

CONFERENCE ABSTRACTS

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Pharmacy practice research

Advancing pharmacy practice and specialty care in Guyana: A multi-sectoral strategic framework

Karishma Jeeboo¹, Jenny Wichart², Areefa Alladin-karan³,
Mary Ramsaroop¹

¹School of Pharmacy, University Of Guyana, Georgetown, Guyana

²Faculty of Pharmacy, University of Alberta, Alberta, Canada

³School of Medicine, University of Guyana, Georgetown, Guyana

Background: Pharmacists are increasingly recognised as essential clinical and public health professionals within resilient health systems (World Health Organisation, 2024). In Guyana, however, pharmacy practice remains largely focused on product-centred, traditional dispensing roles, limiting the pharmacist's contribution to direct patient care, including patient assessment, medication management, and immunisation delivery. These constraints are driven by outdated legislation and policy frameworks, limited competency-based workforce development, and under-utilisation of existing professional capacity. These systemic gaps impede the pharmacist's ability to contribute fully to patient-centred clinical care and multidisciplinary collaborative practice. Currently, Guyana has a growing pharmacy workforce, creating a timely opportunity for strategic growth and transformation.

Objective: To develop a nationally relevant, multi-sectoral strategic framework for pharmacy practice optimisation using direct input from practising pharmacists across all sectors. Recognition of current local issues and creation of collective goals will inform strategies to ensure sustainable expansion of clinical pharmacy and specialty care pharmacy services in Guyana.

Method: A structured, consensus-driven framework was developed following a facilitated two-hour national continuing education hybrid workshop on advancing clinical pharmacy practice held in March 2026. Pharmacists from community, hospital, regulatory, academic, and public health sectors participated in guided discussions focused on workforce capability gaps, regulatory barriers, and service delivery priorities. 220 pharmacists, 79 pharmacy assistants and 5 pharmacy interns were in attendance. Key themes and actions were synthesised into coordinated short, medium, and long-term strategies, including barriers and enablers within the local context of existing health system structures and national priorities.

Results: The framework followed four interdependent domains for transformation: (1) regulatory reform and policy development; (2) workforce education and clinical competency development; (3) enhancement of community pharmacy services, and (4) hospital pharmacy and multidisciplinary care. Priority workforce actions include the rapid expansion of structured clinical training, mandatory competency-based continuing professional development, and the creation of defined roles for clinical pharmacists across care settings. Pharmacist participation in immunisation was identified as a key opportunity. Regulatory reform and policy innovation priorities focused on modernising standards and scope-of-practice regulations, formal recognition of pharmacist-led clinical services, and embedding pharmacists within national service delivery models, such as primary care networks.

Conclusion: This strategic framework presents a clear roadmap for transforming pharmacy practice in Guyana through regulatory reform and workforce development. Future work includes the utilisation of pharmacist-set goals and priorities to set a nationally recognised implementation strategy. This will be done by clearly articulating pharmacy clinical expectations and providing structured support through the continued engagement of practising

pharmacists, pharmacy leadership, and medical and health system leadership. By shifting pharmacists from product-centred to accountable clinical and public health practitioners, this framework will support stronger health system performance, improved patient outcomes, and enhanced professional accountability.

Increased Influenza and COVID-19 Vaccination Uptake Following a Pharmacist-Led Behavioural Intervention in Community Pharmacy: A Multi-Centre Pragmatic Study

Kyle S. Brown¹, William A. Fisher², Sandra Carey³, John Papastergiou^{4,5}, Keith Bailey⁶, Faddy Morgan⁷, Molly Yang⁸, Michael Boivin⁹, Van Hung Nguyen¹⁰, James A. Mansi¹

¹Moderna, Toronto, Canada

²Western University, London, Canada

³SM Carey Consulting, Toronto, Canada

⁴University of Toronto, Toronto, Canada

⁵University of Waterloo, Waterloo, Canada

⁶Shoppers Drug Mart, Conception Bay South, Canada

⁷PharmaGuide, Toronto, Canada

⁸Wholehealth Pharmacy Partners, Toronto, Canada

⁹CommPharm Consulting Inc., Toronto, Canada

¹⁰VHN Consulting, Montreal, Canada

Background: Despite the proven safety and effectiveness of influenza and COVID-19 vaccines, vaccination coverage in Canada remains substantially below public health targets, contributing to preventable morbidity and mortality in high-risk populations. This reflects a broader global challenge of translating immunisation policy into routine practice. Delivery of clear, confident healthcare provider recommendations is a key driver of vaccine acceptance. As trusted and accessible healthcare providers, pharmacists and their teams are well positioned to integrate vaccine discussions into routine care and support immunisation uptake.

Objective: To evaluate the impact of an accredited pharmacist-focused continuing education programme, incorporating evidence-based behavioural interventions, on improving vaccination uptake (influenza, COVID-19, and co-administration) in community pharmacies among high-risk populations, including older adults, those with type II diabetes, and those with chronic respiratory conditions. Secondary objectives included assessing changes in pharmacist knowledge, confidence, and practice behaviours.

Method: A multi-centre pragmatic case-control study was conducted across 128 Canadian community pharmacies

participating in an accredited continuing education programme during the 2025–2026 respiratory season. The intervention included training on presumptive recommendation techniques, workflow integration, and patient communication strategies. Vaccination rates were assessed across three respiratory seasons (2023–2026). A difference-in-differences analytical approach estimated intervention effects while accounting for baseline differences and temporal trends. Data included monthly vaccination counts from standardised electronic queries and pharmacist questionnaires administered pre-, mid-, and post-season to assess knowledge, confidence, and practice behaviours.

Results: Pharmacist knowledge improved following the intervention, with increases of 31.51% and 50.91% in behavioural domains and 14.81% and 11.27% in clinical domains. Consistent with these improvements, intervention pharmacies (n=83) demonstrated higher vaccination rates than non-participating pharmacies (n=322) across all risk groups. In October, relative increases of 57%, 79%, and 77% were observed for COVID-19, influenza, and co-administration, respectively (absolute rates: 26.5%, 25.09%, and 19.43% vs 16.91%, 14.01%, and 10.99%). In November, relative increases were 56%, 78%, and 55% (absolute rates: 20.23%, 23.47%, and 13.31% vs 12.95%, 13.16%, and 10.99%). Similar trends were observed among adults with type II diabetes and chronic respiratory conditions. The intervention also activated previously non-immunising pharmacies into immunisers.

Conclusion: Interim findings demonstrate that a pharmacist-led educational and behavioural intervention is associated with increased vaccination uptake in community pharmacy settings, including among high-risk populations. Consistent effects across vaccines and patient groups, along with activation of previously non-immunising pharmacies, support behavioural approaches to improving vaccine uptake and the operational scalability of this intervention. These findings reinforce the role of community pharmacists as accessible and trusted healthcare providers capable of delivering effective vaccine recommendations and advancing public health immunisation objectives. As a pharmacy-integrated strategy, this approach has the potential to strengthen immunisation delivery, expand vaccination capacity, and improve population-level protection, and provides a scalable model for implementation in other healthcare systems. Further analyses will assess the durability of these effects across the full respiratory season.

Integrating social needs screening into pharmacy workflow: Real-world implementation of the SPARK Tool in Newfoundland and Labrador, Canada

Tiffany Lee^{1,2}, Andrew Pinto^{3,4,5}, Maisam Najafizada², Joseph J. O'Rourke³, Norman Umali³, Dorothy Senior⁶, Marjeiry Robinson⁶, Rick Audas^{2,7}

¹Memorial University of Newfoundland, St. John's, Canada

²Faculty of Medicine, Memorial University of Newfoundland, St. John's, Canada

³Upstream Lab, MAP Centre for Urban Health Solutions, Unity Health Toronto, Toronto, Canada

⁴Faculty of Medicine, University of Toronto, St. John's, Canada

⁵Dalla Lana School of Public Health, University of Toronto, St. John's, Canada

⁶Patient Partner, Memorial University of Newfoundland, St. John's, Canada

⁷Newfoundland and Labrador Centre for Applied Health Research, Memorial University of Newfoundland, St. John's, Canada

Background: Social determinants of health (SDH) influence medication use, access to healthcare services, and health outcomes. Community pharmacists, who serve as accessible and frequent points of contact within the primary healthcare system, are well positioned to identify unmet social needs and to connect patients with appropriate community resources. This presentation reports preliminary quantitative findings from the real-world implementation of the SPARK Tool, a validated health equity screening instrument, by community pharmacists in Newfoundland and Labrador (NL), Canada.

Method: Guided by the Proctor et al. (2011) framework for evaluating implementation outcomes, this work forms the first phase of a patient-oriented, mixed-methods multiple case study. Pharmacist site investigators from 5 community pharmacies representing rural and urban settings and diverse operational models (three chain/franchise, one independent/banner, and one specialty/non-dispensing pharmacy) integrated the SPARK Tool into direct patient care activities over a 6-month period between June 9, 2025 and March 20, 2026. Pharmacists administered the tool orally to facilitate real-time needs identification, resource provision, and referrals. They also recorded the pharmacy service linked to SDH screening, involvement of other pharmacy staff, and time spent (i) completing SDH screening, (ii) sharing information and/or initiating referrals, and (iii) documentation. Sites received a modest stipend (\$40 CAD per patient) to offset workflow demands, and site investigator received honoraria for training and implementation activities. Ethics approval was obtained from the NL Health Research Ethics Board (HREB Reference # 2025.040). Data from each patient encounter (e.g., identified social needs, process outcomes) were submitted via Qualtrics and analyzed

descriptively. Data collection and analysis for the broader project remain ongoing.

Results: Of the 143 patients invited, 134 (93.7%) agreed to social needs screening, demonstrating strong anticipated acceptability from the patient's perspective. Screening volume varied across sites (range: 8 to 42 patients screened), with 58.2% of patients from rural areas, 61.9% aged ≥ 55 years, 66.4% identifying as women, and 94.8% identifying as White. Social needs were common, with 50.7% of patients reporting at least one unmet need. Screening was most often incorporated into medication reviews (26.9%), immunization encounters (22.4%), and common ailment assessments (18.7%). Implementation was primarily led by pharmacist site investigators (86.3%); other pharmacists, pharmacy assistants, or students were involved in fewer than 20% of encounters. Mean encounter time was 15.4 minutes (SD 7.80), including 12.1 minutes (SD 4.81) dedicated to administering the tool.

Conclusion: Early findings suggest that screening was highly acceptable to patients. Varying levels of adoption were observed, with SDH screening integrated into a range of patient care services. Implementation of the SPARK Tool in rural, urban, chain, independent, and specialty pharmacies demonstrates strong appropriateness across diverse contexts. Encounter durations indicate promising feasibility for real-world workflows, while variability in staff involvement highlights opportunities to strengthen adoption and penetration in the future. These patterns also provide early insight into implementation cost and indicate potential for sustainable pharmacist-led SDH screening in NL. The experienced acceptability as well as other implementation outcomes will be explored through qualitative interviews with patients, pharmacy staff, and site investigators.

Early use of a physician-pharmacist medical directive to support adult vaccine access in community pharmacy

Nabeel Effendi¹, Mohamed Elsakbawhi¹, Chris Potter²

¹Shoppers Drug Mart 779, Mississauga, Canada

²Shoppers Drug Mart Health, Toronto, Canada

Background: Adult immunisation rates remain suboptimal despite broad eligibility for vaccines such as shingles, pneumococcal, and respiratory syncytial virus (RSV) vaccines, particularly among older adults and those living with chronic disease. In routine community pharmacy practice, pharmacists frequently identify vaccine eligibility during prescription encounters or clinical consultations, yet delays in obtaining prescriptions can create missed opportunities and act as barriers to timely prevention. This, collaborative prescribing models involving physician-authorised directives may help address this gap by allowing pharmacists to assess,

prescribe, and administer vaccines during the same patient encounter. In Ontario, physician collaboration through structured directives offers one practical approach to strengthening preventive care delivery where prescribing access may otherwise delay vaccine uptake.

Method: A physician-authorised medical directive permitting pharmacist prescribing of shingles, pneumococcal, and RSV vaccines was implemented on 1 December 2025 in a high-volume community pharmacy in Ontario, Canada. A quality-improvement analysis was conducted after the first 12 weeks of implementation, covering the period from December 2025 to February 2026. Vaccine dispensing activity during this period was compared with the same calendar period from the previous year to reduce seasonal bias and allow fair interpretation of short-term uptake trends. Primary measures included total doses dispensed for each vaccine category, total injection fees billed during the same period, and frequency of directive use by vaccine type. Directive activity was also examined monthly to assess consistency of pharmacist uptake during the early implementation phase.

Results: The directive was used 41 times during the first 12 weeks: 14 times for shingles vaccination, 12 times for pneumococcal vaccination, and 15 times for RSV vaccination. Use was observed across all three months of implementation, indicating early integration into normal pharmacy workflow rather than isolated initial uptake. During the same period, shingles vaccine dispensing increased from 51 to 61 doses, pneumococcal vaccine dispensing increased from 15 to 18 doses, and RSV vaccine remained stable with a slight increase from 24 to 25 doses. Total injection fees billed at the pharmacy increased from 174 to 205 during the same comparison period. Although shingles growth was more modest than other categories, vaccine activity was maintained despite fewer physician prescriptions being observed locally during the same timeframe. Moreover, monthly directive use remained relatively balanced across vaccine categories, suggesting pharmacists were applying the directive consistently rather than only in isolated cases.

Conclusion: Early implementation of a physician-pharmacist medical directive demonstrated regular pharmacist use and was associated with maintained or increased vaccine activity across all targeted categories during routine community pharmacy care. Collaborative prescribing frameworks may help pharmacists act more immediately on vaccine eligibility identified during patient encounters and reduce missed preventive opportunities where traditional prescribing pathways alone may be insufficient. This may be especially relevant in settings where adult vaccine eligibility is identified during routine dispensing encounters. These findings support physician-pharmacist partnership as a practical model for strengthening adult vaccine access in community pharmacy.

Bridging risk detection and behaviour change: outcomes of pharmacist-led smoking-cessation outreach in community pharmacy

Nabeel Effendi¹, Mohamed Elsabakhawi¹, Lin Jubain¹, Mariam El-diraby¹, Kirandeep Khurana¹, Chris Potter²

¹*Shoppers Drug Mart 779, Mississauga, Canada*

²*Shoppers Drug Mart Health, Toronto, Canada*

Background: Smoking remains a major modifiable contributor to cardiovascular disease and continues to be one of the most important preventable drivers of long-term morbidity and mortality. Although patients may be informed of cardiovascular risk during routine encounters with healthcare providers, structured follow-up interventions after risk identification are often fragmented or delayed. Nonetheless, community pharmacists are uniquely positioned to help close this gap by providing behavioural support, motivational interviewing, and practical follow-up after cardiovascular risk assessment. Smoking cessation remains difficult to sustain even when cardiovascular risk has already been identified, particularly when no structured follow-up is offered after screening. Thus, pharmacist-led follow-up may help convert identified cardiovascular risk into practical behavioural intervention, especially when patients have not yet engaged with formal cessation support through other parts of the healthcare system.

Method: Adults identified with an elevated Framingham Risk Score ($\geq 10\%$) were contacted by the pharmacy team for targeted smoking-cessation outreach. Each patient's cardiovascular profile, including age, blood pressure, and lipid data, had been assessed previously as part of a pharmacist-led cardiovascular risk-assessment service delivered at the community pharmacy. Follow-up telephone outreach was performed as part of routine pharmacist review and each patient was offered complimentary pharmacist-led counselling, enrolment in smoking-cessation services, and referral to available supports. Where appropriate, patients were also reminded of available pharmacological options, follow-up appointments, and publicly funded cessation resources that could be accessed. Patient responses were categorised as Agreed/Booked, Contemplation, Declined, Completed with another healthcare provider, Successful Quit, or Lost to Follow-up.

Results: Among 87 smokers with elevated cardiovascular risk, 26 (30%) demonstrated positive engagement. This included 11 who agreed to enroll or booked an appointment, 8 who remained in contemplation, 4 already receiving cessation support through another healthcare provider, and 3 who had successfully quit smoking. Engagement outcomes included both immediate acceptance of pharmacist support and early willingness to continue discussing cessation, reflecting different stages of readiness for behavioural change. Patients who had already quit smoking or were receiving support elsewhere were considered positive engagement outcomes

because pharmacist outreach confirmed continued behavioural action after initial cardiovascular risk detection. 22 patients (25%) declined services, while the remainder were lost to follow-up. Patients lost to follow-up generally reflected unsuccessful contact despite repeated outreach attempts during routine pharmacy follow-up periods. Additionally, it was noted that the mean Framingham Risk Score was higher among non-engaged patients (23%) than among those who engaged (19%), suggesting that patients at greatest cardiovascular risk were less likely to participate in preventive interventions.

Conclusion: Pharmacist-led outreach following cardiovascular risk assessment achieved meaningful patient engagement in smoking-cessation care. Even modest engagement may be clinically meaningful when focused on patients already identified as having elevated cardiovascular risk. These findings support the expanding role of community pharmacists in linking cardiovascular disease management services with behavioural intervention and highlight the need for targeted strategies to improve preventive care uptake among individuals at increased cardiovascular risk.

BMI-stratified risk patterns identified through pharmacist-led point-of-care testing in community pharmacy

Nabeel Effendi¹, Mohamed Elsabakhawi¹, Mariam El-diraby¹, Chris Potter²

¹Shoppers Drug Mart 779, Mississauga, Canada

²Shoppers Drug Mart Health, Toronto, Canada

Background: Body mass index (BMI) is a major determinant of cardiovascular risk and is frequently associated with multiple overlapping metabolic and haemodynamic abnormalities. However, the relative contribution of blood pressure, lipid abnormalities, and overall cardiovascular risk may not rise uniformly across BMI groups in real-world screening settings. Community pharmacists are increasingly using point-of-care testing (POCT) to identify cardiovascular risk in adults who may otherwise have delayed access to preventive assessment. In high-volume pharmacy settings, this creates an opportunity not only to detect abnormal results but also to observe broader population risk patterns that may influence preventive priorities. Understanding how measured risk factors differ across BMI categories may help pharmacists identify which clinical findings deserve greater attention when counselling higher-risk patients.

Method: A quality-improvement analysis was conducted using data collected from adults assessed through pharmacist-led cardiovascular risk assessments conducted across four community pharmacy sites in Ontario, Canada between 9 September 2024 and 29 September 2025. Assessments were offered as part of routine pharmacy-based

clinical services and included point-of-care measurement of lipid profile, glycated haemoglobin (HbA1c), and blood pressure. Framingham Risk Score was also calculated to estimate overall cardiovascular risk. Patients were grouped according to BMI category: less than 25 kg/m², 25–29.9 kg/m², and 30 kg/m² or greater. Mean systolic blood pressure, diastolic blood pressure, low-density lipoprotein cholesterol (LDL), and Framingham Risk Score were compared across BMI groups to evaluate whether obesity was associated with uniform increases across measured parameters.

Results: Data from more than 3,500 adults were included in the analysis. Mean systolic blood pressure increased progressively across BMI groups, rising from 124 mmHg among patients with BMI below 25 kg/m² to 127 mmHg in the overweight group and 130 mmHg among patients with BMI of 30 kg/m² or greater. A similar upward trend was observed in diastolic blood pressure. In contrast, LDL cholesterol remained relatively stable across all BMI categories, measuring 3.28 mmol/L, 3.35 mmol/L, and 3.31 mmol/L respectively. Framingham Risk Score increased with BMI, but the observed increase appeared more closely aligned with rising blood pressure than with lipid variation. Similar trends were observed across age and sex subgroups, suggesting that blood pressure elevation may represent the dominant measurable change associated with higher BMI in this screened population. This pattern remained consistent across the main BMI categories despite variation in individual laboratory values.

Conclusion: Pharmacist-led POCT identified clear BMI-linked differences in cardiovascular risk patterns within a large community population. While overall cardiovascular risk increased with BMI, the strongest measurable change was progressive blood pressure elevation rather than worsening lipid values. These findings suggest that BMI-stratified cardiovascular assessments in community pharmacy may allow pharmacists to prioritise blood pressure-focused intervention and counselling in adults with obesity, while also reinforcing that obesity-related cardiovascular risk may not always present through uniformly abnormal laboratory findings alone.

Vaccine uptake remains low among high-risk adults identified through pharmacist-led screening

Nabeel Effendi¹, Mohamed Elsabakhawi¹, Chris Potter²

¹Shoppers Drug Mart 779, Mississauga, Canada

²Shoppers Drug Mart Health, Toronto, Canada

Background: Patients living with elevated cardiovascular risk may benefit from preventive vaccination as respiratory infections such as influenza, pneumococcal disease, and respiratory syncytial virus can worsen cardiovascular

outcomes and increase acute complications. Recent evidence has reinforced the importance of vaccination in older adults and patients with chronic disease, particularly where increased cardiovascular risk factors are already present. Respiratory infections may precipitate acute cardiovascular events, increase hospitalisation risk, and worsen outcomes in patients already living with comorbidities such as hypertension, diabetes, dyslipidaemia, or established cardiovascular disease. Despite this, vaccine uptake in routine practice remains low even among patients who meet age-based and clinical eligibility criteria. Community pharmacists delivering care to high-risk patients may therefore identify important preventive care gaps that extend beyond immediate laboratory or blood pressure findings. This creates an opportunity for pharmacists to identify prevention gaps during encounters that would otherwise focus only on immediate cardiovascular measurements.

Method: A quality-improvement analysis was conducted using data collected from adults assessed through pharmacist-led cardiovascular assessments conducted across four community pharmacy sites in Ontario, Canada between 9 September 2024 and 29 September 2025. Assessment included point-of-care testing, cardiovascular risk calculation, and structured review of preventive care status. Patients with elevated cardiovascular risk were evaluated for eligibility for pneumococcal, shingles, and respiratory syncytial virus (RSV) vaccination according to age and clinical indication. Vaccination status was documented in order to assess preventive care uptake within this higher-risk population. Preventive discussions formed part of the broader pharmacist encounter whenever vaccine eligibility was identified.

Results: More than 3,500 adults were included in the analysis. Among patients meeting age-based or clinical eligibility criteria, uptake remained low across multiple adult vaccines. Pneumococcal, shingles, and RSV vaccine uptake were substantially low, and many eligible patients reported that they had never previously received pharmacist discussion or recommendation regarding adult vaccination despite regular pharmacy contact. Low uptake remained consistent even among patients with multiple cardiovascular risk factors and elevated Framingham Risk Scores. Preventive gaps were observed across both male and female patients and across multiple age groups, suggesting that under-immunisation was not confined to a particular subgroup. These findings indicate that important preventive opportunities remained missed despite frequent patient contact with healthcare providers and repeated eligibility for adult vaccination.

