of which approved new or updated AMS and/or IPC guidelines, tools or protocols. CwPAMS has also facilitated the implementation of 72 AMS Action Plans, with 70 institutions utilising data collected through point prevalence surveys to assess the need for interventions to improve antimicrobial prescribing practices. Furthermore, UK healthcare professionals contributed over 2,500 combined volunteering days to strengthen AMS in LMIC healthcare institutions, underscoring the programme's impact on bilateral learning and cross-country collaboration.

Conclusion: CwPAMS continues to demonstrate effective contributions and progression towards health system strengthening in LMICs. National Action Plans and standards of best practice have been used to inform locally relevant and realistic AMS Action Plans to advance AMS/IPC initiatives while improving knowledge and practice. The programme has created opportunities for multi-sector collaboration and bi-directional learning, with pharmacists at the forefront, further supporting capacity and capability development. The next phase of the programme (CwPAMS 2.5), will continue building on these gains and data captured used to inform a potential CwPAMS 3.

Development of a tripartite experiential learning strategy for the provision of undergraduate pharmacy placements

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Background: In 2021, the General Pharmaceutical Council (GPhC), the UK's pharmacy regulatory body, introduced revised Standards for the Initial Education and Training of Pharmacists. These incorporate prescribing competencies into the undergraduate Master of Pharmacy (MPharm) degree. From 2026 onwards, newly qualified pharmacists will register with independent prescribing capabilities. Undergraduate pharmacy students now require extended experiential placements to gain the necessary competencies to prescribe independently. The expansion, quality assurance (QA) and diversification of placement providers is essential to ensure sufficient clinical exposure. Therefore in 2023 the Pan-London Consortium, a collaboration between the three London Higher Education Institutions (HEIs), was established with support from NHS England (NHSE). We are working in partnership with primary and secondary healthcare providers to standardise MPharm experiential learning across London.

Purpose: To establish a standardised and scalable framework for the expansion, QA, and optimisation of undergraduate pharmacy placements to equip students with clinical and prescribing competencies to meet healthcare demands.

Method: A legal framework for collaboration was established, supported by a Memorandum of Understanding that addressed; terms of partnership, information sharing, and development of joint initiatives. A Steering Group, representing the three HEIs and NHSE, was formed to oversee strategic direction. A Stakeholder Consultative Board was established to ensure stakeholder perspectives were integrated throughout development and implementation.

Working groups addressed three key areas: program quality assurance process, e-portfolio, and training for placement supervisors and capability building.

A major initiative was development of a unified e-portfolio system to replace HEI specific paper-based logbooks. Students use the e-portfolio to record learning, supervisors to sign off achievements, and placement activities mapped to GPhC Learning Outcomes (LOs). The system addressed digital accessibility supporting offline access with multiple device compatibility. A standardised supervisor training program was developed, ensuring alignment with GPhC requirements and improving assessment consistency across placement sites. A bespoke database stored accreditation records and streamlined QA of training centres.

Results: The Steering Committee and working groups met monthly. The Stakeholder Consortium Board held quarterly progress monitoring meetings. Placement providers reported the need to simplify the learning process, clarify mandatory tasks, enhance student engagement through interactive activities, and encourage in depth reflection. Therefore, the e-portfolio was implemented, enabling supervisors to sign off LOs efficiently. Preliminary feedback from 163 students found that 60% considered the e-portfolio interface usable. However, many struggled with navigation, though they valued real-time supervisor feedback.
To promote consistency in assessment and feedback, all three universities delivered standardised training for placement site supervisors. In March 2025, a single online QA placements accreditation process was launched in partnership with 101 training centres, supporting 2,870 students to ensure a cohesive and scalable placement system.

Conclusion: Through collaboration between HEIs, training centres, and NHSE, we have streamlined experiential learning to align with GPhC standards, ensuring consistency, efficiency, and scalability for sustainable high-quality pharmacy training.

Future work includes a holistic evaluation of the project to develop a standardised framework for adaption by other regions, to further strengthen the quality and capacity of pharmacy experiential learning across the UK.