Conclusion: Pharmacist-led assessments identified substantial vaccination gaps among adults already living with elevated cardiovascular risk. Encounters with the pharmacist in community settings may therefore serve not only as a mechanism for detecting measurable risk factors but also as an opportunity to identify broader preventive care deficits. Even brief vaccine review during patient encounters may help redirect attention toward broader preventive care needs. Hence, integrating vaccine assessment into pharmacist-led cardiovascular services may strengthen preventive care

delivery in populations already vulnerable to adverse cardiovascular outcomes.

Identification of barriers and facilitators in diabetes management among Bhutanese refugees in the United States

Sally Haack¹, Ginelle Bryant¹, Samana Biswa¹

¹Drake University, Des Moines, Iowa, United States

Background: The Bhutanese refugee community, comprising over 100,000 ethnic Nepalis resettled in the United States (U.S.), represents one of the largest refugee populations in the country. While it has been over a decade since the largest cohort of Bhutanese refugees arrived in the U.S., data suggest a disproportionately high burden of type 2 diabetes within this population. Diabetes prevalence estimates are up to 2.3 times higher than the general U.S. population and increase with longer duration of residence in the U.S. Understanding the unique needs of Bhutanese refugees is crucial for effective diabetes management within the healthcare system.

Objective: To identify key barriers and facilitators affecting diabetes prevention and management among Bhutanese refugees and to highlight culturally tailored strategies to improve health outcomes.

Method: A literature review was conducted using PubMed and Google Scholar to identify studies published between 2010 and 2025. A convenience sample of key stakeholders serving refugee and immigrant populations were interviewed to clarify themes from the literature and identify strategies for improving health outcomes in this population.

Results: Fifteen peer-reviewed articles and two Bhutanese Health Profiles developed by state Departments of Health were included in the review. Five stakeholder interviews occurred between December 2025 and March 2026. Existing literature addressing diabetes management in refugees is limited, with most studies focusing broadly on chronic disease burden. Findings from the literature suggest Bhutanese refugees may face structural, linguistic, dietary acculturation, and cultural challenges that affect engagement in preventive care and chronic disease management. Transportation barriers, cost, and not understanding appointment reminder messages were identified as barriers by stakeholders to follow-up care. Cultural norms around seeking care only when severely ill and a lack of knowledge of prediabetes may delay engagement in the healthcare system. Lack of follow-up on diabetes screenings was identified as a missed opportunity to engage patients in care and reinforce preventative efforts. Stakeholders emphasized the importance of culturally adapted education, consistent follow-up, and fostering respectful and welcoming

environments. Health systems should develop strategies that build trust with community members by offering care coordination support and assistance in navigating the healthcare system. The need for interpreters familiar with regional variations was also identified as a strategy to help overcome language differences with Nepali dialects. Individual providers should tailor their interventions to include culturally and linguistically specific care to the Bhutanese population. Culturally relevant dietary counseling, including a discussion of staple foods such as rice and lentils, appropriate portion sizes, and the use of visual education tools may aid in patient understanding. Simplified medication regimens may improve adherence. Leveraging peer support and champions in the community to build trust and reinforce the importance of preventative care and wellness behaviors may also be helpful.

Conclusion: Interventions focused on improving health outcomes in Bhutanese refugees should occur at the health system and individual provider levels. Future research should focus on engagement with community members to triangulate the findings from this study and design appropriate interventions.

Project ImPACT: Diabetes. Results from the APhA Foundation's research on pharmacists providing diabetes care through a patient-centered model provided by community pharmacies

Benjamin Blum¹

¹American Pharmacists Association Foundation, Washington, Dc, United States

Background: Project IMPACT: Diabetes was designed to establish a nationwide program that would scale the proven APhA Foundation process model into communities across the United States that are disproportionately affected by diabetes. The approach integrates collaborative care with pharmacists, continuous quality improvement, use of patient self-management credentialing, and collection of a minimum data set. The main objective was to improve key indicators of diabetes care by expanding a proven community-based model of care throughout high-risk areas in the United States.

Method: The study evaluated implementation strategies and patient outcomes in 25 communities across the United States. To be eligible for enrollment, patients had to have a diagnosis of diabetes, be newly initiated on diabetes therapy, or be maintained on diabetes therapy but poorly controlled (e.g., A1C >7%). Each participant was evaluated for 1 year after enrollment. The corresponding baseline data collection period extended up to 180 days before the start of the study period for clinical measures and 365 days before the start of the study period for process measures. Pharmacists educated

patients on the pathology of diabetes and how medications work to improve health; taught insulin injection techniques and the importance of medication adherence; promoted healthy lifestyles; and reinforced health goals and monitored progress toward those goals. In addition to involving one-on-one consultations with pharmacists, local care models varied in their inclusion of such offerings as group educational classes, grocery store food tours, exercise programs, joint visits with patients by a combination of providers and a variety of patient incentives. Changes in clinical performance measures were assessed at baseline and then according to practice guidelines for a period of 1 year. For an individual patient's data to be included in the project evaluation, a minimum of two documented post-enrollment visits at least 90 days apart was required. Each patient was also assessed on key process measures for the care of patients with diabetes, including foot examination status, eye examination status, influenza vaccination status, and smoking status.

Results: Pharmacist patient care services for those underserved or disproportionately affected by diabetes resulted in a statistically significant and clinically relevant decrease in mean A1C levels (−0.8%). Other outcome indicators were below target levels at baseline and decreased significantly but not by clinically relevant amounts (LDL-C, −7.1 mg/dL; triglycerides, −23.7mg/dL, and total cholesterol, −8.8 mg/dL). The mean increase in HDL-C (+0.6 mg/dL) was not statistically significant or clinically relevant. Among evaluable patients who were not at target for process measures at baseline, 51.7% of 453 patients received eye examinations, 72.0% of 271 patients received foot examinations, 41.7% of 307 patients received influenza vaccinations, and 9.3% patients of 270 quit smoking during the project. Of the communities involved in the study, 92% intend to sustain pharmacists' services.

Conclusion: Project IMPACT: Diabetes results show significant improvement in patients' clinical outcomes and demonstrate that all patients, even those with tremendous barriers to appropriate diabetes care, benefit from patient-centered, interdisciplinary health care teams that include pharmacists.

Project ImPACT: Osteoporosis. Results from the APhA Foundation's research on pharmacists providing osteoporosis care through bone mineral density screenings and medication therapy management services

Benjamin Blum¹

¹American Pharmacists Association Foundation, Washington, Dc, United States

Background: Project ImPACT: Osteoporosis was conducted to demonstrate pharmacist's ability to identify patients at risk

for osteoporosis through bone mineral density (BMD) screening at community pharmacies, and provide referrals of at-risk patients to primary care and/or specialty practice physicians, and follow up with at-risk patients as needed. Objectives included to treatment and management of osteopenic and osteoporotic patients referred to the pharmacy for medication therapy management services, and to test a payment methodology for pharmacists who deliver community health management services to a population at risk for or diagnosed with osteoporosis.

Method: Osteoporosis screenings were offered at five sites on a weekly basis during Wellness Days, which were days set aside for the pharmacist to conduct walk-in health screenings in the private consultation room. Stand-alone screening events required additional pharmacist time, while the screenings during Wellness Days were built into an already established workflow. Patients were targeted for screening based on having at least one risk factor other than being female; however, any patient could self-select into the screening program. Patients were required to fill out a consent form for screening. After the screening, patients received an information sheet highlighting the results and pharmacist recommendations. The osteoporosis screenings were offered for a fee, with all participants paying \$25 out of pocket for these services. Collaboration with the health care community was an important component in the screening process. The supermarket contacted key physician specialists in the area to inform them of the new program. Patients were stratified, educated, and referred to their physician through a process based on risk of future fracture. All patients with a moderate or high risk for future fracture received either a written or verbal referral to their physician. At this point, the process was for the physician to make an assessment and potential diagnosis of osteopenia or osteoporosis. The physician would refer the patient back to the pharmacy for the collaborative community health management program if deemed necessary.

Results: The pharmacists screened 532 patients and were able to contact 305 of these patients for follow-up interviews 3 to 6 months later. The stratification for risk of fracture was 37%, high risk; 33%, moderate risk; and 30%, low risk. A total of 78% of patients indicated that they had no prior knowledge of their risk for future fracture. In the moderate- and high-risk categories, 37% of patients scheduled and completed a physician visit, 19% had a diagnostic scan, and 24% of those patients were initiated on osteoporosis therapy subsequent to the screening. Participating pharmacies received payment for both the osteoporosis screening and the collaborative health management services.

Conclusion: Pharmacists can play a useful role in the identification, education, and referral of patients at risk for osteoporosis through pharmacy-based BMD screening. Patients are willing to pay for pharmacy-based osteoporosis screening services. Third-party payers are willing to compensate pharmacists for collaborative community health management services.

Pharmacists' roles in primary health care in Brazil: A documentary analysis of national documents

Vinicius Andre Boff, Gabriele Fritsch Oliskowski, Fernanda Manzini, Silvana Leite

¹UFSC, Florianópolis, Brazil

²UFSC, Florianópolis, Brazil

³UFSC, Florianópolis, Brazil

⁴UFSC, Florianópolis, Brazil

Background: Primary Health Care (PHC) is widely recognised as the foundation of effective health systems. In Brazil, the Unified Health System (SUS) has strengthened PHC through policies aimed at expanding multidisciplinary teams and improving access to essential health services. Within this context, pharmacists' activities have progressively expanded beyond medicine supply to include clinical and patient-centred services. However, pharmacists' roles in PHC remain unevenly defined across policy and clinical documents. Understanding how these roles are described in national guidelines can provide insights into the institutional recognition of pharmaceutical care within the health system.

Method: This study is a documentary analysis of national policy documents, clinical protocols, and therapeutic guidelines related to PHC Sensitive Conditions in Brazil. These conditions are defined as health problems whose occurrence, particularly hospitalisations, can be reduced or prevented through effective interventions at the PHC level. Documents were reviewed through keyword-guided reading to identify references to pharmacists' roles, using terms such as pharmacist, pharmacy, pharmaceutical services, medicines, treatment, and primary health care. Extracted information was analysed and classified into two main categories: management activities and clinical care activities performed by pharmacists.

Results: Forty-six documents were analysed, of which twenty had nationally standardised guidelines. Among these, six explicitly mentioned pharmacists' roles and responsibilities in situations such as the clinical, therapeutic, or organisational management of Sensitive Conditions. These references were mainly related to clinical care activities such as pharmacotherapeutic follow-up, patient education, medication counselling, and support for treatment adherence. Additional normative publications were identified describing established pharmaceutical practices within the SUS in three areas: HIV/AIDS, contraception, and palliative care. These documents reinforce previously regulated pharmacist responsibilities applicable to care provided in PHC. Other published documents did not explicitly mention pharmacists in their recommendations. However, some of these materials include guidance related to processes that are part of pharmacists' activities, such as medication use, treatment adherence, and therapeutic monitoring. Several

policy and technical documents also emphasised pharmacists' technical-managerial responsibilities, including medicine selection, procurement, storage, distribution, dispensing, and pharmacovigilance.

Conclusion: Pharmacists play an essential role in PHC in Brazil by integrating managerial responsibilities with clinical care activities. The findings suggest an ongoing transition from a predominantly logistical role toward a more patient-centred model of pharmaceutical care. However, the heterogeneous recognition of pharmacists' roles across national guidelines indicates the need for greater institutional standardisation and policy support to strengthen pharmaceutical care within PHC.

A comparative assessment of knowledge, attitudes, and dispensing practices among primary healthcare pharmacists in Oman

Hana Salim Sulaiman Al Ghussaini¹

¹Directorate General of Khoula Hospital, Ministry of health, Muscat, Oman

Background: Antimicrobial resistance (AMR) is a major public health threat, driven largely by inappropriate antibiotic use in primary healthcare (PHC). Pharmacists play a critical role as frontline antimicrobial stewards; however, their knowledge, attitudes, and practices (KAP) within Oman's PHC system remain underexplored. This study aimed to comprehensively assess KAP among pharmacists and assistant pharmacists, with a comparative analysis between centers with historically high versus standard antibiotic consumption rates.

Method: A national cross-sectional survey was conducted among 333 pharmacists and assistant pharmacists working in Omani PHC facilities. Data on demographics and KAP were collected using a structured electronic questionnaire. Adequacy thresholds were predefined as follows: knowledge $\geq 70\%$, attitude ≥ 3.5 (on a 5-point scale), and practice ≥ 0.75 (on a 0–1 scale). Generalized Estimating Equation (GEE) models were applied to identify predictors of adequate KAP, accounting for clustering at the facility level.

Results: Overall, participants demonstrated strong theoretical knowledge (72.1% achieved adequate knowledge) and favorable attitudes (78.7% scored ≥ 3.5), while good practice was observed in 56.2%. Stratified analysis revealed a marked disparity: only 20.8% of pharmacists in high-consumption centers achieved adequate knowledge compared to 76.1% in standard-consumption facilities ($p < 0.001$). Multivariable analysis confirmed that high-consumption center status was strongly associated with reduced odds of adequate knowledge (aOR = 0.08, 95% CI: 0.05–0.14). Prior AMR/AMS training significantly improved odds of good practice (aOR = 2.04), but its benefit was

substantially diminished in high-consumption centers (interaction $p = 0.030$).

Conclusion: Pharmacists in Omani PHC exhibit positive attitudes but face challenges in translating knowledge into consistent practice, particularly in high-consumption settings where knowledge gaps are pronounced. Interventions should extend beyond general training to include system-level strategies, such as embedding AMS tools within the electronic health record (EHR) workflow, to overcome structural barriers and strengthen stewardship in high-risk facilities.

At the intersection of race and gender: Multi-level facilitators of professional advancement among women of color pharmacists

Omolayo Umaru¹, Olihe Okoro¹, Meghana Ray¹

¹College of Pharmacy, University of Minnesota, Minneapolis, United States

Background: Women of color (WoC) are represented in pharmacy but remain underrepresented in leadership and senior professional roles. A recent scoping review identified gender- and race-based inequities across the health professions and highlighted limited research on the intersectional experiences of WoC pharmacists. Capturing WoC pharmacists' lived experiences is essential to understand factors enabling professional advancement and wellbeing and to inform strategies that strengthen equity, retention, and leadership in the workforce. This study aimed to identify key facilitators supporting the advancement, wellbeing, and career development of WoC pharmacists.

Method: Using a qualitative interpretive methodology guided by intersectionality theory, nine focus group discussions were conducted with 22 WoC pharmacists across diverse practice settings, career stages, and racial/ethnic backgrounds. Participants ranged from ages 25 to over 65 years (59% under 45 years). A majority held PharmD degrees (68%), and 36% reported additional graduate qualifications. Data were analyzed using thematic analysis guided by an ecological framework. Emerging themes reflected facilitators across structural/systemic, workplace culture, interpersonal, and individual domains.

Results: Facilitators supporting the advancement and wellbeing of WoC pharmacists were identified across four interconnected levels: At the structural/systemic level, participants emphasized institutional initiatives that created access to opportunity. Diversity recruitment initiatives, minority-focused faculty development programs, and WoC networks were described as entry points into professional spaces. Financial support - including scholarships, assistantships, and tuition remissions - enabled educational progression and reduced constraints associated with

advanced training. Participants highlighted transparent academic career pathways that clarified expectations for publications, funding, and promotion, allowing career planning. Institutional policies rejecting discriminatory patient requests were viewed as reinforcing professional legitimacy and signalling organisational commitments to equity. At the workplace culture level, participants described environments where diversity was visible and normalised as fostering belonging and professional confidence. Supportive leaders who encouraged advancement, facilitated promotion, and expressed confidence in WoC pharmacists' capabilities were described as career-shaping influences. Workplace flexibility and accommodations for caregiving responsibilities also supported long-term career sustainability. At the interpersonal level, mentorship emerged as one of the most influential facilitators across participants' careers. Mentors provided guidance on navigating professional environments, developing expertise, negotiating compensation, and accessing leadership opportunities. Participants also emphasized sponsorship, where senior colleagues actively advocated for advancement, as well as professional organisations and affinity networks that offered sources of mentorship, collaboration, and community. At the individual level, participants described pursuing advanced credentials, leadership development, and skill expansion as strategies that broadened professional opportunities. Openness to nontraditional career paths supported mobility across sectors. Participants also described determination and persistence when navigating gendered and cultural expectations, alongside purpose-driven motivations related to mentorship, advocacy, and service to underserved communities.

Conclusion: Facilitators supporting the success and wellbeing of WoC pharmacists operate across structural, workplace, interpersonal, and individual levels. Identifying enabling conditions at each level provides a roadmap for organisations seeking to advance equity in the pharmacy profession. Implementing these findings can strengthen retention, expand leadership representation, and enhance workforce wellbeing, while ultimately improving patient care and outcomes.

Permitted, paid, or patchwork? A national policy & reimbursement scan of pharmacy-delivered harm reduction services across Canada

Jenna Villarba¹, Dana Turcotte¹

¹University Of Manitoba, Winnipeg, Canada

Background: Community pharmacists are increasingly recognized as accessible points of care for harm reduction services for people who use drugs. However, the ability of pharmacists to deliver these services is influenced by regulatory clarity, system support, professional guidance, and sustainable reimbursement models. While existing research

has explored barriers and facilitators to providing pharmacy-based harm reduction services, there is limited comparative evidence describing how these services are enabled, governed, operationalized, and funded across jurisdictions. Understanding the policy and reimbursement landscape is critical to inform equitable and sustainable implementation of pharmacy-based harm reduction services and to inform policy decisions that strengthen pharmacists' roles in overdose prevention and public health. The objective of this research is to map and compare provincial and territorial policies, regulatory frameworks, and reimbursement structures for pharmacy-delivered harm reduction services across Canada using an analytic policy lens.

Method: A jurisdictional scan of publicly available policy and regulatory documents from all 10 provinces and 3 territories in Canada was conducted. Service categories were identified from the literature and included naloxone distribution, OAT-related services, referral, outreach and education, and harm reduction supply distribution. Documents were identified through targeted web searches using standardized, jurisdiction-specific terms between December 2025 and March 2026. Sources included pharmacy legislation, practice standards and guidance, government program manuals, fee schedules, and public health harm reduction policies, which were screened and recorded for full-text review at the time of identification. Data extraction was completed using a standardized framework capturing service type, authorization, reimbursement mechanisms, funding structures, and service requirements. An abbreviated version of the Framework for Analysing Public Policies was used with document analysis to identify cross-jurisdictional patterns, gaps, and opportunities.

Results: Findings indicate substantial variation across Canadian provinces and territories in the scope, governance, and funding of pharmacy-delivered harm reduction services. Naloxone distribution was explicitly authorized in all 13 jurisdictions and had the strongest policy visibility, usually through public health programs; however, only 6 jurisdictions had clearly identifiable pharmacy fee-for-service payments, with absent or unclear reimbursement in the remainder. OAT-related services also showed comparatively strong regulatory clarity and identifiable remuneration mechanisms. In contrast, referrals, outreach/education, and harm reduction supply distribution were rarely established as pharmacy services and were more often treated as embedded practice activities organized through public health or community programs. Several jurisdictions lacked explicit regulatory guidance for pharmacy-based services, often relying on professional goodwill while creating ambiguity in scope of practice and limiting service uptake.

Conclusion: To our knowledge, this study represents the first pan-Canadian policy scan that compares regulatory guidance and reimbursement structures for pharmacy-delivered harm reduction services. Jurisdictional variation suggests that authorization alone is insufficient to support equitable implementation when funding, operational guidance, and documentation expectations remain inconsistent. The

analysis provides jurisdiction-specific insights for Canadian policy development and offers transferable lessons for other countries seeking to expand harm reduction through community pharmacy. Together, these findings lay the groundwork for broader advocacy and policy dialogue to strengthen and sustain pharmacy-delivered harm reduction services and to more fully integrate pharmacists into these critical public health roles.

Overcoming the language barrier! Communication aids used by community pharmacists and individuals with limited native language proficiency to facilitate communication: A scoping review

Taaiba Walliar¹, Kirsty Haywood¹, Helen Wood¹, Annim Mohammad², Tin Fei Sim³, Liza Seubert¹

¹School of Health and Clinical Sciences, The University of Western Australia, Australia

²School of Pharmacy, University of Sydney, Australia

³School of Diagnostic and Therapeutic Sciences, Curtin University, Australia

Background: Individuals with limited native language proficiency (LNLP) face communication barriers when accessing healthcare services where there is no shared language. Such LNLP community members reported feeling less valued, expressed concerns that their conditions were inadequately treated and their questions were often left unanswered. This can lead to increased adverse effects, medication errors, higher hospital admission rates and poorer health outcomes. As pharmacists are one of the most accessible and highly trusted health care professionals, it is necessary to ensure there is effective communication between them and individuals with LNLP. Literature indicates current strategies and resources available are not entirely being implemented in a community pharmacy setting. This study aimed to summarise what communication methods community pharmacists and LNLP individuals use to facilitate communication and to explore their associated strengths and limitations.

Method: A scoping review was conducted following the Joanna Briggs Institute (JBI) methodology for scoping reviews. The PCC framework was used to develop the search terms; Population being “community pharmacists”, Concept being “limited English proficiency” and Context being “communication”. A comprehensive search was conducted across ten databases. Articles were exported into EndNote, duplicates were removed, then transferred into Covidence for title and abstract screening followed by full text screening. Screening and data extraction were conducted independently by two reviewers.

Results: A total of 65 articles were included in this review. Articles were set in 18 different countries and various data collection methods were used including interviews, focus groups and questionnaires. Participants were community pharmacists in 39 of the studies, LNLP individuals in 25 and one study included both populations. This review identified 15 communication aids used by community pharmacists and LNLP individuals to facilitate communication. These aids can be grouped into five categories: 1) Verbal/non-verbal communication aids 2) Interpreter mediated aids(informal/formal) 3) Written and translated resources 4) Technology based aids and 5) Visual aids. These aids had their associated strengths and limitations reported based on the views of community pharmacists and LNLP individuals. Strengths included an enhanced understanding, increased trust between individuals and pharmacists and improved engagement. Limitations included the inaccuracy of aids, limited written and digital literacy of LNLP individuals and time required to implement these aids

Conclusion: This review summarised the various aids pharmacists and LNLP individuals use to facilitate communication, with informal interpreters being the most frequently reported. More limitations were expressed by both pharmacists and LNLP individuals than strengths. Collaborative efforts will be necessary to overcome limitations associated with the uptake of these aids and implementation in a community pharmacy setting. This research may inform global pharmacy practice by identifying effective communication strategies to support individuals with LNLP, which may improve medication safety and health equity.