Evaluating mental health first aid training and simulated psychosis-related patient role-plays with trained actors in pharmacy, medicine, nursing, and occupational therapy curricula

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Introduction: Despite the high disease burden and suicide risk associated with psychosis, healthcare curricula often lack hands-on training and real-world exposure to psychosis-

related situations, which may reduce students' willingness and confidence in providing care in future practice. Mental Health First Aid (MHFA) training improves healthcare students' mental health knowledge and self-reported confidence in supporting individuals experiencing crisis, including acute psychosis and suicidal ideation. Simulated patient role-plays provide a safe environment for students to practise skills before real-world application. Role-plays with feedback provided by lived experience educators (LEEs) enhance students' learning, by offering authentic experiences and equipping them with practical skills for real-world situations. This study aims to explore MHFA-trained students' performance during, as well as experiences and reflections of simulated patient psychosis-related role-play assessments.

Method: MHFA training was provided to student cohorts across pharmacy, medicine, nursing, and occupational therapy programs at The University of Sydney in 2022-2023. Post-MHFA training, students were randomly allocated to participate as role-players with trained actors. Role-plays involved trained actors enacting one of three co-designed scenarios relating to a person living with schizophrenia and taking an antipsychotic, having a plan for suicide, or experiencing visual hallucinations. The role-play sessions were observed and scored using validated rubrics by peers, tutors, and LEEs, with students immediately engaging in self-assessment, feedback, and debrief discussions. Quantitative and comparative analyses were performed to compare scores across scenarios and disciplines, based on scores awarded by student self-assessments, tutors, and LEEs. Focus groups were conducted with students to gather insights on their experiences as role-players or observers, and transcripts underwent inductive thematic analysis.

Results: A total of 201 tutor-, 192 LEE-, and 197 self-assessments (each scored out of 100 points) were analysed. The mean self-assessment scores were the lowest (mean=60.3, SD=17.5), compared to the mean tutor or LEE scores (mean=65.7, SD=19.5 and mean=79.2, SD=18.9, respectively). Students received the lowest scores for the scenario involving provision of support for a person with suicidal thoughts, highlighting the challenges in assessing for suicide risk. Seven focus groups were conducted with 19 students across all four disciplines. Five themes emerged from the data, emphasising that simulated learning was (i) "better than textbooks", with its impact enhanced through (ii) "feedback and reflection" after simulation. Regardless of whether students participated as role-players or observers, they found mental health simulations to be (iii) "a safe yet confronting learning experience". Students also highlighted the value of (iv) "learning through observation" and (v) "recognising the need for mental health education".

Conclusion: Embedding MHFA training into healthcare curricula can help students develop confidence in handling mental health conversations and supporting a person experiencing a mental health related crisis. Students acknowledged the importance of integrating mental health education into curricula and continuing professional development, recognising that such skills are crucial to their daily practice as healthcare professionals. Simulated patient role-plays with trained actors provide a valuable learning experience beyond traditional didactic methods, allowing students to safely practise and refine their mental health support skills.

Changes in student pharmacists' assumptions through interprofessional collaborationoral

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Introduction: Interprofessional collaboration (IPC) in healthcare education is vital for preparing future professionals to work effectively in multidisciplinary teams, ultimately improving patient outcomes. In many healthcare teams, frequent changes and overlaps in the roles played by different health care professionals can create challenges related to recognizing and assigning roles effectively. Research has shown that interprofessional experiences have exposed students to values and ethics, roles and responsibilities, interpersonal communication, and teamwork. Limited exposure to other healthcare roles can lead to misconceptions about different professions. This study aims to examine how participation in IPC changes or confirms pharmacy students' preconceived assumptions about healthcare professionals.

Method: "Assumptions Essays" written by second-year student pharmacists (P2) at the University of Southern California Alfred E. Mann School of Pharmacy and Pharmaceutical Sciences (USC Mann) after participating in at least one IPC session with first-year medical and first-year Master of Science nursing students were analyzed retrospectively with Institutional Review Board (IRB) approval. Student IPC teams worked on patient cases, clarified roles and responsibilities, and engaged in team simulation exercises with standardized patients. A total of 171 essays were submitted by P2 students from the Classes of 2025 and 2026. Of these, 151 essays were included in the study. The essays were reviewed and analyzed following a norming process to ensure consistent evaluation and classification. The topics were classified into five categories: Roles and Responsibilities, Scope of Practice, Patient Interaction and Care Approach, Educational Background and Training, and Professional Values and Ethics.

Results: A total of 175 assumptions were identified. After participating in an IPC session, 94.3% of students stated that their assumptions changed after the session(s). The most common (50.6%) assumptions were related to the nursing profession, 32.1% to physicians, and 17.3% to the student pharmacists' own profession. The predominant assumptions

were related to roles and responsibilities (36.6%), then educational training and background (18.3%), professional values and ethics (17.7%), scope of practice (14.8%), and patient interaction and care approach (12.5%).

Conclusion: Misconceptions about roles and responsibilities in healthcare are prevalent among student pharmacists. Targeted education and exposure to interdisciplinary collaboration can significantly improve understanding, reduce misconceptions, and foster better clarity regarding professional roles in healthcare. These findings underline the importance of ongoing interprofessional training to bridge knowledge gaps and promote effective teamwork in patient care.

Mental healthcare and pharmacy: A new educational program to engage developing country pharmacists in the global mental health movement

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Introduction: Mental healthcare is increasingly acknowledged as a vital component of public health. In developing countries, mental health vulnerabilities are heightened by persistent stigma and severe lack of mental health services.

Pharmacists and pharmacy support staff, who often serve as the first point of contact for patients, can play a crucial role in reducing stigma and promoting mental health in their workplace and communities.

Vennue's program, Mental Healthcare and Pharmacy, provides training and tools to integrate mental healthcare into daily pharmacy practice – with unique attention to developing country settings.

Methods: From June 2023 to May 2024, Vennue developed a new certification course comprised of four competency-based training modules:

1. Supporting the Mental Health of Pharmacy Workers: Reducing stress and building resilience
2. Integrating Mental Healthcare into Pharmacy: Strategies to improve patient care
3. Mental Health is a Public Concern: Reducing stigma and raising awareness
4. Promoting Mental Health and Well-being: Fostering a team approach

In August 2024, the program was awarded the "FIP Programme Seal."

The new content was released through a coordinated, three-pronged approach:
• Hosting a series of interactive roundtables, culminating in a Global Call to Action with mental health expert Dr. Vikram Patel
• Launching the full certification on the Vennue Hub (hub.vennue.org), for any health worker to access the training, anytime
• Stewarding the course into developing countries with local implementation partners

From October 2024, Vennue's in-country staff in Bangladesh and Nepal led three pilot projects for pharmacists and support staff to participate in:
• Bilingual training sessions
• Locally relevant case studies and workshops
• Role-play activities to strengthen consultation skills
• Performance evaluation and feedback

Capstone Projects required each participant to identify specific mental healthcare goals and initiate an action plan – to help translate knowledge into practice.

Results: Quantitative and qualitative data were collected through baseline/endline surveys, pre/post-tests, course evaluations, and interviews. Results included:
**Four online roundtables engaged 362 healthcare professionals from 25 countries, and
**Three pilot projects in Bangladesh and Nepal enrolled and certified 117 pharmacists and support staff, who demonstrated:
• 48.5% average increase in knowledge of Mental Healthcare and Pharmacy
• Adoption of patient-centered strategies and procedures to incorporate mental health promotion into daily pharmacy practice
• Improved skills and confidence to initiate mental health discussions with patients and providers
• Routine use of new tools to identify and manage mental health concerns
• Stronger referral systems and linkages to mental health support
• Awareness of methods to improve patient adherence to mental health medications and protocols

Conclusion: Vennue's program offers an innovative model to strengthen pharmacy workforce capacity to promote mental health in developing countries.