Chemotherapy-induced dysgeusia: Association with baseline serum zinc levels and response to zinc supplementation

Kojiro Hata¹, Yu Nishibatake¹, Toru Matsuura¹, Marie Tachikawa¹, Maki Iwamoto¹, Manaka Nagano¹, Maho Ikebe¹, Yuka Shigematsu¹, Hiroyuki Watanabe¹

¹Department of Pharmacy, Fukuoka Tokushukai Hospital, Kasuga City, Fukuoka, Japan

Background: Dysgeusia is a prevalent adverse effect of cancer chemotherapy that significantly impairs patients' quality of life and may hinder adherence to treatment. Although zinc deficiency is recognised as a risk factor, clinical evidence regarding its specific association with chemotherapy-induced dysgeusia and the therapeutic advantages of zinc supplementation remains inadequate. Since June 2023, our institution has implemented a protocol to measure serum zinc levels at the commencement of a new chemotherapy regimen and administer oral zinc preparations if taste disorders arise in deficient patients. This study aimed to evaluate the relationship between serum zinc levels and the onset of dysgeusia following the initiation of a new

chemotherapy regimen, while also assessing the clinical efficacy of zinc supplementation within a hospital setting.

Method: We conducted a retrospective review of 165 patients who had commenced a new cancer chemotherapy regimen at Fukuoka Tokushukai Hospital between June and December 2023. Eligibility required baseline serum zinc measurements prior to treatment. Clinical data, including patient demographics, cancer type, line of treatment, and serum albumin/zinc levels, were extracted from medical records until the completion of the regimen. Zinc status was classified as deficiency (<60 µg/mL), marginal deficiency (60–79 µg/mL), or normal (≥ 80 µg/mL). The efficacy of zinc supplementation was defined as 'improved' based on subjective symptom evaluations documented in clinical records; 'unchanged' or 'worsened' were considered ineffective.

Results: Dysgeusia occurred in 30 out of 165 patients (18.2%). The incidence was notably highest in patients with colorectal cancer (31%, 17/54) and gastric cancer (23%, 3/13). Regimens incorporating fluoropyrimidine-based antineoplastic agents exhibited a tendency towards a higher frequency of taste disorders. Of the affected patients, 17 (57%) received zinc supplementation, resulting in an efficacy rate of 47% (8/17). All cases that showed improvement also exhibited an objective increase in serum zinc levels following supplementation. Regarding baseline zinc levels, 71% of the total cohort was below normal (deficiency: 17%; marginal: 54%). However, no statistically significant association was found between the onset of dysgeusia and pre-treatment zinc deficiency (Fisher's exact test).

Conclusion: Although baseline zinc deficiency did not emerge as a significant predictor of dysgeusia onset, zinc supplementation proved effective in approximately half of the treated cases. The efficacy rate of less than 50% suggests that the aetiology of chemotherapy-induced dysgeusia is multifactorial and not solely dependent on zinc status. The high incidence in patients with colorectal cancer highlights the need for further investigation into drug-specific and patient-specific factors. Future studies should focus on establishing clear indications for zinc therapy and identifying non-zinc-related causes to optimise supportive care.

Effectiveness of pharmaceutical counseling in sore throat management according to patients and pharmacists

Piotr Merks¹, Sebastian Sikorski², Urszula Religioni³, Justyna Kazmierczak⁴, Radosław Sierpinski⁵, Zbigniew Doniec⁶

¹Faculty of Medicine – Collegium Medicum Cardinal Stefan Wyszyński University, Warsaw, Poland

²Department of Administrative Law and Local Government, Cardinal Stefan Wyszyński University, Warsaw, Poland

³School of Public Health, Centre of Postgraduate Medical Education, Warsaw, Poland

⁴Silesian Pharmacy Chamber (SIA), Katowice, Poland

⁵Faculty of Medicine, Collegium Medicum, Cardinal Stefan Wyszyński University, Warsaw, Poland

⁶Medical Institute, Academy of Applied Sciences, Rabka Zdroj, Poland

Background: Overload of primary care systems, limited access to physicians, and increasing antimicrobial resistance have intensified the search for effective pharmacy-based management of minor ailments. Sore throat is one of the most common self-limiting conditions presented in community pharmacies. Structured pharmaceutical counseling supported by point-of-care testing may improve symptom control while reducing unnecessary physician visits and antibiotic use.

Objective: The aim of this study was to evaluate the effectiveness, acceptability, and perceived value of a pharmacy-led sore throat management pathway from the perspectives of patients and pharmacists.

Method: A multicenter, prospective observational study was conducted in 23 community pharmacies in Poland. Adult patients (≥18 years) presenting with sore throat underwent rapid antigen detection testing (RADT) for group A streptococcus (GAS). Patients with positive results were referred to physicians, while those with negative results received standardized pharmaceutical counseling and symptomatic treatment with ketoprofen throat spray. Data were collected using structured questionnaires assessing symptom severity, onset and duration of relief, convenience of use, adherence, perceived effectiveness compared to previous remedies, and overall patient-reported outcomes.

Results: A total of 142 patients were included. Among patients using ketoprofen throat spray, 98.4% reported symptom improvement, and 75.0% rated pain relief at ≥8 on a 10-point scale. Compared with previously used treatments, 88.3% of participants perceived higher effectiveness and 86.7% reported faster onset of action. The spray formulation was considered convenient by 91.4% of respondents, and no cases of overdosing or safety concerns were reported. Qualitative patient feedback emphasized rapid symptom

relief, improved swallowing and speaking, and the ability to resume daily activities without physician consultation.

Conclusion: An integrated pharmacy-based sore throat management pathway combining point-of-care testing, structured pharmaceutical counseling, and targeted symptomatic therapy proved feasible, safe, and well accepted in real-world community pharmacy practice. These findings support the expanding clinical role of pharmacists in minor ailment management and justify further large-scale comparative and health-economic studies, particularly to assess the impact on antibiotic prescribing and healthcare system efficiency.

Increased pharmacists' time in Quebec family medicine groups: What are the impacts?

Léa Prince-duthel¹, Léonie Rouleau², Alexandre Bergeron^{3,4}, Amélie Boudreau⁵, Nicolas Dugré^{2,6}, Marie-claude Vanier^{2,7}, Anne Maheu⁸, Line Guénette^{4,9}

¹Groupe de médecine familiale-Réseau Sud-Ouest, Verdun, Qc, CANADA, Montréal, Québec, Canada

²Faculté de pharmacie, Université de Montréal, Mtl, Qc, CANADA, Montréal, Canada

³Groupe de médecine familiale du Grand-Portage, Rivière-Du-Loup, Qc, CANADA, Rivière-du-Loup, Canada

⁴Faculté de Pharmacie, Université Laval, Qc, Qc, CANADA, Québec, Canada

⁵Groupe de médecine familiale Lafontaine, Rivière-du-Loup, Qc, CANADA, Rivière-du-Loup, Canada

⁶CIUSSS Nord-de-l'île-de-Montréal, GMF-U Sacré-Coeur, Mtl, Qc, CANADA, Montréal, Canada

⁷CISSS Laval, GMF-U Cité de la santé de Laval, Laval, Qc, CANADA, Laval, Québec

⁸CIUSSS Nord-de-l'île-de-Montréal, GMF-U Bordeaux-Cartierville, Mtl, Qc, CANADA, Montréal, Canada

⁹Centre de Recherche du CHU de Québec, Axe Santé des Populations et Pratiques Optimales en Santé, Québec, Qc CANADA, Québec, Canada

Background: Since 2015, pharmacists have integrated primary care teams in Québec's Family Medicine Groups (FMGs). Approximately 95% of FMGs integrate a pharmacist about 16 hours/week varying according to FMG size ($\approx$ 5 hours/week/6000 patients). To explore the potential of expanding pharmacist presence, the Réseau québécois des pharmaciens en GMF (RQP GMF) designed with the Ministère de la Santé et des Services Sociaux two initiatives : BOOST#1 (April 2022 to March 2023, + 11 to 28 hours/week for 5 FMGs) and BOOST#2 (October 2024 to March 2026, + 8 to 12 hours/week for 18 FMGs). Additionally, some sites decided to further increase pharmacist presence through other means.

Method: Participating pharmacists provided a detailed activity report after 12-months and some electronic medical records (EMR) enabled structured coding. All sites had an Advanced Collaborative Practice Agreement (ACPAs) enabling independent pharmacists prescribing. A pre-post analysis compared data from before and after the increase in pharmacist hours (Oct 2023/Sept 2024 and Oct 2024/Sept 2025) in three FMGs (#1 Lafontaine, #2 Grand-Portage and #3 Sud-Ouest) for clinical activities using predefined categories extracted from their EMR (review, adjustments, initiations and discontinuations). A descriptive analysis was conducted.

Results: BOOST#2 pharmacists reported that increased hours enabled development of dedicated follow-up pathways for chronic diseases (e.g. COPD, falls, chronic pain, depression) and vulnerable elderly patients were specifically targeted for reviews (2.9% - 15.4% reviewed after 12 months). Pre-post analysis in the three FMGs revealed substantial gains in clinical activities: Site 1 (prior BOOST#1: 13 to 37 hours, +185%), maintained stable time in BOOST#2 (35.25 to 35 hours/week, -0.7%), with unique patients receiving direct interventions increasing from 561 to 628 (+12%). Treatment adjustments (+11%), discontinuations (+9%) and initiations (+13%) all rose. Site 2 saw pharmacist time increase from 24 to 36.5 hours/week (+52%), driving unique patients with interventions from 795 to 1188 (+49%), with treatment adjustments (+85%), discontinuations (+43%), and initiations (+67%). Site 3 time increased from 42 to 57 hours/week (+36%), with unique patients impacted rising from 618 to 706 (+14%) and increases in treatment adjustments (+53%), discontinuations (+81%), and initiations (+63%).

Conclusion: BOOST#2 demonstrated that all participating FMGs achieved substantial clinical gains regardless of baseline pharmacist hours. Site 2's transition from part-time (24 $\rightarrow$ 36.5h) yielded the highest proportional increases, while Site 3 showed robust absolute gains. Even stable hours at Site 1 produced meaningful improvements. Consistent service availability preserves timely referral reflexes as interprofessional habits develop, as demonstrated in Site 1. Scaling towards a dedicated full-time presence strengthens interprofessional integration. Increasing pharmacist presence across all FMG sizes enhances primary care capacity, maximizes interventions, thereby supporting wider implementation of this model to improve medication management, safety, and primary care efficiency across Québec.

Réseau Québécois des Pharmaciens GMF (RQP GMF): Evaluation of a dedicated online hub for pharmacist' community of practice in family medicine groups

Léa Prince-duthel^{1,2}, Léonie Rouleau¹, Nicolas Dugré^{1,4}, Marie-claude Vanier^{1,3}, Line Guénette^{5,6,7}, Anne Maheu^{1,8}

¹Faculty of Pharmacy, University of Montreal, Montreal, QC H3T 1J4, Canada., Montréal, Québec, Canada

²Family Medicine Group GMF-R Sud-Ouest, 4475, rue Bannantyne, bureau 103, Verdun, Québec, H4G 1E2, Montréal, Canada

³Centre Intégré de Santé et de Services Sociaux (CISSS) de Laval, GMF-U Cité-de-la-Santé de Laval, Laval, QC H7M 3S7, Canada., Laval, Canada

⁴Centre Intégré Universitaire de Santé et de Services Sociaux (CIUSSS) du Nord-de-l'île-de-Montréal, GMF-U Sacré-Cœur, Montreal, QC H3M 3A9, Canada., Montréal, Canada

⁵CHU de Québec-Université Laval Research Centre, Population Health and Optimal Health Practices Research Unit, Quebec, QC G1S 4L8, Canada., Québec, Canada

⁶Faculty of Pharmacy, Laval University, Quebec, QC G1V 0A6, Canada., Québec, Canada

⁷Centre Intégré Universitaire de Santé et de Services Sociaux (CIUSSS) de la Capitale-Nationale, Quebec, QC G1C 3S2, Canada., Québec, Canada

⁸Centre Intégré Universitaire de Santé et de Services Sociaux (CIUSSS) du Nord-de-l'île-de-Montréal, GMF-U Bordeaux-Cartierville, Montreal, QC H3M 2X6, Canada., Montréal, Québec

Background: Since 2015, pharmacists have integrated primary care teams in Québec's Family Medicine Groups (FMGs; multidisciplinary clinics). In 2018, the Réseau Québécois des Pharmaciens en GMF (RQP GMF) Community of Practice was launched for these pharmacists. Legislative changes in 2021 expanded independent pharmacists' prescribing scope via FMG partnerships. In 2025, with endorsement from the Ministère de la Santé et des services sociaux du Québec, our community of practice adopted a formalized structure incorporating a dedicated secure website (Sharepoint), a members-only forum (VivaEngage), and new sub-committees for continuing education and regional activities. Entering 2026, a broader scope of practice for all pharmacists was approved by the government and will be implemented shortly. With 400–450 FMG pharmacists across 382 FMGs in Quebec, sharing best practices and peer discussions remains essential for enhancing efficiency, peer support, and role definition amid this expanded scope.

Objective: This study evaluated early engagement, satisfaction, and perceived practice impact of the updated CoP six months post-launch. Objectives also included identifying strengths, barriers, and needed adaptations to foster best practices, professional networking, problem-solving, and primary care contributions within the CoP.

Method: In June to August 2025, six months after the updated CoP's was launched, an 18-item web survey was distributed via Viva Engage, newsletter and Facebook group. The survey assessed CoP participation, engagement, satisfaction, barriers to participation, and perceived practice impact. Descriptive analysis summarized responses. Microsoft tools tracked SharePoint library visits and Viva Engage forum interactions; ad hoc post-webinar surveys gauged feedback (6 webinars).

Results: Of 194 CoP members, 48 responded (24,7% rate). Most found the process of onboarding the online CoP easy, objectives clear, and were satisfied with peers' participation and shared resources. Despite limited organizational support or dedicated time to participate in the CoP (most cited barriers), pharmacists were engaged because the CoP benefited their practice, helped solve daily problems and advance their FMG role. From the 194 members, an average of 950 monthly SharePoint visits and a 73% Viva Engage forum response rate (first reply in ≤ 1 day) were documented. Average webinar was 8.7/10. Half of the respondents dedicated < 15 min/week, requesting protected time.

Conclusion: The RQP GMF CoP's new online format met most of its objectives – promoting best practices, problem-solving, and strengthening pharmacists' primary care contributions – despite challenges like professional isolation and institutional constraints. These findings will guide process adaptations to increase engagement (currently reaching 50% of all Québec FMGs pharmacists), networking, and knowledge sharing. Collaborations with researchers, leveraging CoP data, will help optimize pharmacists' roles, thereby improving primary care efficiency and patient outcomes in Québec. Planned improvements include platform training, dedicated time for participation, and strategies to boost member involvement. A follow-up evaluation is scheduled for June–August 2026 to assess the CoP's evolution.

Project IMPACT: Immunizations. Results from the APhA Foundation's innovative model of care, as utilized by numerous research initiatives over a decade

John Little¹, John Grabenstein¹

¹American Pharmacists Association Foundation, Washington DC, United States

Background: The APhA Foundation has implemented various practice-based research initiatives related to improvement of immunization rates over the past 10 years. These research studies have each proven to improve vaccination rates of communities, thereby making a strong case for pharmacist's ability to help patients become up to date with needed vaccines, and gain the protection that immunizations provide. The APhA Foundation's IMPACT: Immunizations model has

been utilized to success in a variety of aspects, all making progress toward the ultimate goal of improving patient vaccination rates.

Method: Although the various research projects have taken on slightly different names, the essence of the APhA Foundation's "IMPACT Immunizations" model is to equip pharmacists with a patient's vaccination data at the point of care through utilization of the state Immunization Information System (IIS), instruct the pharmacist to conduct a comprehensive vaccination review with the patient, offer to provide vaccinations at this patient visit, and document the outcome of the visit. Although each state's IIS attempts to provide a comprehensive look at the patient's vaccination history, it is often significantly inaccurate and/or incomplete. Through these APhA Foundation research initiatives, pharmacists have contributed to improvement of the IIS thanks to bidirectional read/write access that community pharmacies perform. In addition, pharmacists have been able to engage patients in direct conversation about their vaccination history, answer questions, provide education, and offer vaccine administration immediately.

Results: Results from IMPACT: Immunizations include that 447 of the 1334 unmet vaccination needs were resolved during the 6-month study period. In addition, this project led to a 41.4% increase in the number of vaccines administered. In IMPACT: Vaccine Confidence, pharmacists identified a mean of 1.8-2.2 unmet vaccination needs per adult assessed. The leading vaccination needs were COVID-19, influenza, zoster, tetanus-containing, and pneumococcal vaccines. From a baseline mean of 59.1% for these five vaccinations, pharmacists increased the mean percentage vaccinated to 73.2%. Results from IMPACT: Tennessee Vaccine Confidence were nearly 56,000 initial patient visits and over 35,000 vaccinations administered, through partnership with 95 pharmacies throughout Tennessee. IMPACT: HPV Immunizations is an ongoing initiative that employs the same general process, with a tweak to emphasize the importance of cancer prevention through HPV immunizations.

Conclusion: In conclusion, the APhA Foundation IMPACT: Immunizations model has proven to be extremely useful for pharmacies to meet their patients' vaccination needs. Through this model, which can be tailored based on goals, pharmacists are able to increase immunization rates of patients they serve.

Project IMPACT: Diabetes Prevention. Results from the APhA Foundation's research on community delivery of the National Diabetes Prevention Program

John Little¹, Jean-venable "kelly" Goode¹

¹American Pharmacists Association Foundation, Washington Dc, United States

Background: Project IMPACT: Diabetes Prevention was designed to establish increased accessibility of the National Diabetes Prevention Program (DPP) through delivery by pharmacies and to establish a financially sustainable model for pharmacies to participate in delivering the program. The National DPP is a year-long evidence-based lifestyle intervention program for people with prediabetes or at high risk for development of type 2 diabetes. Delivery of the National DPP in community pharmacies was expected to increase the accessibility of the program. The administrative burden of a Centers for Disease Control and Prevention (CDC)-recognized National DPP is high, resulting in decreased participation and financial sustainability for pharmacies. The CDC Umbrella Hub model allows pharmacies to operate as subsidiaries, focused on program delivery, while shifting much of the administrative burden to the Hub. The main objectives of Project IMPACT: Diabetes Prevention were to improve access to the National DPP and to establish pharmacies as a delivery location with a clear path to financial sustainability of services.

Method: The study evaluated implementation of the National DPP in community pharmacies across the United States. To be eligible for enrollment, patients had to meet eligibility criteria established by the CDC Diabetes Prevention Recognition Program (DPRP). Session delivery followed the DPRP standards and utilized the PreventT2 curriculum. A minimum data set was required which was comprised of the required data under the DPRP including eligibility criteria, enrollment, attendance, weight, and activity level. Participating pharmacies were required to have at least one staff member who had completed a CDC-recognized lifestyle coach training program, recruit and enroll participants, and conduct the National DPP and document participant data according to the DPRP standards. APhA Foundation support included contracting, training, technical assistance, use of the Data Integration Framework, DPRP data reporting, and support for lifestyle coaches. In parallel to these activities, the APhA Foundation Hub model was developed and designated by CDC. In addition to the above support participating pharmacies received, the Hub infrastructure was built to submit claims to Medicare Administrative Contractors (MAC) and compensate pharmacies according to the Medicare Physician Fee schedule, minus Hub administrative and claims processing fees.

Results: Over 4,000 pharmacies participated in offering the National DPP under Project IMPACT: Diabetes Prevention,

demonstrating that pharmacies can act as effective sites to identify patients at risk for development of diabetes. 5,023 people enrolled in the program, indicating that pharmacy delivery of the National DPP improved access for patients. The APhA Foundation Umbrella Hub achieved Full-Plus recognition status under the DPRP and Medicare DPP supplier status in 8 of the 12 MAC regions. These two items combined set the stage for financial sustainability of National DPP delivery in pharmacies by decreasing administrative burden and connecting pharmacies to payment for services.

Conclusion: Project IMPACT: Diabetes Prevention results show a path forward for community pharmacy to serve as a solution in improving the health of the communities they serve by increasing access to the National Diabetes Prevention Program and doing so in a way that is financially sustainable for pharmacies.

Project IMPACT: CGM access. Results from the APhA Foundation's research on community pharmacist's ability to increase patient access to CGM devices and pharmacist-provided clinical services

John Little¹, Jean-venable "kelly" Goode¹

¹American Pharmacists Association Foundation, Washington Dc, United States

Background: Despite significant advances of Continuous Glucose Monitors (CGM) in terms of technology as well as improvement of clinical outcomes, numerous barriers to patient uptake still exist. Project IMPACT: CGM Access was designed to leverage the expertise and accessibility of community pharmacists in order to provide patients with improved access to the CGM devices as well as to patient visits regarding diabetes management. The primary objective of this research was to improve access to continuous glucose monitoring for people with diabetes who are on insulin through community pharmacies utilizing pharmacists' services. The primary outcome to be measured from this pilot was to demonstrate that as people with diabetes receive pharmacist-provided CGM services, their overall outcomes improve, thereby allowing payors to see the value their members may obtain through CGM services in pharmacies.

Method: This research included community pharmacy practice sites from 11 states: 12 independent practices and 11 chain practices, who were instructed to have up-to-monthly visits with their patients for 12-15 months. Pharmacists in this project sought credentialing verification in order to be compensated just like their physician colleagues, utilizing payment based off CPT codes, for having performed the same services. Pharmacists were able to provide Initial Education to patients for the initial device dispensing, manual placement, and education. Thereafter, pharmacists were

instructed to provide monthly meetings with the patients to allow longitudinal education to occur, and provide feedback surrounding patient specific needs such as identifying and correcting patterns, alert management, hypoglycemia prevention, impact of medications, meals, physical activity on blood glucose curves, etc.

Results: 500 patients were enrolled in this research, 66 of whom were "New-to-CGM" which was defined as not having a CGM device prior to enrolling in the project. Of the 500 patients, 65 patients had Type 1 Diabetes (13.1%), and 435 had Type 2 Diabetes (86.9%). Pharmacists in this research conducted 3,720 patient visits which was an average of 7 visits per patient over the 12-15 month patient care period. Both the New-to-CGM population, as well as those who had a CGM device prior to enrollment, experienced a statistically significant improvement in percent Active Time on CGM from baseline (first visit to last visit). CGM metric results (GMI, Hypoglycemia, TIR) are variable with slight improvements across population, statistically significant for incidence of Hypoglycemia across all patients. For patients who reported A1c values in addition to required CGM metrics, statistically significant improvements were observed., A1c = 8.91 at first to 7.91 at last visit (n=167) (p < 0.001).

Conclusion: Pharmacies in this research demonstrated the value they're able to provide patients with diabetes through utilization of a CGM device as well as recurring patient visits with the pharmacist. this project showed that pharmacists increase access to CGM devices for patients, as well as utilization of the devices. As a valuable member of the health care team, pharmacists, when compensated appropriately are able to provide crucial CGM services to patients, which are key to helping them maintain consistent CGM use, which ultimately results in improved measurable outcomes.

Impact of a structured educational intervention on community pharmacists' management of acute childhood diarrhoea in Lagos State, Nigeria: A simulated patient pre-post study

Ugonna Ekene Ayolugbe¹

¹Kenix Pharmacy, Lagos, Nigeria

Background: Acute childhood diarrhoea remains a leading cause of morbidity and mortality among children under five, particularly in low- and middle-income settings. Appropriate management using oral rehydration salts (ORS), zinc supplementation, and caregiver counselling can substantially reduce complications and deaths. Community pharmacists are often the first point of care for caregivers; however, studies in Nigeria report suboptimal practices, including under-dispensing of ORS and zinc and inappropriate antibiotic use. Evidence suggests that educational interventions can improve professional practice, yet research on their

effectiveness among community pharmacists in Nigeria is limited.

Objective: This study aims to evaluate the impact of a structured educational intervention on community pharmacists' management of acute childhood diarrhoea. Specifically, it assesses baseline management practices, implements an intervention on guideline-based care, and evaluates changes in practice post-intervention. It is hypothesised that the intervention will significantly improve adherence to recommended guidelines.

Method: A pre-post quasi-experimental study using the simulated patient method will be conducted among community pharmacies in the Isolo-Festac axis of Lagos State, Nigeria. From a population of approximately 250 registered pharmacies, 152 will be selected using Cochran's formula with finite population correction. Simulated patients will present a standardized scenario of uncomplicated childhood diarrhoea, with data collected via a structured checklist assessing history-taking, medicines dispensed (ORS, zinc, antibiotics, antidiarrhoeals), and counselling practices. Pharmacists will then participate in a two-day educational intervention (2 hours per day). Post-intervention simulated patient visits will repeat the same scenario. Data will be analysed using McNemar's test, with significance set at $p < 0.05$.

Conclusion: This study is expected to provide evidence on the effectiveness of educational interventions in improving community pharmacists' management of childhood diarrhoea and promoting rational medicine use in primary healthcare settings.

The evolving clinical roles of pharmacists in general practice: An international systematic review

Areej Amir¹, Hala Shokr¹, Ali Hindi¹

¹The University Of Manchester, Manchester, United Kingdom

Background: Primary care systems internationally face growing pressures from ageing populations, rising multimorbidity, and general practitioner (GP) shortages. Integrating pharmacists into general practice (family medicine) has emerged as a strategic response to optimise medicines use, support chronic disease management, and reduce GP workload. Despite a growing body of individual studies, a comprehensive international synthesis of pharmacists' evolving clinical roles and their impact across clinical, patient-centred, and economic domains was lacking. This review aimed to systematically synthesise international evidence on the implementation and impact of expanded clinical roles for pharmacists in general practice.

Method: A systematic review was conducted following PRISMA guidelines. Three academic databases (EMBASE, SCOPUS, and PubMed) were searched for peer-reviewed literature published globally between 2015 and 2024. Studies were included if they evaluated pharmacists delivering direct, patient-facing clinical services in general practice settings. Titles, abstracts, and full texts were screened against predefined inclusion and exclusion criteria. Data were systematically extracted and subjected to thematic analysis. Methodological quality was appraised using the nine-item Hawker et al. checklist.

Results: From 13,574 identified records, 35 studies were included, predominantly from the USA ($n=24$), UK ($n=4$), and Australia ($n=4$), published between 2015 and 2024. Methodological quality was moderate to high (Hawker scores: 27-35/36). Four main themes were identified: (1) Clinical contribution to chronic disease management: pharmacists significantly improved outcomes in diabetes (HbA1c reductions, treatment target achievement) and hypertension (blood pressure control), while also contributing to mental health, respiratory, and complex medication management. (2) Enhancement of patient-centred care: consistently high patient satisfaction was reported across studies, driven by longer consultations, personalised education, and socioeconomic barrier mitigation. (3) Integration into general practice: Collaborative Practice Agreements (CPAs) underpinned successful integration; pharmacists also served as agents of knowledge diffusion, improving evidence-based prescribing within practice teams. However, integration was hindered by key barriers, including limited patient awareness of the pharmacist's role, unclear role boundaries among some GPs, workflow integration difficulties, and inconsistent access to electronic medical records. (4) Financial impact and sustainability: pharmacist-led care demonstrated cost-avoidance benefits, though persistent concerns about sustainable, long-term funding models for pharmacist positions were identified across multiple studies.

Conclusion: Pharmacist integration in general practice delivers measurable clinical, patient-centred, and economic benefits, positioning pharmacists as valuable members of the primary care team. However, their full potential remains constrained by narrow training frameworks, variable public awareness, inconsistent integration models, and unstable funding mechanisms. This review highlights the need for formalised collaborative structures, broader competency-based training, and robust evaluation frameworks. Future research should prioritise long-term outcome studies, standardised integration models, and economic analyses across diverse healthcare systems to realise the sustainable contribution of pharmacists to high-quality primary care.

Addressing safety and appropriate use of glp-1 receptor agonists in community pharmacy: A pilot study

Olatz Vergniory¹, Carlos Treceño¹

¹Community Pharmacy, Bizkaia, Spain

Background: The use of glucagon-like peptide-1 receptor agonists (GLP-1 RAs) has increased markedly in recent years, particularly for the treatment of obesity and type 2 diabetes mellitus (T2DM). These medicines improve glycaemic control and promote clinically relevant weight loss with a low risk of hypoglycaemia. However, their rapid expansion has raised concerns related to off-label use, inappropriate dose escalation, administration errors and insufficient adherence to lifestyle recommendations, potentially compromising effectiveness and safety. Community pharmacists play a key role in ensuring the rational use of these medicines through structured pharmaceutical care interventions.

Objective: To evaluate the patterns of use, effectiveness and safety of GLP-1 receptor agonists in real-world practice and to assess the feasibility of a pharmacist-led intervention questionnaire designed for a future large-scale observational study.

Method: A multicentre, cross-sectional, observational pilot study was conducted in two urban community pharmacies in Spain (Bizkaia and Valladolid) during August and September 2025. Adult patients receiving GLP-1 receptor agonists for obesity or T2DM were included. Community pharmacists conducted structured interviews using a specifically designed questionnaire addressing treatment indication, duration, dose escalation, administration technique, adherence to dietary and physical activity recommendations, perceived effectiveness and adverse drug reactions. A descriptive analysis was performed to identify key trends and to refine the study protocol and data collection tools.

Results: A total of 32 patients were recruited. Patients experienced a mean weight loss of 2.6 kg from treatment initiation. Greater weight reduction was observed in patients treated with Wegovy® and Mounjaro® compared with other GLP-1 RAs (6.2 kg vs 0.9 kg). Baseline body mass index did not significantly influence weight loss, whereas longer treatment duration and adherence to dietary and physical activity recommendations were associated with improved effectiveness. Off-label use was identified in 36.4% of patients treated with Wegovy® or Mounjaro® and in 14.3% of those receiving Ozempic®, Rybelsus® or Trulicity®. Incorrect or absent dose escalation was reported in 81.3% of patients, and 41% experienced difficulties related to medication administration. More than half of the participants (53%) did not follow dietary recommendations or perform regular physical activity. Adverse drug reactions were mainly

gastrointestinal (46.9%), with dry mouth, abdominal pain and diarrhoea being the most frequently reported. Nervous system-related effects included five cases of asthenia and two cases of dysthymia. All patients agreed to participate in the interview and reported a high level of satisfaction with the pharmacist-led intervention.

Conclusion: This pilot study identified relevant challenges in the real-world use of GLP-1 receptor agonists, including frequent off-label prescribing, inadequate dose escalation, administration problems and insufficient lifestyle support. Despite these limitations, weight loss outcomes were consistent with previous evidence, particularly when treatment duration and behavioural recommendations were adequately followed. The pilot confirmed the feasibility and acceptance of a structured pharmacist-led intervention and allowed optimisation of the questionnaire and study design. These findings support the development of a standardized pharmaceutical care protocol to enhance the effectiveness and safety of GLP-1 receptor agonists in community pharmacy practice and provide the basis for a forthcoming large-scale multicentre study.

Assessment of the cost of illness associated with type 2 diabetes

Ramesh Adepu¹, G Chaitanya¹, J Nagasri¹, Ch Thanuja¹, Ch Sravanthi¹

¹Vikas College of Pharmaceutical Sciences, Hyderabad, India

Background: India is the diabetic capital of the world. Every fifth Indian is Type 2 Diabetes Mellitus (T2DM) is a chronic metabolic disorder associated with significant clinical and economic burden worldwide. The present study is carried out to estimate the cost of illness (COI) associated with T2DM management

Method: A prospective, observational, prevalence-based cost-of-illness study was conducted in five diabetic clinics in Suryapet town, Telangana, over a 6-month period. A total of 100 patients were enrolled. Direct medical and non-medical costs were calculated using a bottom-up micro-costing approach.

Results: About 100 patients with type 2 diabetes were enrolled in the study. Among them were 50 males (30 with complications + 20 without complications) and 50 females (33 with complications + 17 without complications). The mean age of enrolled patients was 56.2 years, and the disease duration was 10.1 ± 5.9 years. The annual cost per patient with complications was ₹44,417.68 (US\$510.96) compared to ₹27,804.96 (US\$319.68) for patients without complications. Medication and laboratory costs accounted for the largest share of direct costs. Regression analysis identified

complications, insulin therapy and hospitalisation as major predictors of increased total cost.

Conclusion: The economic burden of T2DM is substantial and increases significantly with complications. Strengthening preventive strategies and improving financial protection may reduce out-of-pocket expenditure.

Awareness, trust, utilization, and perceived barriers of Ghana's National Electronic Pharmacy Platform (NEPP): Implications for safe digital pharmaceutical care

Afia Frimpomaa Asare Marfo¹, Constance Cobbold², John Serbe Marfo¹, Pauline Boachie-ansah¹, Ivan Eduku Mozu², Janet Ameyaw¹, Akua Asantewaa Appiah-num Safo¹, Mercy Opare Addo¹

¹KNUST, Kumasi, Ghana

²UCC, Cape Coast, Ghana

Background: Digital health technologies are increasingly transforming healthcare delivery globally, including pharmaceutical services. In Ghana, the National Electronic Pharmacy Platform (NEPP), introduced by the Pharmacy Council of Ghana, was developed to facilitate access to licensed pharmacies, improve medicine availability, and reduce the circulation of counterfeit and substandard medicines. The platform is designed to enable patients to locate accredited pharmacies, obtain medicines through regulated channels, and benefit from professional pharmacist support through digital systems. Despite these potential advantages, the uptake of NEPP among the general public appears limited, raising concerns about awareness, trust, and the readiness of patients to adopt digital pharmaceutical services. This study assessed awareness, trust, utilization, perceived benefits, and barriers to the adoption of the National Electronic Pharmacy Platform (NEPP) among customers of community pharmacies in Ghana.

Method: A descriptive cross-sectional survey was conducted among 155 customers visiting 15 community pharmacies in the Ashanti Region of Ghana. Participants were selected using convenience sampling. Data were collected using a semi-structured questionnaire that captured socio-demographic characteristics, awareness of NEPP, trust in digital pharmacy services, utilization patterns, perceived benefits, and barriers to adoption. The questionnaire included both closed-ended and Likert-scale items to assess participants' perceptions. Data were entered into SPSS and analyzed using descriptive statistics, including frequencies and percentages, to summarize responses.

Results: Nearly half of the respondents reported awareness of NEPP (49.7%, n = 77), while 49.0% (n = 76) had never heard

of the platform. Only 24.2% (n = 38) indicated that they had ever used NEPP services. The most commonly reported barriers to NEPP utilization were lack of awareness or information about the platform (62.6%, n = 97), unreliable internet connectivity (54.8%, n = 85), limited digital literacy (47.1%, n = 73), lack of trust in online medicine purchases (41.3%, n = 64), and concerns regarding payment security and potential fraud (32.3%, n = 50). Despite the relatively low utilization, respondents identified several potential benefits associated with the platform. These included convenience and time-saving (68.4%, n = 106), reduced risk of counterfeit medicines through access to licensed pharmacies (61.9%, n = 96), improved access to medicines for individuals with mobility or distance challenges (55.5%, n = 86), availability of professional pharmacist support (48.4%, n = 75), and potential cost savings (39.4%, n = 61). Importantly, more than three-quarters of respondents (76.8%, n = 119) expressed willingness to use NEPP if improvements were made in awareness campaigns, digital literacy education, online pharmacist consultation, and secure payment mechanisms.

Conclusion: Although awareness and utilization of the National Electronic Pharmacy Platform remain relatively low, the perceived benefits among pharmacy clients are high. Addressing critical barriers—particularly inadequate public awareness, digital literacy challenges, unreliable internet connectivity, and trust concerns—will be essential for improving public adoption. Strengthening these areas could enhance the integration of NEPP into routine pharmaceutical services and support the advancement of safe, patient-centered digital pharmaceutical care in Ghana.

Knowledge, attitudes and clinical practices of health professionals toward postoperative pain management: A cross-sectional study

Constance Cobbold¹, Afia Frimpomaa Asare Marfo², Robert Incoom¹, Prince Ofori¹, Richard Delali Djochie¹, Ivan Mozu¹, Janet Ameyaw², Pauline Boachie-ansah²

¹UCC, Cape Coast, Ghana

²KNUST, Kumasi, Ghana

Background: Postoperative pain remains one of the most common and inadequately managed complications of surgery worldwide despite advances in surgical and analgesic care. Poorly managed postoperative pain can delay recovery, prolong hospital stay, and negatively affect patient satisfaction and overall surgical outcomes. Effective pain management relies heavily on the knowledge, attitudes, and clinical practices of healthcare professionals involved in postoperative care. However, evidence examining these factors from an interprofessional perspective remains limited in many low- and middle-income countries (LMICs), including Ghana. Understanding these gaps is essential for informing targeted interventions to improve postoperative pain

management. This study therefore assessed the knowledge, attitudes, and clinical practices related to postoperative pain management among healthcare professionals in a tertiary hospital in Ghana. The objective of the study was to assess the knowledge, attitudes, and clinical practices regarding postoperative pain management and associated factors among healthcare professionals involved in postoperative care.

Method: A descriptive cross-sectional study was conducted among 100 healthcare professionals, including doctors, pharmacists, nurses, and midwives involved in postoperative care at Cape Coast Teaching Hospital in Ghana. Data were collected using a structured self-administered questionnaire assessing sociodemographic characteristics as well as knowledge, attitudes, and practices related to postoperative pain management. Descriptive statistics were used to summarize participant responses. Differences in knowledge scores across professional groups were examined using one-way ANOVA with post hoc tests, while Pearson's correlation analysis was performed to explore relationships between knowledge, attitudes, and clinical practices. Statistical significance was set at $p < 0.05$.

Results: Overall knowledge of postoperative pain management was moderate, with a mean score of 32.2 ± 6.3 out of 50 (64.3%). Knowledge differed significantly across professional groups ($F(3,96) = 16.5, p < 0.001$), with doctors and pharmacists demonstrating higher knowledge scores than nurses and midwives. Attitudes toward postoperative pain management were largely indifferent (mean score 38.4 ± 6.9 ; 63.9%). Clinical practice was also suboptimal, as 63.0% of participants were classified as having inadequate practice. Knowledge showed a strong positive correlation with attitude ($r = 0.569, p < 0.001$), while attitude demonstrated a moderate positive correlation with clinical practice ($r = 0.315, p = 0.001$).

Conclusion: Healthcare professionals demonstrated moderate knowledge but less favourable attitudes and suboptimal clinical practices regarding postoperative pain management. These findings suggest the presence of important interprofessional gaps that may influence the quality of postoperative pain care. Targeted interprofessional education and institutional strategies, including strengthened involvement of pharmacists in pain management teams, may help address these gaps and enhance collaborative approaches to postoperative pain care, ultimately improving patient outcomes.

Launching Antimicrobial Stewardship Programmes in Rural Canadian Hospitals: A Programmatic Description of a Pharmacist-Led Telestewardship Model

Eli Tran¹, Tina Thomas¹, Courtney Wong¹, Paula Newman¹, Sammu Dhaliwall¹, Kevin McDonald¹

¹Northwest Telepharmacy Solutions, Deep River, Canada

Background: As antimicrobial resistance remains a persistent critical public health and patient safety concern, the implementation of antimicrobial stewardship programmes (ASPs) is expected in all acute care facilities. Small hospitals face unique barriers, including limited staffing and lack of on-site infectious disease expertise. When adjusted for patient volume, antimicrobial use in small hospitals is comparable to larger facilities suggesting similar antimicrobial pressures. Despite national professional guidelines, only half of hospitals have designated ASP funding, and staffing often falls below recommended thresholds particularly in small hospitals. While remote technology is employed to bridge resource gaps, descriptions of the implementation of remote pharmacist-led ASPs in small rural Canadian hospitals are limited.

Objective: To describe the implementation of a pharmacist-led antimicrobial telestewardship programme in rural Canadian hospitals. Outcomes evaluated included reach (hospital exposure pre-launch antimicrobial stewardship activities), effectiveness (descriptive assessment of antimicrobial use), adoption (hospital acceptance and funding), implementation (pre- and post-launch activities), and maintenance (post-launch sustainability efforts).

Method: A retrospective, descriptive evaluation of a quality improvement initiative across five rural Canadian hospitals with existing telepharmacy programmes. Site selection was based on pharmacist observations of high antimicrobial prescribing without formal ASP presence. Pre-launch activities included site-specific comprehensive antimicrobial stewardship gap analyses, business cases, and consultation with hospital leadership teams. The remote ASP initiative consisted of core components including ASP committees, dedicated telepharmacist full-time equivalents, defined programme goals and metrics, weekday prospective audit and feedback with prescriber follow-up, collaboration with physician champions, selective antimicrobial stewardship activities guided by local needs, and structured documentation in the electronic health record. Descriptive evaluation was guided by the RE-AIM (Reach, Effectiveness, Adoption, Implementation, Maintenance) framework. Data sources included gap analysis results, stakeholder survey results, programme workload data, and site-specific antimicrobial use data. Ethics approval was not required as this work was conducted as a quality assurance project.

Results: Five rural Canadian hospitals were assessed for implementation of a pharmacist-led antimicrobial stewardship programme (2024-2026). All targeted hospitals participated in pre-launch activities. Three hospitals fully implemented the programme (i.e., all core components of the intervention), one partially, and one declined, influenced by leadership support and funding. Visual inspection suggested directional decreases in antimicrobial use. Core activities were integrated into workflows and iteratively refined based on stakeholder feedback. Ongoing ASP meetings, consultations and telepharmacist involvement, increased prescriber consultations, and improved on-site pharmacist engagement indicated early feasibility and acceptability.

Conclusion: The pharmacist-led antimicrobial stewardship programme was implemented across rural hospitals, leveraging existing clinical workflows and achieving broad reach and adoption. Early outcomes showed reductions in antimicrobial use and continuous engagement from on-site staff, supporting programme operational viability, acceptance, and sustainability. Limitations include short follow-up, incomplete antimicrobial use data, variable adoption, and absence of patient-level outcomes. These findings support scalable rural antimicrobial stewardship and highlight the value of telepharmacy-enabled ASPs. Future research should clarify the utility of the pharmacist-led antimicrobial stewardship programme through examination of clinical and cost effectiveness outcomes.

Exploring the role of community pharmacies in menopause support in Norway: Perspectives of pharmacy staff and women experiencing menopause

Fatima Bibi¹, Parisa Gazerani¹

¹Oslo Metropolitan University, Oslo, Norway

Background: Menopause is a natural life stage associated with a range of physical, psychological, and social symptoms that may negatively affect women's health, well-being, and quality of life. Many women seek accessible and reliable sources of information and support to manage menopausal symptoms and make informed decisions regarding treatment and self-care options. Community pharmacies are highly accessible healthcare settings and may play an important role in providing counselling, health information, and guidance on symptom management and medicine use. Pharmacists are well-positioned to contribute to women's health through patient education, product counselling, and referrals when appropriate. Despite increasing attention to women's health internationally, limited evidence exists regarding how menopause-related support is currently addressed within community pharmacy practice in Norway. Furthermore, little is known about how pharmacy staff perceive their

competence and professional responsibilities in this area, or how women experiencing menopause perceive and utilise pharmacy-based support. Understanding both perspectives is important for informing future development of pharmacy practice and improving accessibility to menopause-related support.

Method: A quantitative cross-sectional study design was applied using two separate anonymous online surveys conducted in Norway. One survey targeted community pharmacy staff, including pharmacists and pharmacy technicians, while the second survey targeted women experiencing menopause. The questionnaires explored perceived competence, experiences with menopause-related counselling, perceived barriers, informational needs, expectations towards pharmacy-based support, and attitudes towards potential digital tools. Recruitment was conducted through professional networks and public dissemination channels. A total of 108 pharmacy employees and 530 women completed the surveys. Data were analysed using descriptive and inferential statistical methods to identify patterns in experiences, perceived challenges, and expectations related to menopause counselling and pharmacy support.