By integrating mental health education into pharmacy training and practice, the program fosters a patient-centered approach to overcome stigma and improve patient health outcomes, while also reducing stress and burnout among pharmacists and support staff.

The pilot projects demonstrate a concrete way for the pharmacy workforce in developing countries to take action as local leaders and change-agents in the Global Mental Health Movement.

What is effective professional practice to early career pharmacists?

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Introduction: The pharmacy profession is undergoing significant transformation, driven by updates to undergraduate standards, the Royal Pharmaceutical Society (RPS) Post-Registration Foundation Pharmacist Curriculum, and anticipated curriculum changes in 2026. These reforms aim to equip pharmacists with expanded roles and responsibilities in clinical settings. However, early career pharmacists often face challenges related to communication, teamwork, and transitioning to autonomous practice. Given the evolving workforce landscape, this work examines how integrating psychological perspectives into pharmacist development can support effective professional practice and address emerging needs. A novel workshop designed collaboratively by clinical pharmacists and a psychologist aims to foster reflective practice, enhance resilience, and equip early career pharmacists with practical strategies for navigating professional challenges.

Methods: A pilot workshop was introduced as part of the Post-Registration Foundation Programme (PRFP) in Northern Ireland. The workshop structure involved two pharmacists sharing challenging professional experiences, with a clinical psychologist facilitating discussions and proposing techniques to address the issues identified. To evaluate the workshop's effectiveness and understand pharmacists' perceptions of professional practice, a Microsoft Forms survey was developed collaboratively by the PRFP team and a clinical pharmacist. The survey included open-ended questions exploring participants' definitions of effective professional practice and their perceived support needs. A pre-and post-workshop evaluation was also conducted to assess changes in understanding and confidence. Thematic analysis was employed to identify patterns and insights across different age groups and practice sectors.

Results: Preliminary analysis reveals that early career pharmacists associate effective professional practice with strong communication, collaborative teamwork, and confident decision-making. However, respondents highlighted gaps in emotional resilience, conflict resolution, and managing the pressures of independent practice — areas not extensively covered in undergraduate or postgraduate training. Feedback from the post-workshop evaluation indicates that the psychological techniques discussed (e.g., reframing challenging situations and reflective practice strategies) were perceived as valuable tools for improving confidence and problem-solving. Additionally, pharmacists reported an enhanced understanding of their roles' emotional and interpersonal aspects. Key themes emerging from the analysis include the need for ongoing mentorship, accessible psychological support, and structured guidance during the transition from trainee to independent practitioner.

Conclusion: This pilot workshop demonstrates the potential benefits of integrating psychological thinking into the professional development of early career pharmacists. The findings underscore the importance of equipping pharmacists with clinical expertise and the emotional and interpersonal skills necessary to navigate complex healthcare environments. The evaluation data highlights and a clear demand for targeted support in areas such as resilience-building, conflict management, and reflective practice — essential components of effective, sustainable professional performance. Future iterations of the workshop will evolve based on participant feedback, aiming to address unmet educational needs and better prepare pharmacists for the dynamic demands of modern pharmacy practice. This initiative offers a scalable model for other regions seeking to enhance post-registration pharmacist development through interdisciplinary collaboration and psychologically informed training interventions.

Bridging AI and precision medicine: Training future clinical pharmacists with OSCE-based evaluation

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Introduction: Artificial intelligence (AI) is revolutionizing precision medicine, enabling personalized drug therapy based on patient-specific data. Clinical pharmacists play a crucial role in implementing AI-driven decision-making, yet traditional education lacks structured training in this domain. This study evaluates the effectiveness of an AI-enhanced precision medicine curriculum using Objective Structured Clinical Examinations (OSCEs).