Results: Pharmacy staff generally recognised menopause counselling as a relevant professional responsibility and expressed willingness to support women experiencing menopausal symptoms. However, many respondents reported uncertainty regarding their knowledge base and indicated a need for additional education and professional guidance. Frequently reported barriers included limited consultation time, perceived low patient demand, and insufficient access to up-to-date information resources. Women reported relatively infrequent counselling encounters in community pharmacies but expressed interest in receiving clearer information, broader product guidance, and opportunities for dialogue with pharmacy staff. Both pharmacy staff and women demonstrated positive attitudes towards the use of digital tools as a complement to face-to-face counselling, particularly to improve access to reliable information and continuity of support.

Conclusion: The findings indicate that community pharmacies in Norway represent an underutilised resource for menopause-related support and women's health more broadly. Addressing identified barriers through targeted competence development, improved access to evidence-based information, and clearer professional frameworks may strengthen the role of pharmacists in this area. The integration of digital support solutions may further enhance the accessibility and continuity of counselling. These results provide insights relevant to future pharmacy practice development, education, and policy discussions aimed at improving menopause support within community pharmacy settings.

Smoking cessation in Norwegian community pharmacy: A national survey of practice, barriers, and opportunities for pharmacy service development

Mudassar Aziz¹, Parisa Gazerani¹

¹Oslo Metropolitan University, Oslo, Norway

Background: Although smoking prevalence in Norway has declined over recent decades, tobacco use remains a significant public health concern and continues to contribute to preventable morbidity and mortality. Accessible and effective smoking cessation support remains essential to further reduce tobacco-related harm. Community pharmacy is a highly accessible healthcare setting, and community pharmacists are well-positioned to support smoking cessation through patient counselling, behavioural guidance, and evidence-based pharmacotherapy. International evidence indicates that pharmacy-based cessation interventions can improve quit outcomes; however, the role of community pharmacy in smoking cessation is not formally embedded within national healthcare strategies in Norway. Consequently, empirical data describing pharmacists' current involvement, perceived competence, and structural challenges remain limited. Understanding pharmacists' experiences and perceived barriers is important for identifying opportunities to strengthen pharmacy contributions to tobacco cessation and to inform the future development of community pharmacy-based services within the healthcare system.

Method: A quantitative cross-sectional study was conducted using an anonymous, web-based survey distributed to community pharmacists across Norway. The questionnaire explored pharmacists' knowledge, attitudes, and self-reported practices related to smoking cessation, as well as perceived facilitators and barriers influencing service provision. Survey items addressed experience with cessation counselling, confidence in supporting patients, training exposure, and perspectives on organisational and policy-related factors affecting practice. In total, 101 community pharmacists completed the survey. Quantitative data were analysed using descriptive statistics and inferential statistical methods, including chi-square tests and ordinal regression analyses, to examine associations between professional characteristics and engagement in smoking cessation activities.

Results: Respondents generally reported positive attitudes towards involvement in smoking cessation and expressed confidence in providing basic counselling and pharmacotherapy guidance. No statistically significant differences were observed in knowledge, confidence, or engagement according to gender, educational background, or years of professional experience. However, several systemic barriers were consistently identified. Limited consultation time, perceived low patient demand, insufficient access to

structured training, and lack of financial and organisational incentives were reported as key constraints. These barriers were perceived as more influential than individual competence-related limitations. Pharmacists indicated that clearer professional frameworks, improved training opportunities, and stronger integration within healthcare pathways could facilitate greater involvement in smoking cessation support.

Conclusion: Community pharmacists in Norway demonstrate willingness and foundational capacity to contribute more actively to smoking cessation efforts, but remain constrained primarily by structural and policy-related barriers. Strengthening pharmacists' involvement will require system-level measures, including targeted professional training, organisational support, and clearer integration into national tobacco control strategies. Development of structured community pharmacy-based cessation services may enhance accessibility to evidence-based interventions and support public health efforts to reduce tobacco-related harm. The findings provide empirical insights to inform pharmacy practice development, healthcare system integration, and future policy initiatives.

Establishing a new national framework for good pharmacy practice: Creation of the Council for Standards of Good Pharmacy Practice in Portugal

Diana Costa¹, Ricardo Santos², António Matias⁴, Cátia Sousa Marques⁴, Mariana Dias⁴, Teresa Torres⁴, Joana Santos Silva³, Helder Mota-filipe⁵

¹Deputy Secretary-General, Portuguese Pharmaceutical Society, Lisbon, Portugal

²Secretary-General, Portuguese Pharmaceutical Society, Lisbon, Portugal

³Coordinator, Council for Standards of Good Pharmacy Practice Portuguese Pharmaceutical Society, Lisbon, Portugal

⁴Member, Council for Standards of Good Pharmacy Practice Portuguese Pharmaceutical Society, Lisbon, Portugal

⁵President, Portuguese Pharmaceutical Society, Lisbon, Portugal

Background: Setting professional standards helps ensure quality, safety, efficiency, accessibility, and person-centred care in pharmaceutical services. As healthcare changes quickly, pharmacists need clear, evidence-based guidance to keep their practice consistent. In Portugal, the Portuguese Pharmaceutical Society (Ordem dos Farmacêuticos, OF) created the Council for Standards of Good Pharmacy Practice to develop a national framework for pharmacy standards. This framework is based on the best available evidence and follows ethical, professional, and legal principles. It draws on key documents such as the WHO Handbook for Guideline Development, the NICE Guideline Development Manual, the

Direção-Geral da Saúde framework for health quality standards, and the OF's earlier General Standard on the Elaboration and Control of Pharmaceutical Standards. This article explains the governance model, methods, and implementation strategy used to develop Good Pharmacy Practice Standards in Portugal.

Method: The framework follows a structured life-cycle model for the development, validation, implementation and revision of standards. Pharmacists, OF bodies, professional groups, and outside stakeholders like scientific societies, patient associations, and regulators can submit proposals for new or updated standards. Priority topics are chosen based on health indicators, professional needs, new science and technology, regulatory changes, and their expected impact on pharmacy practice and health outcomes. For each prioritised standard, a thematic Working Group is established, including a coordinator, a member of the consultative structure, pharmacists with recognised expertise, and methodological support for evidence review. The scope of each standard is defined using a PICO-based approach. Evidence appraisal follows GRADE methodology, or a simplified equivalent depending on topic complexity, and incorporates international and national literature, grey literature, real-world data, economic considerations and equity aspects. Draft standards undergo internal technical review, appraisal by the OF National Board and public consultation. After approval, standards are published and supported by implementation plans, communication actions, training activities and practical tools. A monitoring and revision cycle is included, with review every three years or earlier if warranted by new evidence, legislation or technological developments.

Results: The establishment of the Council provides, for the first time, a formal and transparent governance structure for the development of pharmacy standards at national level in Portugal. The model defines common methodological requirements, standardised templates and an organisational logic designed to support quality manuals by area of practice. It is expected to strengthen harmonisation, improve the consistency and applicability of recommendations, and enhance pharmacists' capacity to respond to emerging health needs.

Conclusion: The creation of the Council for Standards of Good Pharmacy Practice represents an important step in strengthening professional self-regulation and quality improvement in pharmacy practice in Portugal. By promoting harmonised, practical and regularly updated standards, this initiative supports patient safety, better health outcomes and the role of pharmacists as key contributors to an integrated and resilient health system.

Impact of telepharmacy services on hospital emergency care utilisation: A systematic review and meta-analysis

Anna Barwick^{1,2}, Christopher Freeman¹, Liam Caffery^{3,4}, Anthony Smith^{3,5,6}

¹School of Pharmacy, University of Queensland, Brisbane, Australia

²School of Rural Medicine, University of New England, Armidale, Australia

³Centre for Online Health, The University of Queensland, Brisbane, Australia

⁴Centre for Health Services Research, The University of Queensland, Brisbane, Australia

⁵Centre for Innovative Medical Technology, Odense University Hospital, Odense, Denmark

⁶Faculty of Health Sciences, University of Denmark, Odense, Denmark

Background: Telepharmacy enables pharmacists to deliver clinical and medication related services remotely, and its use has expanded rapidly in response to evolving patient needs and shifting models of care. While telepharmacy has demonstrated benefits across patient, provider, and system levels, its impact on hospital emergency care utilisation remains unclear, with studies report mixed findings. Our study aimed to evaluate the impact of pharmacist delivered telepharmacy interventions on utilisation of emergency department (ED) presentations and hospital readmissions. Secondary outcomes include describing the characteristics of telepharmacy models of care, and identifying study-reported outcomes, including facilitators or enablers of successful telepharmacy services, and the economic impact of interventions.

Method: A systematic search for randomised controlled trials (RCTs) assessing the effectiveness of telepharmacy services was conducted in November 2025. The primary outcome was the effect of telepharmacy interventions on rates of hospital admission and/or ED presentation. A meta-analysis was completed for studies that reported 30-day hospital readmissions and ED presentations.

Results: Seventeen RCTs involving 9,692 patients were included. Three studies reported a significant reduction in 30-day ED presentations, and three studies reported a significant reduction in 30-day hospital readmissions. Seven studies (n=1,859 patients) were eligible for meta-analysis. Telepharmacy interventions were associated with a 6% absolute reduction in 30 day ED presentations (risk difference=0.06, 95% CI 0.02-0.10, p=0.005). A non-significant reduction was observed in 30-day hospital readmission rates. Services that employed multiple contact points, technology types, and ongoing care appeared to have the greatest impact on reducing the need for emergency care. Most studies neglected to include cost comparisons between intervention and control groups. Overall, the evidence

indicates that telepharmacy may help reduce short-term emergency care utilisation, but its impact on preventing hospital admissions remains uncertain.

Conclusion: Across a small number of heterogeneous RCTs, telepharmacy interventions were associated with a significant reduction in 30 day ED presentations but did not significantly reduce 30 day hospital readmissions. These findings highlight the potential value of telepharmacy in reducing emergency care utilisation.

Enhancing respiratory stewardship: Impact of clinical pharmacist-led interventions on asthma control and lung function in Northern Iraq

Israa Nabeel Adil¹, Betul Okuyan², Suha Shangula³, Mesut Sancar², Abdikarim Abdi¹

¹Department of clinical pharmacy, Yediepe University, Istanbul, Istanbul, Türkiye

²Department of clinical pharmacy, Marmara University, Istanbul, Türkiye

³College of Pharmacy, Hawler Medical University,, Erbol, College of Pharmacy, Hawler Medical University,

Background: Effective asthma management in a "One Health" framework requires a synergistic approach to pharmacological care, environmental awareness, and patient education. In resource-limited or high-acuity settings, the clinical pharmacist's role as a medication steward is critical to overcoming barriers such as poor inhaler technique and non-adherence, which otherwise lead to suboptimal clinical outcomes and increased healthcare utilization.

Objective: To evaluate the clinical impact of structured pharmacist-led interventions on asthma control, medication adherence, and pulmonary function among patients in Erbil, Northern Iraq.

Method: A prospective, randomized, interventional study was conducted at a tertiary hospital from May to September 2024. 120 patients with mild-to-severe asthma were enrolled. The intervention group received monthly clinical pharmacist-led sessions focused on mastery of inhaler technique and adherence counseling. Primary outcomes included the Asthma Control Test (ACT), Pulmonary Function Tests (PFT)—specifically a 12% improvement in Forced Expiratory Volume in one second (FEV₁)—and adherence measured via the Medication Adherence Report Scale-5 (MARS-5) and Test of Adherence to Inhalers (TAI).

Results: At baseline, ACT scores were comparable between groups. Post-intervention, the clinical pharmacist-led group demonstrated significantly superior asthma control ($p < 0.001$), with a higher proportion of "well-controlled" cases

(30.1% vs. 11.5%). Adherence rates (MARS-5 and TAI) were significantly higher in the intervention group and strongly correlated with improved clinical outcomes. Furthermore, the intervention group achieved nearly double the rate of clinically significant FEV₁ improvement (30.1% vs. 14.2%) compared to the control group.

Conclusion: Clinical pharmacist-led interventions significantly enhance lung function, adherence, and overall disease control in asthma patients. These findings advocate integrating specialized pharmacy services into respiratory care pathways to ensure sustainable, patient-centered health outcomes in line with global "One Pharmacy" standards.

Implementation of a consult-based pharmacist model for inpatient hospitalist patients

Calli Safnuk¹, Liberty Liu², Nikita Baker²

¹Alberta Health Services, Calgary, Canada

²Department of Family Medicine, University of Calgary, Calgary, Canada

Background: Recent Canadian population-based studies demonstrate a marked rise in patient complexity, including polypharmacy, advanced age, multiple acute medical problems, and adverse events. As patient complexity increases, the evidence supports hospital pharmacists' roles to include direct patient care, medication management, and transitions of care, which are associated with improved clinical outcomes and efficiency. Pharmacy practice varies from country to country, and Canada is in an era of expansion for clinical integration of pharmacists into care teams. The model of clinical hospital pharmacist services varies from site to site, and in Alberta, Canada a unit-based model is commonly employed. At an acute care center in Calgary, Alberta, a hospitalist physician group provides care to roughly 230 patients across 26 units. The dedicated hospitalist pharmacists provide care to 2 of the 26 designated units, thus limiting access to clinical pharmacists' services by geographical location.

Objective: To describe a consult-based pharmacist care model which identifies patients by physician-led consultation, or by a self-directed pharmacist screening process, rather than patient bed location and to describe the role of a consult-based hospital pharmacist in a large, tertiary, teaching hospital.

Method: This is a multi-method study to descriptively capture a consult-based pharmacist practice pilot from Nov 22, 2023, to March 30, 2024. The number of physician-led and pharmacist-led consultations, the type of consultation, pharmacist-led recommendations and acceptance, the type of drug therapy problem recommendation, and the type of

clinical pharmacy key performance indicators completed were captured. Feedback from patients and physicians was measured through qualitative surveys

Results: The pilot captured 106 physician-led consults. Medication choice/dosing, accurate medication history, evaluation of drug cause for acute presentation, polypharmacy/deprescribing review, and therapeutic drug monitoring were the most common reasons for consultation. The pharmacist targeted high-yield patients, such as polypharmacy, therapeutic drug monitoring, intravenous antibiotics, heart failure, complex discharges, and/or recent falls. The pharmacists' physical working space shifted from on unit to within the physicians' office to facilitate visibility and encourage interaction. 837 drug therapy problems were identified, and of those, 751 drug therapy problems were resolved by the pharmacist. 94% of consults resulted in at least one drug therapy problem resolution. An average of 3.46 resolved drug therapy problems per patient, with a higher average for patients on whom the pharmacist completed an initial medication history (5.3 DTP/patient and 1.79 DTP/patient, respectively). Several cost-saving events, up to \$450/event, were identified, and 46 pharmacist-led teaching events for physicians were held. Stakeholder surveys illustrated positive outcomes.

Conclusion: Hospital pharmacists are well-positioned to handle the rising complexity of the aging population. A consult-based pharmacist model was utilized by a hospitalist physician group and expanded the access to clinical pharmacy services. The pilot catalyzed the change of 3 full-time pharmacist positions onsite and was adapted for 2 additional acute care hospitals in Alberta. The model shifted pharmacist involvement from geographical location to physician and pharmacist-identified need.

Strengthening influenza vaccination coverage through pharmacist engagement in Albania: A pilot intervention and qualitative assessment

Rovena Daja¹, Juliana Nanaj², Keit Rahmani³, Valbona Zefi⁴, Redona Dudushi⁵, Suela Dibra⁶, Dorina Toçi⁷, Silva Bino⁸

¹Rovena Daja, Tirana, Albania

²Juliana Nanaj, Tirana, Albania

³Keit Rahmani, Tirana, Albania

⁴Valbona Zefi, Tirana, Albania

⁵Redona Dudushi, Tirana, Albania

⁶Suela Dibra, Tirana, Albania

⁷Dorina Toci, Tirana, Albania

⁸Silva Bino, Tirana, Albania

Background: Seasonal influenza vaccination remains a key public health intervention for reducing morbidity and mortality, particularly among high-risk populations. In contrast to the experience of many countries, pharmacists in Albania are not legally authorised to administer vaccines in community pharmacies, and their role in vaccination promotion remains limited. This initiative aims to address this gap, with the objective of expanding the role of pharmacists not only in vaccine dispensing but also in promoting and potentially administering vaccines for adults aged 18 years and above.

Objective: The aim of this study was to assess the impact of pharmacist-led promotion on influenza vaccination uptake in an urban area of Tirana, and to explore pharmacists' experiences, challenges, and readiness for an expanded role in vaccination services.

Method: A mixed-methods approach was used. At the beginning of the 2024–2025 influenza season, a pilot intervention was implemented involving 66 community pharmacies in a defined neighbourhood of Tirana. Pharmacists received training and actively promoted influenza vaccination, while vaccination trends were monitored throughout the season. At the end of the season, a structured questionnaire was administered to 13 pharmacies to evaluate their experiences. Subsequently, during the 2025–2026 influenza season (December 2025 to January 2026), a qualitative study was conducted with 14 pharmacists from Tirana, Kamëz, and Vaqarr, using in-depth interviews and one focus group discussion. Data were analysed thematically.

Results: The pilot intervention was associated with a 20 % increase in influenza vaccination coverage in the study area compared with previous seasons. All participating pharmacists expressed willingness to engage in similar initiatives in the future. From the survey (13 pharmacies): 12 pharmacies rated their experience as positive or very positive,

10 pharmacists reported being well prepared to inform patients, 11 pharmacists reported frequent patient requests for additional information, 7 pharmacists considered the intervention highly beneficial and 6 moderately beneficial. Qualitative findings confirmed that vaccine demand is largely seasonal and influenced by patient awareness. Trained pharmacists demonstrated a more proactive approach to vaccination promotion. Key barriers included lack of legal authorisation to administer vaccines, limited institutional support, and operational constraints. The majority of pharmacists expressed willingness to administer vaccines if appropriately trained and authorised.

Conclusion: This study demonstrates that pharmacist-led promotion can positively influence influenza vaccination uptake in Albania. Pharmacists represent an accessible and trusted healthcare resource with significant potential to improve vaccination coverage. However, this potential is currently constrained by regulatory, structural, and training-related barriers. The integration of pharmacists into national vaccination strategies—through formal authorisation, structured training, and strengthened collaboration with primary healthcare services—could substantially enhance vaccination uptake. The Ministry of Health and Social Protection is supporting this initiative led by the Institute of Public Health and is in the process of enabling pharmacist-administered vaccination for adults through a ministerial order, based on the law on infectious diseases.

Advancing Clinical Pharmacy Practice in Nigeria: A Multinational Competency-Based Framework for Standardizing Clinical Pharmacist, Specialist, and Consultant Roles

Ifeanyi Egbunike¹, Teresa Pounds², Atai Okokon³, Bola Sotubo⁴, Lola Goke-dabiri⁵, Folasade Lawal⁶, Lere Baale⁷, Tarilate Temedie-asogwa⁸, Zainab Parker⁹

¹LH DCMC, Gwynn Oak, United States

²Western African Society of Parenteral and Enteral Nutrition, Atlanta, United States

³Alberta Primary and Preventative Health Services., Alberta, Canada

⁴NHS & Community Pharmacy Owner, Greater London, England, United Kingdom

⁵NHS Independent Prescriber, Scotland, United Kingdom

⁶Victory Drugs and Pharmacists Association of Nigeria, Lagos, Nigeria

⁷Nigeria Academy of Pharmacy, Lagos, Nigeria

⁸University of Houston College of Pharmacy, Houston, Texas

⁹Philadelphia College of Osteopathic Medicine, Philadelphia, United States

Background: Clinical pharmacy practice in Nigeria continues to evolve but remains constrained by the absence of clearly defined, competency-based roles, inconsistent training pathways, inadequate clinical documentation systems, and limited integration into multidisciplinary care teams. These gaps reduce pharmacists' ability to provide direct patient care and limit their impact on patient outcomes and health system performance. This initiative aimed to develop a scalable, implementation-focused framework to advance clinical pharmacy practice in Nigeria through competency-based job descriptions for clinical pharmacists, clinical pharmacist specialists, and consultant pharmacists, while strengthening multidisciplinary integration and clinical documentation practices.

Method: A multinational comparative approach was used, drawing on established clinical pharmacy practice models from Nigeria, the United States of America, the United Kingdom, and Canada. A collaborative group of pharmacy leaders and subject matter experts identified best practices in workforce development, credentialing, scope of practice, and clinical documentation. These elements were synthesized into a structured framework tailored to the Nigerian healthcare context and centered on competency-based job descriptions across progressive levels of practice.

Results: Key gaps identified included the absence of standardized clinical pharmacy roles, variability in scope of practice, limited postgraduate training infrastructure, and lack of formalized documentation of pharmacist interventions. The proposed framework introduces competency-based job descriptions for clinical pharmacists,

specialists, and consultants; clearly defined competencies, scope of practice, and performance expectations for each level; structured training and credentialing pathways, including residency and non-traditional models; and alignment with multidisciplinary team integration and standardized clinical documentation practices. Implementation strategies include national stakeholder engagement, regulatory alignment, and leveraging diaspora expertise for training and mentorship. This framework represents a ready-to-implement workforce model for advancing clinical pharmacy practice in Nigeria.

Conclusion: Developing and implementing competency-based job descriptions provides a critical foundation for standardizing clinical pharmacy practice in Nigeria. This framework improves role clarity, supports workforce development, and facilitates integration of pharmacists into patient-centered care teams. The model is scalable and adaptable to other countries seeking to strengthen clinical pharmacy services and improve health outcomes.

Patients' or caregivers' perceptions of cytotoxic medication waste in an outpatient oncology setting

Chui Mei Thum¹, Vivianne Shih¹, Wen Ting Teo¹, Yi Rui Ho², Wern Si, Hannah Chan², Liong Shun Zi³

¹National Cancer Centre Singapore, Department of Pharmacy, Singapore, Singapore

²National University of Singapore, Faculty of Science, Dept of Pharmacy & Pharmaceutical Sciences, Singapore, Singapore

³National Cancer Centre Singapore, Dept of Clinical Trials & Epidemiology Sciences, Singapore, Singapore

Background: The increasing use of oral chemotherapy has transformed cancer care by enabling treatment in home settings. While this improves convenience and autonomy, patients and caregivers may have limited knowledge of the safe handling, storage, and disposal of cytotoxic medications, posing potential health and environmental risks. This study aimed to evaluate patients' and caregivers' knowledge of prescribed oral cytotoxic medications, the presence of unused cytotoxic medications at home, and their understanding of appropriate disposal practices.

Method: A cross-sectional study was conducted at the National Cancer Centre Singapore Outpatient Oncology Pharmacy between December 2024 and February 2025. The study was reviewed by the SingHealth Centralized Institutional Review Board and granted exemption status. A 23-item survey, available in English or Mandarin, was administered to eligible patients aged ≥21 years who were on their second cycle or beyond of oral cytotoxic therapy. Caregivers completed the survey on behalf of patients when patients were unable or preferred caregiver participation.

Surveys were conducted using a standardized script in the participant's preferred language. Categorical variables were analyzed using Chi-square or Fisher's Exact tests, and continuous variables using Mann-Whitney U or two-sample t-tests. Logistic regression analyses were performed to identify factors associated with medication knowledge and disposal practices ($p < 0.05$).

Results: A total of 203 participants were surveyed. Patients were older than caregivers (mean age 64.7 vs 51.7 years; $p < 0.001$), while caregivers were more likely to have education above secondary level (78.5% vs 40%; $p < 0.001$). Patients were more likely than caregivers to be unable to name their cytotoxic medications (44.9% vs 33.8%; $p = 0.011$). After adjustment, higher education level was independently associated with better medication knowledge. Participants with university level education (OR 3.83; $p = 0.007$) and above (OR 6.20; $p = 0.005$) had higher odds of knowing their medication name, while those with secondary education and above were more likely to know the reason for treatment (OR 16.2; $p = 0.005$). Almost half of participants (47.3%) disposed of unused or expired cytotoxic medications as household waste, while only 18.2% returned them to the pharmacy. Most participants (83.3%) reported not receiving pharmacist counselling on safe disposal, 74.4% were unaware of the effects of improper disposal, and only 28.6% knew where to obtain information on safe disposal. Although most participants did not have unused (88.2%) or expired (98.0%) cytotoxic medications at home, males had significantly lower odds of returning these medications to the pharmacy for disposal compared with females (OR 0.30; $p = 0.027$). Lack of pharmacist counselling was strongly associated with failure to return cytotoxic medications to the pharmacy for disposal (OR 0.03; $p < 0.001$).

Conclusion: This study reflects real world practice and identifies significant gaps in medication literacy and pharmacist counselling on the safe disposal of oral cytotoxic medications. Despite most participants not retaining unused or expired medications at home, inappropriate disposal practices and limited awareness of disposal risks remain common. These findings highlight the need for a multifaceted, pharmacist-led patient education approach to improve knowledge, promote safe disposal practices, and reduce potential health and environmental risks associated with cytotoxic medication waste.

Expansion of Prescribing Scope and Perceived Autonomy in Pharmacist Prescribers: A National Exploratory Survey

William Swain¹, Ian Bates¹, Eleanor Wakeling¹, Michael Leech¹

¹UCL, London, United Kingdom

Background: The international expansion of pharmacist prescribing has increased attention on how competence develops following qualification. Training programmes often require a defined therapeutic focus, while regulatory processes formalise what may be prescribed. However, authorised scope does not necessarily reflect how prescribing decisions are made in practice. While competence is often assessed dichotomously, the level of decision support required varies across contexts. In this study, prescribing decision autonomy refers to the degree of decision support used to reach a competent prescribing decision. This study explored post-qualification scope expansion, governance arrangements and perceptions of prescribing decision autonomy among pharmacist independent prescribers.

Method: A cross-sectional online questionnaire was distributed across the UK via professional networks using non-probability convenience sampling; a response rate could not be calculated. The instrument was informed by prescribing governance literature and conceptual work on decision autonomy, and piloted for clarity. It collected demographic data, practice setting, years since qualification, defined therapeutic focus, scope expansion, organisational recognition of scope, supervision arrangements and Likert-scale items on prescribing autonomy. Valid partial responses were retained using available-case analysis, so denominators varied by item. Quantitative data were summarised descriptively and free-text responses reviewed for recurring ideas.

Results: A total of 57 eligible respondents across community, primary care and hospital settings contributed data. Of those answering the relevant question, 77.2% (44/57) identified as active prescribers. Among respondents answering the scope questions, 77.6% (38/49) reported expanding beyond the therapeutic or clinical focus defined during training. Expansion included increased patient complexity, additional medicines, new therapeutic areas and increased decision autonomy.

Organisational recognition of prescribing scope varied. Formal processes were reported by 65.3% (32/49), 12.2% (6/49) described informal arrangements and 22.4% (11/49) reported no formal recognition.

Respondents generally supported the potential value of defining prescribing autonomy. Overall, 88.4% (38/43) agreed that clearly defined levels of prescribing autonomy would help clarify roles and structure development. A smaller proportion, 60.5% (26/43), agreed that knowing their expected level of prescribing decision autonomy during or

after training would have supported development, while 93.0% (40/43) agreed that clearly describing levels of prescribing decision autonomy would support safer prescribing in early practice. Free-text responses suggested that autonomy was dynamic and context-dependent, influenced by supervision availability and organisational structures.

Conclusion: Scope expansion was common among respondents, while organisational recognition varied. Respondents perceived defined levels of prescribing decision autonomy as potentially useful for clarifying roles, structuring development and supporting safer early practice. These findings suggest that autonomy may complement scope by contextualising expected decision support during training and post-qualification development. Its practical utility and impact require prospective evaluation. Findings should be interpreted as exploratory given the small convenience sample and varying item denominators.

These findings may inform international efforts to develop safe, sustainable pharmacist prescribing models across diverse healthcare systems.

Assessing pharmacist preceptors' confidence on prescribing

Claudia Derzakaeyan¹, Natalia Kazangian¹, Paulina Bagdasarjan¹

¹Usc, Los Angeles, United States

Background: Pharmacists' scope of practice has expanded in recent years, including provider status recognition and prescribing authority under collaborative practice agreements in states such as California (SB 493). Despite these advancements, there is still variability amongst pharmacists' readiness, confidence, and perceived barriers regarding prescribing responsibilities. The purpose of this study is to assess pharmacists' perceptions, readiness, and perceived barriers regarding prescribing authority, with a focus on identifying factors that influence confidence and implementation in practice settings.

Method: A cross-sectional, anonymous survey was conducted using Qualtrics to evaluate pharmacists' perceptions on prescribing authority. Eligible participants included licensed pharmacist in the U.S. serving as active USC-affiliated IPPE/APPE preceptors. This survey included Likert-scale, multiple-choice, and open-ended responses to demographic characteristics, current prescription authority, self-reported confidence in prescribing, perceived barriers, and educational preparedness.

Results: Sixty-one pharmacists completed the survey. Support for pharmacist prescribing was high, with 90%

agreeing pharmacists should have prescribing authority and 95% reporting improved patient access. However, only 56% believed physicians would support expanded prescribing. Eighty percent reported confidence in core prescribing activities, with highest confidence in over-the-counter medications (85%) and lowest confidence in opioid prescribing (34%). The most commonly identified barriers were lack of reimbursement (60%), lack of provider recognition (53%), and physician support (36%).

Conclusion: Experienced pharmacists exhibit strong support for expanded prescribing authority and report high confidence in performing crucial prescribing tasks, specifically in chronic disease management and preventative care. Despite favorable attitudes and clinical readiness, significant systemic barriers exist, particularly lack of reimbursement and provider recognition. Addressing these financial and structural limitations will be essential to advancing pharmacist-led prescribing services and optimizing patient access to care.

Australian pharmacists improving equitable access to community healthcare and health outcomes for priority populations: A case series

Amanda Wheeler², Jean Spinks¹, Fiona Kelly¹, Claire O'reilly¹, Vicky Stewart¹

¹Griffith University, Brisbane, Queensland, Australia

²University of Auckland, Auckland, New Zealand

Background: Improving healthcare equity and outcomes for priority populations such as Aboriginal and Torres Strait Islander people (hereafter referred to as First Nations Australians), and people living with mental ill-health is an Australian public health need. Easier access to medication management services, and the national network of 5,700+ community pharmacies, presents an ideal opportunity for community pharmacists (CPTs) to contribute more meaningful and integrated healthcare. First Nations Australians, and people living with mental ill-health, face greater chronic illness burdens and a wider range of medication-related problems (MRPs). However, medication services are not well utilised by these priority populations, due to numerous barriers such as stigma and discrimination, lack of trust in health service providers, complex funding rules, and cultural safety and geographical isolation for First Nations people. The aim of this communication is to present a case series of three co-designed community models of care, delivered by pharmacists working with consumers and multidisciplinary healthcare teams, to improve health outcomes of at-risk populations.

Method & Results: 1. 'Indigenous Medication Review Service (IMeRSe) feasibility study' of a strengths-based, culturally responsive, medication management service delivered by

pharmacists (23 community pharmacies). Pharmacists worked with 255 First Nations consumers and staff at nine local Aboriginal health services via medication review and follow-up to reduce incidence of serious MRPs. Other positive health outcomes included increased likelihood of taking medicines, confidence with medicines, and treatment satisfaction.

2. 'Bridging the Gap between Physical and Mental Illness in Community Pharmacy (PharMIbridge) RCT' of a person-centred, flexible, and goal-oriented support service (versus MedsCheck - an existing government-funded medication review) delivered by pharmacists. Over 6-months, pharmacists (25 community pharmacies) and 166 consumers with serious mental ill-health (SMI) worked in partnership to identify concerns about medicine use, physical and mental wellbeing, lifestyle and nutrition, and together developing relevant and achievable goals, with referrals to other healthcare professionals as needed. Outcomes included significant reductions in psychological distress, improved quality of life, and increased likelihood of taking prescribed medicines effectively for physical health conditions (compared to the control group).

3. 'Healthy SMILES (Serious Mental Ill-health): Piloting a community youth and pharmacy model of care partnership' is an innovative program designed to improve access and utilisation of oral health services for youth living with SMI; a priority Australian population. SMI populations are 3-times more likely to lose all their teeth to dental caries and periodontal disease, resulting in substantial personal, social and financial challenges. Maximising recent government recognition of accredited CPTs strategic role in oral healthcare, our pilot study pharmacists (working with a youth mental health NGO) will undertake guideline-based, 6-monthly, oral health risk assessments and fluoride applications for young people experiencing SMI. We propose that timely, evidence-based and appropriate oral healthcare will reduce, and ultimately prevent, oral diseases across the lifespan.

Conclusion: Our co-designed research strategies target barriers and reduce health inequities by increasing existing workforce capabilities and capacities, namely, Aboriginal health services practitioners, mental health practitioners, and CPTs, to provide preventative, and opportune, healthcare.

Challenges and enablers in advancing practice of community pharmacists in Indonesia: A qualitative constructivist grounded theory study

Kartika Citra Dewi Permata Sari^{1,2}, Cate Whittlesea¹, Sara Garfield¹

¹University College London School of Pharmacy, London, United Kingdom

²Faculty of Pharmacy, Universitas Indonesia, Depok, Indonesia

Background: Advanced community pharmacists' (ACPs) practice in low- and middle-income countries (LMICs) is underrepresented in the literature. In Indonesia, formal recognition of ACPs has yet to be established, despite the development of an advanced practice framework tailored to the national context. This study aims to explore stakeholders' perspectives on the challenges and potential enablers related to recognising ACPs and optimising their roles within the Indonesian healthcare system.

Method: This qualitative study employed a Constructivist Grounded Theory (CGT) approach. Data are being collected through online semi-structured interviews which commenced in December 2025 and are expected to be completed in March 2026. Stakeholders with high power in policy development or high interest in pharmacy practice are being purposively invited until theoretical saturation is reached and there is sufficient information power. Categories are being developed through two stages of coding, line-by-line initial coding followed by focused coding to identify themes, using an inductive constant comparative approach. NVIVO version 14 was used to assist data analysis.

Results: To date, 12 participants have been interviewed (policymakers, professional organisations, pharmacy managers, and academics) with backgrounds in pharmacy and medicine. Interim findings indicate that pharmacist role ambiguity and persistent differing expectations of policymakers versus community pharmacists are key factors hindering recognition and utilisation of ACPs in Indonesia. The unclear professional role of pharmacists has led to diverse perceptions and implementation on how pharmacists should be educated and positioned in the healthcare system, including in the community pharmacy setting. Policymakers emphasised that community pharmacists need to demonstrate full practice within existing regulatory scopes before expanding roles. Pharmacists reported regulatory inconsistencies and reduction of recognised community pharmacists' roles, constraining daily professional practice and advancement. Despite pharmacists' interest in providing expanded clinical services, policymakers and pharmacy managers continue to prioritise dispensing and supply roles. Public demands for advanced services provided by community pharmacists and a national integrated system of continuing education programmes were identified as potential enablers for further advancing the practice of Indonesian community pharmacists.

Conclusion: The role ambiguity and unaligned expectations of community pharmacists appear to be central challenges in recognising and utilising ACPs in Indonesia. Further interviews and analysis will be undertaken to refine emerging concepts and inform contextually relevant strategies.

Evaluating pharmacists' authorship trends in leading emergency medicine journals

Brian Erstad¹, Christopher Edwards¹, Ola Allababidi¹, Jahnvi Patel¹, Sinem Ozgur¹, Mina Patel¹, Christopher Palting¹

¹University of Arizona R. Ken Coit College of Pharmacy, Tucson, United States

Background: A pharmacist's authorship in emergency medicine (EM), particularly high-impact EM journals, is an important indicator of the pharmacy profession's contribution to advancing the field of emergency care research and practice. The objective of this study is to characterize pharmacist authorship in high-impact EM journals and assess trends from the first publications in each journal.

Method: The study focused on high-impact EM journals using a publicly available web platform that uses indicators from an algorithm to evaluate research performance, innovation, and impact. Based on these criteria, four journals were included in this study.

Results: The final data set included 811 articles of which 539 occurred in one journal. The first year of pharmacist authorship in each of the 4 journals was 1980, 1983, 1994, and 2007. The journal with 539 articles accounted for 3% of total pharmacist authorship over the study time period compared to 1.1% for the other 3 journals combined. The journal with 539 articles also accounted for 75% of pharmacist authorship of the 4 journals in year 2024.

Conclusion: Inclusion of pharmacists as first and last authors in recently published EM journals, particularly in high-impact EM journals, has increased over time, but overall inclusion remains variable and limited.

Discordance rates in drug dosing of commonly utilized antimicrobial agents in extremes of body mass index using various equations to estimate glomerular filtration (eGFR)

Brian Erstad¹, Brian Kopp², Kathryn Reiman², Deepti Vyas², Alina Price²

¹University of Arizona R. Ken Coit College of Pharmacy, Tucson, United States

²Banner University Medical Center, Tucson, United States

Background: Dose adjustments in patients with altered renal function have traditionally been completed using the Cockcroft-Gault (CG) equation. Recent guidance from the U.S. Food and Drug Administration (FDA) recommended using estimated glomerular filtration rate (eGFR) instead of CG in pharmacokinetic studies for new drug entities. A subsequent consensus statement recommended the use of the race-free Chronic Kidney Disease Epidemiology equation adjusted for body surface area (CKD-EPIBSAAdj) for making dosing recommendations. However, there is limited published data comparing how different estimations of renal function affect drug dosing recommendations particularly among patients at the extremes of body weight.

Method: This was a retrospective study of adult patients with a body mass index (BMI) of <18.5 kg/m² or >40 kg/m² who received a targeted antimicrobial agent for at least 72 hours. Exclusion criteria included pregnancy, renal replacement therapy, extracorporeal membrane oxygenation, acute kidney injury, and renal transplantation. For each prescribed antimicrobial agent meeting inclusion criteria, estimated renal function using CG and creatinine-based CKD-EPIBSAAdj was calculated. The primary outcome evaluated was the incidence of dose discordance, defined as when a discrepancy in drug dosing recommendations based on drug labeling and institutional guidelines existed between estimations of renal function using CG and CKD-EPIBSAAdj. Adjusted body weight (AdjBW) was used in the BMI >40 kg/m² group for this analysis. Secondary outcomes included dose discordance in the BMI >40 kg/m² group when using actual body weight (ABW) and ideal body weight (IBW) in the CG equation, differences in dose discordance between patients with BMI <18.5 kg/m² and >40 kg/m², and differences in dose discordance in patients with BMI >40 kg/m² using different weight descriptors.

Results: A total of 383 patients were included in the study with 507 antimicrobial agent orders evaluated for dose discordance. In the primary analysis, dose discordance was identified in 8/507 (1.6%) of orders including 6/254 (2.4%) in the BMI <18.5 kg/m² group and 2/253 (0.8%) in the BMI >40 kg/m² group. The incidence of dose discordance when ABW was used in the CG equation for patients with BMI >40 kg/m² was 1/253 (0.4%) and 55/253 (21.7%) when IBW was used in the CG equation. When comparing dose discordance between the BMI <18.5 kg/m² and BMI >40 kg/m² groups,

dose discordance was similar when AdjBW ($p = 0.29$) and ABW ($p=0.12$) were utilized in the CG equation. Dose discordance was higher in the BMI >40 kg/m² group compared to the BMI <18.5 kg/m² when IBW was utilized to calculate the CG equation ($p<0.01$). When IBW was utilized in the CG equation in patients with BMI >40 kg/m², the risk of dose discordance was higher compared to when AdjBW and ABW were evaluated ($p<0.01$ for both analyses).

Conclusion: Differences in dosing recommendations using CG and CKD-EPIBSAAdj were infrequent in this patient cohort; however, use of IBW in the CG equation in severely obese patients significantly influenced dose recommendations. The low incidence of baseline chronic kidney disease in the study cohort may be a contributor to the low dose discordance rates.

Prevalence and molecular characteristics of antibiotic-resistant Escherichia coli O157:H7 in humans and poultry faeces within the Federal Capital Territory (FCT), Nigeria

Obinna Okeke¹

¹Ministry Of Foreign Affairs Abuja, Abuja-fct, Nigeria

Background: This study assessed the prevalence and molecular characterization of antibiotic-resistant Escherichia coli O157:H7 in humans and poultry within the Federal Capital Territory (FCT), Nigeria. Escherichia coli (E. coli) is a Gram-negative enteric bacterium and a significant zoonotic foodborne pathogen worldwide. It is grouped based on virulence factors and infection types. E.coli O157:H7 is of great public health importance as it is fast becoming resistant to multiple antibiotics; causes colibacillosis with other infections in poultry, hemorrhagic colitis, hemolytic uremic syndrome, thrombotic thrombocytopenic purpura and dysentery in humans especially in children below 10 years of age.

Method: A cross sectional epidemiological study design was adopted in the study and used to conduct a study on medium scale commercial poultry farms, Internally Displaced Persons (IDP) camps and hospitals in three randomly selected area councils of Federal Capital Territory, Nigeria, to determine the prevalence and molecular characterization of antibiotic-resistant Escherichia coli O157:H7, using sampled poultry faecal samples and human stools, by conventional bacteria culture, biochemical tests and Multiplex PCR assay. Faecal samples from Nine different medium scale commercial poultry farms in FCT were collected from 400 broiler chicken and 400 human stool samples from two IDP camps and three hospitals from the three sampled area councils in the FCT. Primary isolation by culturing and biochemical identifications of E.coli O157:H7 were conducted using standard methods. In vitro susceptibility testing of E.coli O157:H7 was conducted

using the antibiotics discs and double disc diffusion methods for demonstration of Extended Spectrum Beta-lactamase production based on the United States National Committee for Clinical Laboratory Standards (NCCLS) guidelines to respectively establish the antibiotic-resistance profile and ESBL production effect by *E. coli* O157:H7. The DNA of the Multiplex-PCR-amplified-ESBL products of *E. coli* O157:H7 from poultry and humans were subjected to electrophoresis to separate and identify the target resistant and virulent genes responsible for conferring resistance to the different selected antibiotics from different pharmacological classes.

Results: A total prevalence of 9% was observed in humans, with 7.5% in Internally Displaced Persons (IDP) camps and 10.5% in hospitals, while poultry showed a prevalence of 0.8%. The isolates showed the Multiple Antibiotic Resistance Index (MARI) of 0.6, which is significant and shows a high degree of abuse of antibiotics in both humans and poultry in FCT, with 100% resistance to oxytetracycline in both human and poultry samples. Extended-Spectrum Beta-Lactamase (ESBL) enzymes were detected, while resistant genes (*bla*CTX-M1, *bla*CTX-M2, *bla*CTX-M9, *bla*SHV, *bla*TEM) and virulent genes (*rfbE*, *eaeA*, *stx1*, and *stx2*) were identified. Phylogenetic analysis revealed close genetic relationships between human and poultry isolates, suggesting possible cross-transmission and zoonotic potentials across board.

Conclusion: These findings highlight the urgent need for judicious antibiotic use, regular surveillance, and molecular monitoring to guide antimicrobial therapy and prevent disease outbreaks due to resistance. The study underscores the importance of adopting a 'One Health approach', integrating the human health, animal health and environmental factors to address antimicrobial resistance and safeguard public health.

Socio-availability of medicines: A bioethical framework for evaluating pharmacy service quality

M Amparo Pérez Benajas¹

¹Universidad Católica De Avila, Valencia, Spain

Background: Quality assessment in community pharmacy has traditionally relied on instruments measuring patient satisfaction and technical efficiency, such as the Pharmacy Service Quality Scale (pSQS). However, these tools overlook the ethical dimensions of pharmaceutical care, including equity, autonomy, and social vulnerability. Beauchamp and Childress's principlist framework (autonomy, beneficence, non-maleficence, and justice) offers a universal ethical language, yet no validated instrument currently integrates bioethical principles with pharmacy service quality metrics. This gap is particularly relevant for detecting "invisible

patients"—individuals whose social circumstances limit their functional access to medicines despite physical availability.

Objective: To develop and validate a bioethical adaptation of the pSQS by mapping its six dimensions onto the four principles of biomedical ethics, and to empirically test whether patients' prioritisation of quality dimensions reflects systematic bioethical preferences or random distribution.

Method: A cross-sectional study was conducted in a Spanish community pharmacy (n=115 patients with pharmacotherapeutic follow-up). Phase A assessed patients' prioritisation of pSQS dimensions: Technical Quality (TQ), Health and Medicines Advice (HMA), Relationship Quality (REL), Environmental Quality (EQ), Health Outcomes (HO), and Non-Prescription Services (NPS). Each dimension was mapped to bioethical principles: REL→Autonomy, TQ→Beneficence, HMA→Autonomy/Justice, EQ→Justice, HO and NPS→Non-maleficence. Phase B collected qualitative responses exploring ethical experiences. A chi-square goodness-of-fit test evaluated whether prioritisation deviated from uniform (random) distribution.