Methods: A total of 120 final-year pharmacy students were randomly assigned to two groups: one receiving conventional pharmacotherapy training (Control, n = 60) and the other

undergoing an AI-integrated precision medicine module (AI Group, n = 60). The module covered AI-assisted drug selection, pharmacogenomic-based dosing, and real-time clinical decision support systems. OSCEs were used to assess competency in therapeutic accuracy, adverse drug reaction (ADR) identification, clinical reasoning, and confidence in AI utilization. Statistical analysis was conducted using paired t-tests and ANOVA.

Results: Students in the AI-integrated group demonstrated superior performance across multiple OSCE parameters compared to the control group. Their therapeutic accuracy was significantly higher (86.4% ± 4.2 vs. 64.7% ± 5.1, $p < 0.001$), along with improved adverse drug reaction (ADR) identification (82.1% ± 3.8 vs. 58.3% ± 4.5, $p < 0.001$). Clinical reasoning scores on a 10-point scale were also notably better in the AI group (7.9 ± 1.2) than in the control group (5.8 ± 1.5, $p < 0.01$). Confidence in AI-driven decision-making showed a marked increase, with AI-trained students scoring 8.6 ± 1.1 compared to 5.2 ± 1.4 in the control group ($p < 0.001$). Additionally, 91.7% of AI-trained students reported increased confidence in AI-assisted pharmacotherapy, a significant contrast to the 54.2% reported in the control group.

Conclusion: AI-integrated precision medicine training significantly enhances pharmacy students' competency, as demonstrated through OSCE evaluations. Improvements in therapeutic accuracy, ADR identification, and clinical reasoning highlight the potential of AI-driven education in bridging the gap between theoretical knowledge and clinical application. Further studies should assess the long-term retention and scalability of this training model across pharmacy curricula.

Embedding teaching on health inequities within the undergraduate pharmacy curriculum to enhance relevance and insight

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Introduction: De Montfort University has a sustained track record at working collaboratively to tackle global issues, as the United Nations Sustainable Development Goal (UNSDG) chair for UNSDG 16- Peace, Justice and strong institutions since 2018 and now as chair for UNSDG 11- Sustainable Cities and Communities. The university is committed to embedding all 17 goals across its curriculum, informing all aspects of teaching, learning and research. Recognising situations of health inequality and inequity in communities and individuals and the impact these have on health outcomes is a priority for healthcare professionals and organisations to ensure equitable access to healthcare for all.
The aim was to develop and embed a theme of teaching throughout all 4 years of the MPharm curriculum to provide an insight into the scale and impact of health inequities and to prompt students to actively consider what steps they can take to minimise these and to improve access and relevance of care for all people.

Method: Teaching was developed using a spiral approach, with concepts being revisited and increasing in complexity as students progress through the programme. Starting in year 1, students are introduced to the concept of person-centred care and the importance of utilising a biopsychosocial approach to healthcare, considering aspects such as gender and ethnicity when making decisions about their health. In Year 2 in an infectious diseases module, students are introduced to health inequities on a global scale and evaluate data from the WHO Health Observatory related to life expectancy and infectious diseases. Within a module on cardiovascular disease they then consider aspects of inequity within the UK, exploring the factors impacting the different rates of cardiovascular disease in the north and south of England. In workshops they then apply this understanding as they practice providing personalised lifestyle advice to patients. This learning is then extended into Year 3 as students research and consider inequities experienced in specific groups, such as gender-based differences, the impact of homelessness, neurodivergence and ethnicity. They then peer teach this information to their classmates and consider practical strategies to improve access to healthcare for these groups. Year 4 focusses on the application of this insight and understanding as they develop care plans and consider the clinical decision making process for diverse patients.

Results: This embedded programme of teaching has been successfully implemented and enhanced following feedback from students and through peer observation. Students have found the sessions insightful, and those from minoritized groups found it validating to share their personal experience of discrimination and inequity. Placement supervisors have provided feedback that students show respect, compassion and understanding towards their patients.

Conclusion: It is essential for pharmacy students to have an insight into situations of health inequity on a global, national and local scale so they can provide equitable, inclusive and accessible care. An embedded teaching strategy aligns with therapeutic topics being taught, enhancing student perceptions of relevance and facilitates application to practice.