Results: Of 105 patients completing Phase A, dimension prioritisation was: REL 30.5%, TQ 23.8%, HMA 21.0%, NPS 16.2%, HO 7.6%, and EQ 1.0%. The chi-square test revealed highly significant deviation from uniform distribution ($\chi^2=37.11$, $df=5$, $p<0.001$). Standardised residuals identified REL (Autonomy) as significantly over-represented (+3.47, $p<0.05$) and EQ (Justice) as dramatically under-represented (-3.94, $p<0.05$). Qualitative analysis (n=136 responses) confirmed this pattern: EQ received zero qualitative comments, whilst REL and TQ together accounted for 65% of narratives. This systematic undervaluation of Justice suggests patients are unaware of access vulnerabilities—empirically validating the "invisible patient" concept.

Conclusion: Patients prioritise relational and technical dimensions (Autonomy, Beneficence) whilst systematically undervaluing environmental and access-related factors (Justice). This bioethical blind spot supports the proposed concept of "socio-availability"—defined as the capacity of the pharmaceutical system to ensure not merely physical presence of medicines but functional, equitable, and ethically appropriate access. The bioethical pSQS adaptation offers a validated tool for detecting vulnerabilities invisible to traditional satisfaction metrics, positioning community pharmacy as an "ethical radar" for social determinants of medication access. These findings directly support the Joint FIP/WHO Guidelines on Good Pharmacy Practice, which mandate that pharmacists "promote equity and access" and address "the needs of frail, vulnerable populations". The socio-availability framework operationalises FIP Development Goals 10 (Equity) and 18 (Access to Medicines) at the community pharmacy level, providing measurable bioethical indicators for patient-centred pharmaceutical care.

Changes in drug use practices following an educational intervention in primary healthcare centres in Lagos State, Nigeria

Shakirat Adeosun¹, Arinola Joda², Roseline Aderemi-williams³

¹Lagos State Primary Health Care Board, Lagos, Nigeria

²Department of Clinical Pharmacy and Biopharmacy, Lagos, Nigeria

³Department of Clinical Pharmacy and Biopharmacy, Lagos, Nigeria

Background: Drug use practices in primary healthcare settings are critical indicators of the quality of care, particularly in prescribing patterns, patient care, and facility-level performance. This study evaluated changes in drug use practices following an educational intervention across basic and comprehensive primary healthcare centres (PHCs) in Lagos State, Nigeria.

Method: A quasi-experimental design involving baseline and post-intervention assessments was conducted using WHO/INRUD core drug use indicators from February to October 2021. Proportionate stratified sampling and simple random sampling across five divisions of Lagos State identified 68 basic and 20 comprehensive PHCs. A total of 2,640 patient encounters were evaluated at baseline and 600 encounters post-intervention across selected PHCs. Data were analysed using descriptive statistics and the Mann–Whitney U test to compare differences between phases, with $p \leq 0.05$ considered statistically significant. Ethical and social approvals were obtained from the Health Research Ethics Committee, Lagos University Teaching Hospital and the Lagos State Primary Healthcare Board, respectively.

Results: At baseline, the majority of patients were female, aged 30–39 years, and accounted for a larger proportion of attendees across both PHC types. Malaria and pain-related conditions were the most common diagnoses in both basic and comprehensive PHCs. Antibiotics were the most frequently prescribed drug class, accounting for 63.0% and 64.3% of prescriptions in basic and comprehensive PHCs, respectively. Following the intervention, notable improvements were observed across prescribing indicators. The average number of drugs per encounter decreased from 3.6 to 3.2 in basic PHCs and from 3.8 to 3.1 in comprehensive PHCs. The proportion of encounters with antibiotics prescribed declined significantly from 63.0% to 45.5% in basic PHCs and from 64.3% to 31.5% in comprehensive PHCs ($p < 0.05$). Generic prescribing increased significantly in basic PHCs from 76.7% to 85.5% ($p = 0.008$). Injection use showed minimal change across both facility types. Patient-care indicators improved significantly, with the proportion of drugs actually dispensed rising from 87.9% to 96.9% in basic PHCs ($p = 0.006$) and from 92.1% to 99.0% in comprehensive PHCs ($p = 0.018$). Labelling adequacy greatly increased from 43.8% to 99.0% in basic PHCs ($p = 0.001$) and from 40.6% to

99.4% in comprehensive PHCs. Likewise, patients' understanding of correct dosage significantly grew from 72.3% to 98.9% in basic PHCs ($p = 0.01$) and from 72.8% to 99.0% in comprehensive PHCs. Facility-specific indicators showed improvements, with the availability of key drugs increasing significantly from 88.2% to 96.8% in basic PHCs ($p = 0.001$) and from 95.3% to 99.2% in comprehensive PHCs ($p = 0.01$). In addition, polypharmacy patterns improved, with major polypharmacy decreasing in both basic PHCs (25.6% to 18.7%) and comprehensive PHCs (31.3% to 16.7%), while single-drug prescribing increased across both settings.

Conclusion: The intervention was associated with significant improvements in prescribing patterns, patient care practices, and facility-level drug availability, alongside reductions in antibiotic use and polypharmacy across primary healthcare centres.

Antibiotic prescribing patterns and AWaRe classification in primary health centres in Lagos State, Nigeria.

Shakirat Adeosun¹, Arinola Joda², Roseline Aderemi-williams³

¹Lagos State Primary Health Care Board, Lagos, Nigeria

²Department of Clinical Pharmacy and Biopharmacy, Lagos, Nigeria

³Department of Clinical Pharmacy and Biopharmacy, Lagos, Nigeria

Background: Antibiotic prescribing in primary healthcare reflects rational drug use and influences antimicrobial resistance. In low- and middle-income settings, antibiotics are often prescribed without following guidelines, resulting in overprescribing, broad-spectrum use, and unnecessary combinations. The WHO AWaRe system classifies antibiotics based on spectrum, resistance risk, and application to support stewardship efforts. The Access group includes first- and second-line antibiotics with lower resistance risks; Watch contains higher-risk antibiotics; Reserve comprises last-resort drugs for severe infections. Using AWaRe to assess prescribing patterns provides insights into prescribing appropriateness and helps target interventions to encourage rational use. This study assessed antibiotic prescribing patterns and their distribution based on the WHO AWaRe classification across basic and comprehensive primary health centres (PHCs), and examined changes following an intervention.

Method: A quasi-experimental study with baseline and post-intervention assessments was conducted from February 2021 to June 2022. The intervention took place six months after an educational training aimed at enhancing drug-use practices. Antibiotic prescribing patterns were examined across patient encounters in both basic and comprehensive PHCs. The analysis included the number of antibiotics prescribed per

encounter and their classification according to the WHO AWaRe categories (Access, Watch, and Reserve). Descriptive statistics summarised proportions and distribution patterns, with comparisons between baseline and post-intervention results. Ethical and social approvals were obtained from Health Research Ethics Committee, Lagos University Teaching Hospital and Lagos State Primary Health Care Board, respectively

Results: At baseline, antibiotics were prescribed in 63.0% of encounters at basic PHCs and 64.3% at comprehensive PHCs. About half of all prescriptions included one antibiotic, while fewer than 20% contained two or more antibiotics. Antibiotics from the Access group accounted for the majority of prescriptions, at 58.0% at basic PHCs and 64.0% at comprehensive PHCs. No Reserve group antibiotics were prescribed. Amoxicillin was the most commonly prescribed antibiotic in both settings (20.3% and 22.5%), while ciprofloxacin (14.5%) and cefuroxime (12.4%) were the most frequently prescribed Watch group antibiotics in basic and comprehensive PHCs, respectively. Post-intervention, the proportion of encounters with antibiotics decreased to 45.6% at basic PHCs and 31.3% at comprehensive PHCs. The proportion of Access group antibiotics declined slightly to 53.2% and 55.3% at basic and comprehensive PHCs, respectively. Amoxicillin remained the most frequently prescribed antibiotic, increasing to 24.9% at basic PHCs and 23.4% at comprehensive PHCs. Use of amoxicillin/clavulanic acid decreased at basic PHCs (from 15.2% to 13.2%) but increased at comprehensive PHCs (from 2.1% to 12.8%). Prescribing of Watch group antibiotics increased, with cefuroxime rising to 22.9% at basic PHCs and 21.3% at comprehensive PHCs. No Reserve group antibiotics were prescribed in either phase.

Conclusion: Antibiotic prescribing was high at baseline but reduced substantially following the intervention. While Access group antibiotics remained predominant, an increase in the use of Watch group antibiotics was observed post-intervention. These findings highlight improvements in overall antibiotic use alongside emerging shifts in prescribing patterns that warrant continued monitoring.

Evaluation of pharmacist-led obesity care in community pharmacies: The RxOC-IT Study

Daniel Burton³, Stephanie Gysel³, Ross Tsuyuki², Cindy Deetz¹, Dianna Easton¹, Daniel Rafferty¹

¹Department of Medicine, Faculty of Medicine and Dentistry, University of Alberta, Edmonton, Canada

²EPICORE Centre, Faculty of Medicine and Dentistry, University of Alberta, Edmonton, Canada

³Apothecare Pharmacy, Calgary, Canada

⁴Patient Advisory Team, Calgary, Canada

Background: Obesity is a progressive chronic disease affecting 59% of adults in Alberta. Despite the availability of efficacious therapies, nearly 1 in 5 Albertans lack a primary care provider, creating a critical gap in access to obesity management. In Alberta, pharmacists have the broadest scope of practice in the world, including prescriptive authority and the ability to order laboratory tests, positioning them as highly accessible providers for comprehensive obesity care. With the emergence of unevaluated, privatised community pharmacy obesity services in regions such as Scotland, this research is essential to establish a rigorously evaluated, evidence-based model for pharmacist-led obesity care.

Objective: The primary objective of the RxOC-IT study is to determine the effect of a pharmacist-led weight management programme on the change in weight from baseline to 6 months of follow-up. Secondary objectives for this analysis include examining the proportional weight change from baseline, and evaluating changes in obesity-related markers, including body mass index (BMI) and waist circumference.

Method: This prospective before-and-after study is conducted across one core and 3 satellite community pharmacy clinics in Alberta. Pharmacists completed a preceptorship-style training programme at the core clinic. Eligible participants were 18 years of age or older with a BMI ≥ 30 kg/m² or ≥ 27 kg/m² with an obesity-related comorbidity. Intervention: The intervention follows Obesity Canada's 5As framework and includes medical nutrition therapy, physical activity recommendations, medication prescribing and pharmacotherapy support. Participants received an initial one-hour consultation, followed by ten 15- to 30-minute follow-up appointments over 6 months.

Results: A total of 205 patients provided informed consent and were enrolled in the study. The baseline cohort had a mean age of 50.2 years (standard deviation [SD] 14.7), was predominantly female (79%), and 75% self-identified as White. Overall, 176 participants (86%) completed the six-month intervention. In the intention-to-treat analysis, the mean weight loss from baseline was 8.2 kg (95% confidence interval [CI]: 7.4-9.0), representing a mean weight loss of 8%. Participants demonstrated a mean reduction in BMI of 3.0

kg/m² (95% CI: 2.7-3.2) and a mean decrease in waist circumference of 6.8 cm (95% CI: 4.9-8.7).

Conclusion: Six-month findings from the RxOC-IT study suggest that pharmacist-led interventions represent a promising model for weight management. Twelve-month weight change data are pending. By leveraging the full scope of pharmacist practice, this model has the potential to provide a scalable approach to expanding access to evidence-based obesity care in community pharmacy settings.

Effectiveness of the CareAide® mobile application in improving medication adherence, clinical outcomes and economic burden among patients with chronic diseases: A multicenter randomized controlled trial

Baharudin Ibrahim¹, Rajat Rana¹, Mohd Syamir Mohamad Shukeri¹, Tooba Malik²

¹Universiti Malaya, KUALA LUMPUR, Malaysia

²Universiti Sains Malaysia, Penang, Malaysia

Background: Chronic diseases such as hypertension, diabetes mellitus, asthma, and heart failure remain leading contributors to global morbidity and mortality. Medication non-adherence continues to undermine optimal disease control, resulting in poor clinical outcomes and increased healthcare utilization. Digital health interventions, particularly mobile health applications, offer a scalable strategy to enhance adherence and patient self-management. This study evaluated the effectiveness of the CareAide® mobile adherence application in improving medication adherence, clinical outcomes, health-related quality of life (HRQoL), and economic burden among patients with chronic diseases in Malaysia.

Method: A multicenter randomized controlled trial was conducted across three Malaysian hospitals involving 1,320 participants, with 1,106 retained for final analysis (intervention group [IG]: n=565; control group [CG]: n=541). The primary outcomes were medication adherence measured using the Morisky Medication Adherence Scale (MMAS-8) and proportion of days covered (PDC). Secondary outcomes included clinical parameters (blood pressure, glycemic indices, lipid profiles), HRQoL assessed using EQ-5D-5L and AQoL-6D instruments, patient satisfaction, and economic impact related to adherence. Statistical analyses comprised Mann-Whitney U, Wilcoxon signed-rank, Friedman test, McNemar's test, and general linear model repeated measures.

Results: Baseline adherence was comparable between groups (P=0.54). At 3 months, the IG demonstrated significantly higher MMAS-8 scores compared with the CG

(6.50 vs 5.50; Z=12.96, P<0.001, r=0.41), with further improvement at 6 months (7.00 vs 5.75; Z=16.13, P<0.001, r=0.51). Median PDC at 6 months was significantly higher in the IG (100.0 vs 66.7; Z=8.87, P<0.001, r=0.29). Clinically, significant reductions were observed in systolic blood pressure (-10.24 mmHg, P<0.001), diastolic blood pressure (-5.43 mmHg, P<0.001), and LDL cholesterol (-0.80 mmol/L, P=0.03) in the IG at 6 months. HbA1c improved modestly (IG -0.60% vs CG -0.20%, P=0.001, r=0.14), although no significant differences were observed in fasting blood glucose. HRQoL improved significantly in the IG, reflected by higher EQ-5D-5L utility and EQ-VAS scores (P<0.001). Patient satisfaction was highest in the Service Quality domain (median=5.00). Economic evaluation demonstrated substantial cost savings in the IG, largely driven by reduced hospital visits and lower productivity losses.

Conclusion: The CareAide® mobile application significantly improved medication adherence, clinical outcomes, and HRQoL, while reducing healthcare costs among patients with chronic diseases. These findings support the integration of digital adherence technologies into routine chronic disease management. Future research should explore long-term sustainability, optimization of user engagement strategies, and system-level integration within healthcare infrastructures to maximize clinical and economic impact.

Risk factors and predictive model for gastrointestinal adverse events in patients with type 2 diabetes treated with tirzepatide injection

Wei Bai¹

¹Chongqing Yongchuan District Mental Health Center, Chongqing, China

Background: This study aimed to investigate the types and severity of gastrointestinal adverse events associated with tirzepatide therapy in patients with T2DM and to identify related risk factors and develop a predictive model.

Method: This cross-sectional study included patients with T2DM who received tirzepatide therapy at a tertiary mental health center in Chongqing, China, between January 2023 and June 2025. Patients were classified into a study group (n=68) and a control group (n=144) according to the presence or absence of gastrointestinal adverse events during treatment.

Results: A total of 212 patients were included, comprising 54.7%(116/212) men and 45.3%(96/212) women, with a mean age of 57.2±10.6 years and a median duration of T2DM of 9(IQR, 6–13) years. The types of gastrointestinal adverse events observed included nausea in 17.5%(37/212) patients, diarrhea in 10.4%(22/212), loss of appetite in 8.5%(18/212),

and vomiting in 7.5%(16/212). Among all gastrointestinal adverse events cases, mild reactions accounted for 86.8%(59/68), moderate for 10.3%(7/68) and severe for 2.9%(2/68). Multivariate logistic regression analysis identified female sex [aOR=2.06(95%CI,1.09–3.88), P=0.03], an initial tirzepatide dose $\geq$ 5mg [aOR=1.97(95%CI,1.03–3.76), P=0.04], and ALT>40 U/L [aOR=1.91(95%CI,1.00–3.62), P=0.04] as independent risk factors for gastrointestinal adverse events in patients with T2DM. The combined predictive model demonstrated good discriminatory performance [AUC=0.80(95%CI,0.74–0.86)].

Conclusion: Female patients, those with an initial tirzepatide dose $\geq$ 5mg, and ALT>40U/L were independently associated with gastrointestinal adverse events during tirzepatide injection therapy.

Development of online medication support tools for older people: a systematic review

Temitope Esther Afolabi¹, Aili Langford², Sarah Hilmer^{1,2}, Christopher Etherton-beer³, Lisa Kouladjian O'donnell^{1,2}

¹University Of Sydney, Sydney, Australia

²Kolling Institute, Sydney, Australia

³University of Western Australia, Crawley, Australia

Background: Success of online medication support tools is contingent on how well they are designed and address the needs of users, especially older people. The aim of this review is to systematically review and describe existing online medication support tools for older people, their development and how they have been evaluated.

Method: Five electronic databases (MEDLINE, EMBASE, CINAHL, Scopus and Web of Science) were searched from inception to October 2024 for studies describing the development and/or evaluation of online medication support tools for older people aged $\geq$ 65 years, or their informal caregivers. The mixed-methods appraisal tool was used for quality assessment. Two authors completed the screening, data extraction and quality assessments independently and subsequently discussed any conflicts. Extracted data was analysed descriptively in line with PRISMA guidelines.

Results: A total of 1,621 studies were identified, and 29 studies met the inclusion criteria. Over 80% (n=21) of the tools were mobile health apps or websites. The most common development approach involved user-centred design methodologies (comprising user needs assessments, focus groups, interviews, and user experience workshops). Usability testing using questionnaires and surveys (n=13 tools) were the most common evaluation techniques followed by think aloud protocol (n=9 tools), interviews and focus groups (n=9 tools). Findings across 22 studies suggest

that user satisfaction of the developed online tools was high. The remaining seven studies did not measure usability of the final prototype or explicitly report on usability.

Conclusion: This review summarises online medication support tools for older people and carers and the approaches used to develop and evaluate them. Findings suggest that iterative refinement driven by user feedback may be more influential than any one approach for developing high usability tools. A responsiveness to user feedback and employing development approaches that incorporate iterative prototyping, is essential to ensuring these tools are both effective and satisfactory to their users.

Remote medication data collection in frailty intervention through specific therapies (FITTEST) trial participants

Temitope Esther Afolabi^{1,2}, Lisa Kouladjian O'donnell^{1,2}, Christopher Etherton-beer³, Sarah Hilmer^{1,2}

¹University Of Sydney, Sydney, Australia

²Kolling Institute, Sydney, Australia

³University of Western Australia, Crawley, Australia

Background: Ensuring the validity of remotely collected medication data in clinical trials is essential for accurately translating research findings into clinical practice. This study aims to assess the feasibility and validity of a structured remote method for collecting medication data from older adult clinical trial participants, for calculation of medication measures relevant to older adults.

Method: This study was conducted as a sub-study of an Australian clinical trial (FITTEST trial; ACTRN12624000693527). Informed by literature and a multidisciplinary team, a data collection instrument was developed using Microsoft Excel to facilitate the remote acquisition of medication data. Following an interview guide, participants enrolled in the FITTEST trial between December 2024 and December 2025, took part in structured telephone interviews with a clinical pharmacist who collected a comprehensive list of their current medications. A subset of participants also completed follow-up video calls via Microsoft Teams to validate the initial self-reported medication data. Data collected included medication name, dosage form, dosing instructions, indication, interview duration, data completeness, call completion rate and number of call attempts. Medication regimen complexity index (MRCI), medication adherence using Morisky Green Levine Scale (MGLS-4) and Drug Burden Index (DBI) were calculated. The American Geriatrics Society 2023 Beers Criteria® was used to identify potentially inappropriate medications (PIMs). Agreement between both modalities of data collection was evaluated using Cohen's kappa and

McNemar's test. Data analysis was conducted using Microsoft excel and SPSS statistics software.

Results: Medication data from thirty-seven FITTEST trial participants are reported. Mean participant age was 76years, 70%(n=26) were female and 62%(n=23) were frail (Frailty Index>0.2). Ninety-five percent of scheduled calls were completed; 86% of participants were reached on first call attempt; mean interview duration was 38 minutes. Validation: Sixteen participants completed follow-up video calls. Sixty-three percent (n=10) required assistance using Microsoft Teams. Across all medications (n=183), agreement between the data obtained via telephone-only and combined telephone-video interviews was high. Video follow-up calls helped resolve brand vs generic name discrepancies and clarify over the counter medication details. McNemar's tests were generally non-significant, indicating no strong statistical evidence of a difference between modalities, except for fields for generic name and brand name correctness where $p=0.002$ and $p<0.001$ respectively. Medication measures: medication counts ranged from 3 to 33 medications per participant with 76%(n=28) on ≥ 5 regular medications. On average, one PIM was identified per participant; approximately 50% had DBI>0 indicating exposure to one or more anticholinergic or sedative drug; MRCI ranged from 5 to 86.5; 68%(n=25) scored 0 on the MGLS-4 suggesting high medication adherence, and 98% of medication data fields in the data collection instrument were completed.

Conclusion: Findings suggest structured telephone interviews performed by an experienced pharmacist, to remotely obtain medication data from older adult clinical trial participants, is feasible. Such data could be used to measure remediable metrics of medication management in older adults. Future studies should validate with larger, broader groups of participants and interviewers and report on participant and interviewer experience and acceptability of data collection via telephone.

Beyond pharmacy dispensing: The transformation of the pharmacist's role in the ten-year progress of dermatological medication

Xin Wei Shi¹

¹Shanghai Skin Disease Hospital, Shanghai, China

Background: Over the past decade (2015–2025), dermatological pharmacotherapy has undergone a paradigm shift towards targeted and biologic treatments, significantly expanding therapeutic options. However, challenges have persisted regarding drug accessibility, individualised therapy, and the evolving role of pharmacists within multidisciplinary teams.

Method: This review has synthesised literature, clinical trial data, regulatory approvals, and real-world evidence pertaining to dermatological drugs in China over the ten-year period. It has systematically examined drug innovation, formulation advances, changes in treatment paradigms, and the concurrent transformation of clinical pharmacy services.

Results: Notable advancements have included the approval of novel dermatological drugs for clinical trials in China, featuring first-in-class agents such as the AhR agonist benvitimod and highly selective JAK1 inhibitors. Innovative delivery systems—including foam, spray, and microneedle technologies—have enhanced efficacy and adherence. Treatment paradigms have integrated biologics with topical therapies within chronic disease management frameworks. Concurrently, the pharmacist's role has evolved from dispensing to encompass precision medicine—utilising pharmacogenomics and therapeutic drug monitoring—alongside comprehensive management of biologic therapies and patient education.

Conclusion: These developments have positioned pharmacists as essential contributors to clinical decision-making and optimised therapeutic outcomes. Future progress will depend on addressing drug accessibility, establishing robust bioequivalence standards for topical formulations, and fostering pharmacists' competencies in precision medicine and digital health technologies to meet the evolving demands of dermatological care.

Pharmacists and psychotropic drug stewardship for older adults: A narrative review across institutional settings

Chris Fan-lun^{1,2}, Isabella Pontello², Camille Angle¹, Leona Spasik³, Carolyn Tan^{1,3,4}, Catherine Ross¹, Romina Marchesano¹

¹Sunnybrook Health Sciences Centre, Toronto, Ontario, Canada

²Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, Ontario, Canada

³GeriMedRisk, Waterloo, Ontario, Canada

⁴Temerty Faculty of Medicine, University of Toronto, Toronto, Ontario, Canada

Background: Older adults in long-term care and hospital settings are frequently exposed to psychotropic medicines, and inappropriate use contributes to adverse events, reduced quality of life, and hospitalisation. Psychotropic stewardship programmes aim to optimise prescribing by promoting structured medication review, deprescribing, and monitoring practices. Pharmacists are key contributors to these programmes due to their expertise in medication safety, yet the scope of their involvement and the consistency of stewardship strategies across settings remain unclear.

Objective: This review synthesises current evidence on psychotropic stewardship initiatives for older adults in long-term care and hospital settings, with emphasis on targeted drug classes, pharmacist-supported interventions, and reported clinical, process, and implementation outcomes.

Method: A narrative review using systematic search and screening methods was conducted. MEDLINE, EMBASE, Cochrane Database of Systematic Reviews, and PsycINFO were searched from January 2016 to March 2026. We supplemented database searches with citation chaining. Grey literature searching was conducted using keywords in Google Scholar and Grey Matters search tool. Reference lists of included studies and relevant reviews were screened. Two reviewers independently screened titles and abstracts, followed by full text screening by three independent reviewer pairs. Exclusion reasons were assigned using standardised categories using the Covidence platform, with conflicts adjudicated by an independent reviewer. A narrative synthesis was organised by study characteristics, psychotropic drug class, stewardship components, outcomes and implementation factors.

Results: Antipsychotics, benzodiazepines, and non benzodiazepine receptor agonists were the psychotropic classes most frequently identified in stewardship initiatives. In long term care, benzodiazepines and antipsychotics were prioritised due to concerns about inappropriate prescribing and harms, particularly among residents with dementia. No studies specifically targeted antidepressants, mood stabilisers, cholinesterase inhibitors or memantine. Stewardship interventions commonly included pharmacist-led or co-led multidisciplinary medication reviews and deprescribing. Reported outcomes included reductions in total medications and fewer potentially inappropriate medications. Process measures included number and type of pharmacist recommendations, acceptance rates, use of validated medication appropriateness tools and drug related problem classifications. Implementation strategies incorporated structured medication reviews, multidisciplinary meetings, deprescription algorithms and education.

Conclusion: This review highlights the central role of pharmacists in psychotropic stewardship and identifies critical gaps to guide future implementation. Opportunities remain to broaden stewardship beyond sedative-hypnotics and antipsychotics, standardise processes, and strengthen implementation across institutional settings.

Enhancing medication identification to support medication safety: development and evaluation of the ScanPill AI-based smartphone tool

Sophia Hannou^{1,2}, Uddhava Monney³, Nancy Perrottet^{1,2,4}, Chantal Csajka^{1,2,4}

¹Department of Pharmacy, Lausanne University Hospital, Lausanne, Switzerland

²Center for Research and Innovation in Clinical Pharmaceutical Sciences, University of Lausanne, University of Geneva, Lausanne, Switzerland

³École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland

⁴Institute of Pharmaceutical Sciences of Western Switzerland, School of pharmaceutical sciences, University of Geneva, University of Lausanne, Geneva, Switzerland

Background: Medication errors remain a major source of preventable patient harm worldwide. Healthcare professionals manage thousands of medications with different appearances, strengths, and formulations, creating a substantial cognitive burden when medications must be identified visually. This situation is common in polypharmacy contexts, where medications are stored in pill organizers or removed from their original packaging. Artificial intelligence has the potential to augment healthcare professionals' ability to identify medications while preserving their clinical expertise.

Objective: To develop and evaluate ScanPill, an AI-based smartphone application designed to improve pill identification accuracy and potentially contribute to reducing medication administration errors.

Method: ScanPill was developed as a smartphone-based application integrating a multi-model computer vision pipeline for pill recognition. The system used a hierarchical architecture in which specialized sub-models addressed distinct visual features. The system relied on a combination of deep learning models, including YOLOv5 for pill localization and engraving detection, and EfficientNetB0 for visual feature classification using transfer learning from the ImageNet dataset, together with traditional image processing techniques and linear models for pill length estimation. A custom dataset of 50,000 smartphone images was created from eight commonly used medications selected to represent visually similar characteristics that may challenge identification by healthcare professionals, including variations in shape, color, engraving, and size. Images were captured using a smartphone camera under varying orientations and lighting conditions to simulate real-world use. Model performance was assessed on a held-out test dataset including both single-pill images (n=800) and multi-pill images (n=100). In addition to overall system performance, individual sub-models were evaluated separately. A confidence threshold was applied, below which the system returned no prediction.

Results: The ScanPill system demonstrated high performance for pill identification. For single-pill images, the overall accuracy of the multi-model system was 99.55%. Individual model accuracies were 89.27% for the engraving model, 100% for the shape model, 100% for the round sculpture model, 100% for the oval sculpture model, and 78.53% for the color model. For multi-pill images, overall system accuracy was 94.81%, with accuracies of 78.73% for the engraving model, 97.41% for the shape model, 90.97% for the color model, 96.99% for the round sculpture model, and 94.34% for the oval sculpture model.

Conclusion: AI-assisted pill recognition may support healthcare professionals in identifying medications based on visual characteristics. ScanPill demonstrated very high performance for single-pill images and strong performance for multi-pill images. Further studies are needed to evaluate its performance across a broader range of medications, as well as integration into clinical workflows and impact on medication safety.

Knowledge and attitudes of pharmacists regarding drug-food interactions: A cross-sectional study in Kabul, Afghanistan

Mirwais Zazai¹

¹Department of Biochemistry-Nutrition, Faculty of Pharmacy, Kabul University, 1006 Kabul, Afghanistan., Kabul, Afghanistan

Background: Food–drug interactions (FDIs) occur when nutrients or dietary components influence the pharmacokinetics or pharmacodynamics of medications, potentially altering drug absorption, metabolism, distribution, or elimination. Such interactions may reduce therapeutic efficacy or increase the risk of adverse effects, posing a significant concern for safe medication use. Pharmacists play an important role in identifying and preventing FDIs through appropriate medication management and patient counselling. Adequate knowledge of FDIs is therefore essential to ensure optimal therapeutic outcomes and enhance patient safety. However, research examining pharmacists' knowledge and attitudes toward FDIs in Afghanistan remains limited. To the best of our knowledge, this is the first study aimed at evaluating the knowledge and attitudes of pharmacists in Kabul, Afghanistan regarding food–drug interactions.

Method: A cross-sectional study was conducted in 2025 among licensed pharmacists working in community pharmacies and hospital settings in Kabul, Afghanistan. Data were collected using a pre-validated structured questionnaire distributed through convenience sampling. The questionnaire assessed socio-demographic characteristics, knowledge of common FDIs, knowledge of appropriate drug–food timing

intervals, and attitudes toward FDIs. Knowledge questions included clinically relevant interactions such as tetracycline with milk, caffeine with diazepam, and grapefruit juice with selected cardiovascular medicines. Attitude items evaluated pharmacists' perceptions regarding the importance of FDIs and the need for continuing professional education. Data were analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics summarized participant characteristics and responses. Chi-square tests were used to examine associations between knowledge scores and variables such as educational level and area of professional practice. A p-value of less than 0.05 was considered statistically significant.

Results: A total of 342 pharmacists participated in the study. Overall knowledge regarding FDIs was moderate. A high proportion of participants correctly identified interactions such as tetracycline with milk (77.5%) and caffeine with diazepam (80.1%). However, knowledge gaps were observed for several clinically important interactions. Only 38.3% of pharmacists recognized the interaction between grapefruit juice and atorvastatin, while 34.8% identified the interaction with amiodarone. Knowledge regarding appropriate drug–food timing intervals was generally poor. Correct responses were particularly low for isotretinoin (17.0%), glipizide (25.7%), and levothyroxine (18.7%). Despite these gaps, pharmacists demonstrated positive attitudes toward FDIs. Most participants (98.0%) supported greater emphasis on FDIs in pharmacy curricula, and 94.7% acknowledged the importance of updating their knowledge. Educational level was significantly associated with knowledge scores for most FDIs ($p < 0.05$), whereas no significant differences were observed between community and hospital pharmacists.

Conclusion: Pharmacists in Kabul demonstrated moderate knowledge and positive attitudes regarding FDIs; however, important knowledge gaps remain, particularly regarding drug–food timing intervals and grapefruit-related interactions. Higher educational attainment was associated with better knowledge levels. These findings highlight the need for targeted continuing professional development programmes and stronger curricular integration of FDIs within pharmacy education to improve pharmacists' competency and enhance patient safety.

Assessment of knowledge, attitudes and practices regarding storage and disposal of unused and expired medicines among community pharmacists: A cross-sectional study from Lahore, Pakistan

Saba Ashraf¹

¹Umt - University Of Management And Technology, LAHORE, Pakistan

Background: The increasing production and utilisation of pharmaceutical products has resulted in a substantial accumulation of unused and expired medicines at household level. Improper storage and disposal of these medicines may lead to accidental poisoning, environmental contamination, antimicrobial resistance, and diversion for inappropriate or illegal use. Community pharmacists are key stakeholders in promoting rational medicine use and safe disposal practices. However, limited evidence exists regarding their knowledge, attitudes and practices (KAP) in Pakistan. This study aimed to assess community pharmacists' knowledge, perceptions and practices related to the storage and disposal of unused and expired medicines in Lahore.

Method: A descriptive cross-sectional quantitative study was conducted among 400 community pharmacists working in various areas of Lahore. Participants were recruited using a convenience sampling technique. Data were collected through face-to-face interviews using a structured and pre-validated questionnaire. The instrument assessed demographic characteristics, knowledge of medicine wastage and environmental impact, attitudes towards safe disposal, and routine disposal practices. Data were analysed using Statistical Package for the Social Sciences (SPSS) version 26.0. Descriptive statistics including frequencies and percentages were calculated. The chi-square test was applied to explore associations between educational qualification and knowledge variables, with statistical significance set at $p < 0.05$.

Results: Most participants (98%) were familiar with the concept of expired medicines, and 73.3% had heard of medicine wastage. However, 55% demonstrated inadequate knowledge regarding the environmental consequences of improper disposal. Additionally, 67.3% were unaware of recommended disposal methods for expired medicines. More than half of the respondents (53.8%) identified insufficient information and lack of formal guidance as major reasons for improper management of unused and expired medicines. Notably, 83.6% reported that they had never read disposal instructions on medicine packaging. Common disposal practices included discarding medicines in household waste, flushing them into sewage systems, or burning them. A statistically significant association was observed between pharmacists' educational qualification and knowledge of appropriate disposal methods ($p < 0.05$).

Conclusion: The findings indicate substantial gaps in knowledge and suboptimal disposal practices among community pharmacists in Lahore. Despite awareness of expired medicines, understanding of environmental risks and recommended disposal methods remains limited. Development of national guidelines, structured training programmes, and organised medicine take-back systems are urgently required. Strengthening the role of community pharmacists in public education and pharmaceutical waste management may contribute to improved environmental safety and rational medicine use in Pakistan.

Harnessing large language models for medication error analysis

Lita Chew¹, Mohamed Hussain Mohamed Irshad¹, Kaily Ting¹, Fy Chium², Mohammed Nazri Abdul Ghani³

¹National University of Singapore, Singapore, Singapore

²National Cancer Centre Singapore, Singapore, Singapore

³KK Women's and Children's Hospital, Singapore, Singapore

Background: Medication errors are a major global patient safety concern, demanding resource-intensive incident review processes grounded in Root Cause Analysis (RCA) and the Human Factors Analysis and Classification System (HFACS) to identify contributory factors and preventive actions. Large Language Models (LLMs), with their capacity to process complex clinical narratives, offer potential to augment these reviews, but their performance against expert standards in structured medication safety analysis remains underexplored. This study aimed to determine whether an LLM (PAIR, based on Claude 3.5 Sonnet) can produce incident analyses comparable in quality and safety to expert panels, and to characterise its strengths, limitations, and implementation implications.

Method: This retrospective process-improvement study used de-identified medication error reports (2024–2025) previously reviewed by multidisciplinary Medication Error Review Committees; expert consensus served as reference standard. Cases were sampled from two institutions, standardised into a common template, and analysed by PAIR configured via structured, multi-stage prompting, chain-of-thought reasoning (hidden from users), and predefined output formats for root causes, HFACS categories, recommendations, and reliability statements. Performance was iteratively optimised using 28 cases, then validated on 19 unseen cases. Alignment with experts was assessed using Likert ratings (five domains) and precision, recall and F1 scores across root causes, HFACS, and recommendations.

Results: Across 47 cases, mean Likert scores improved from round 1 to round 2 in all domains and were sustained or

further enhanced in validation, with all domains exceeding the predefined threshold of 4; safety and confidence reached 4.8 in validation. Root cause analysis achieved the highest absolute performance (F1 increasing from 0.71 to 0.87 and maintained at 0.86), while HFACS classification showed the largest relative gain (F1 from 0.53 to 0.80), driven by marked recall improvement. Recommendation quality also improved (F1 from 0.61 to 0.79), with higher precision and reduced unsupported suggestions.

Conclusion: With carefully engineered prompts and iterative refinement, the LLM produced medication error analyses that approximated expert performance in root cause identification, HFACS coding, and recommendation generation, with high perceived safety and usability. Nonetheless, limitations in HFACS granularity, dependence on documentation quality, and residual hallucination risk underscore the need for continued expert oversight. LLMs are therefore best positioned as preliminary analytical partners within a human-in-the-loop model, supported by robust governance, privacy safeguards, and standardised evaluation metrics to enable safe, scalable deployment in medication safety workflows.

Patient-drug related factors associated with nonadherence to chronic treatment in patients attending a primary care setting in South Africa

Lucky Norah Katende-kyenda¹

¹Walter Sisulu University, Mthatha, South Africa

²Walter Sisulu University, South Africa, South Africa

Background: Nonadherence to treatment for chronic conditions is associated to patient-drug related factors. It can result in a worse disease progression, more frequent hospitalizations, and a lower quality of life. Patient-drug related aspects associated with non-adherence to chronic medication include patient related factors (like knowledge and motivation), therapy-related factors (like side effects), and health system-related issues (like cost and access). The objective of this research was to evaluate patient-related factors associated with nonadherence to chronic treatment in patients attending a primary healthcare setting.

Method: Cross-sectional quantitative research using a standardized form with face-to-face interviews was conducted with 80 chronically ill patients attending a primary healthcare setting. Demographics and patient-drug related factors obtained were analyzed using SPSS to obtain descriptives and Inferential values used to show magnitude of associations between demographics, chronic conditions, patient-drug related factors and nonadherence to the chronic treatment and post hoc corrected residual test were added to interpret which categories are driving significant associations.

Furthermore, those values with sparse data were analyzed using Fisher's Exact Tests to increase the magnitude.

Results: The demographics of the patients obtained revealed more females (56.30%) than males (43.80%), their ages ranged from 41 to 50 years, mostly were singles, with secondary level of educational, unemployed, and living in rural areas. HIV/AIDS was the leading chronic condition. Research highlights the novelty in understanding how patient beliefs, perceptions, and knowledge gaps specific to this primary health care setting in a low middle income country drives nonadherence, as there's limited prior evidence. Specific clusters of risk factors such as younger age, multiple chronic conditions, and desire for more information creates a novel predictive profile. Furthermore, the study has shown novelty in quantifying how experiencing side effects ($X^2 = 9.238$, $P = .002$, $V = .36$) and not receiving adequate knowledge ($X^2 = 12.660$, $P = .001$, $V = .34$) both indicating moderate significant association with nonadherence.

Conclusion: Improving adherence is critical for managing chronic conditions. Therefore, identifying specific patient-drug related factors is necessary for evolving tailored intercessions that can effectively improve adherence and ultimately lead to better treatment outcomes.

Real-world medication use evaluation of anagrelide in essential thrombocythemia: Efficacy, safety, and hematological trends

Yu-chi Lai¹, Hui-chuan Lin¹

¹Ditmans Medical Foundation Chia-yi Christian Hospital, Ditmans Medical Foundation Chia-Yi Christian Hospital No. 100, Baojian St., East Dist., Chiayi City 600, Taiwan (R.O.C.), China Taiwan

Background: Essential thrombocythemia (ET) is a myeloproliferative neoplasm characterized by abnormal platelet elevation, increasing the risks of thrombosis and hemorrhage. Anagrelide reduces platelet production by inhibiting megakaryocyte maturation. However, its clinical use requires careful monitoring of liver function, cardiovascular adverse effects, and potential rebound thrombocytosis upon abrupt discontinuation.

Objective: This study aimed to evaluate the clinical patterns, efficacy, and safety of anagrelide in ET patients through a Medication Use Evaluation (MUE) to optimize therapeutic strategies and patient outcomes¹.

Method: A retrospective medical record review was conducted at a regional hospital for adult ET patients treated with anagrelide between January 2023 and December 2024. Data collected included demographics, JAK2/CALR status, dosage, liver function, platelet counts, and adverse events.

Statistical analysis utilized descriptive statistics, Chi-square tests, and logistic regression.

Results: The study included 72 patients (mean age 63.9 ± 14.1 years; 57% female), with 48 being JAK2 positive. Anagrelide significantly reduced median platelet counts from 734.5 to $406 \times 10^3/\mu\text{L}$ (a 45% reduction), achieving clinical targets for most patients. Notably, 85% of patients exhibited leukocytosis, and 41.7% experienced anemia, which was more severe in those receiving concurrent hydroxyurea. The most common adverse reactions were dizziness (28%), palpitations (24%), and headache (12%). Furthermore, 30 bleeding events were recorded, primarily in patients using concurrent antiplatelet or anticoagulant agents. No rebound thrombotic events occurred during drug discontinuation as gradual dose-tapering protocols were followed.

Conclusion: Anagrelide demonstrates robust efficacy in platelet control for ET patients. However, clinical management should prioritize regular monitoring of full blood counts (due to high leukocytosis and anemia rates) and cardiovascular symptoms. Vigilance regarding bleeding risks during combined therapy and adherence to gradual dose tapering are essential for maintaining patient safety.

Prevalence and hematological impact of leukocytosis in essential thrombocythemia: A real-world retrospective study

Yu-chi Lai¹, Hui-chuan Lin¹

¹Ditmanson Medical Foundation Chia-yi Christian Hospital, Ditmanson Medical Foundation Chia-Yi Christian Hospital No. 100, Baojian St., East Dist., Chiayi City 600, Taiwan (R.O.C.), China Taiwan

Background: Essential thrombocythemia (ET) is typically defined by excessive platelet production; however, its clinical profile often reflects a more systemic activation of the bone marrow. While anagrelide is a standard therapy for managing thrombocytosis, tracking concurrent hematological trends—specifically leukocytosis—is vital for a comprehensive risk assessment and effective disease monitoring.

Method: We retrospectively evaluated 72 adult ET patients (mean age 63.9 ± 14.1 years) treated with anagrelide at a regional hospital between January 2023 and December 2024. Our analysis extended beyond primary drug efficacy to specifically investigate the long-term patterns of white blood cell (WBC) count variations as a surrogate for bone marrow activity.

Results: Leukocytosis emerged as a predominant feature, affecting 85% ($n=61$) of the cohort at various points in their clinical course. Extreme WBC counts ($> 20 \times 10^3/\mu\text{L}$) were observed in 14% of patients, primarily during initial

presentation or periods of disease instability. Additionally, 10% of patients exhibited persistent leukocytosis ($> 10 \times 10^3/\mu\text{L}$) throughout the study period. Notably, only 15% of the cohort remained within the normal WBC range across all observations. These trends persisted regardless of anagrelide's targeted action on platelets, identifying WBC elevation as an intrinsic disease characteristic rather than a treatment-related adverse event.

Conclusion: The high prevalence of leukocytosis (85%) underscores that ET involves comprehensive bone marrow activation beyond megakaryocyte proliferation. These findings suggest that WBC counts serve as an essential marker for assessing disease activity. We propose that pharmacists and clinicians adopt a holistic hematological monitoring strategy, integrating WBC data to improve long-term prognostic evaluation and treatment response in ET management.

Clean2Earth 1.0: A Community-driven and pharmacist-led environmental intervention advancing household water safety, antimicrobial stewardship and gut microbiota protection in Nigeria

Jennifer Clifford-nkemdilim¹

¹CLIF-J PHARMACY, Delta, Nigeria

Background: Unsafe drinking water continues to pose a major public health challenge in low- and middle-income countries, contributing to gastrointestinal infections that frequently prompt inappropriate antibiotic use and increase the risk of antimicrobial resistance (AMR). Emerging evidence highlights that environmental exposures can disrupt the human gut microbiota, with potential long-term consequences for metabolic and gastrointestinal health. Pharmacists, as accessible healthcare professionals, are increasingly recognised for their role in preventive health, community engagement, and antimicrobial stewardship. Clean2Earth 1.0 was designed as an innovative, pharmacist-led community intervention targeting household water safety as an upstream determinant of gut health and rational antibiotic use.

Method: Clean2Earth 1.0 was implemented as a community-based environmental health initiative in a rural Nigerian setting. Structured household visits were conducted to educate residents on safe water storage and handling, low-cost purification methods, and the relationship between environmental hygiene, gastrointestinal health, and responsible antimicrobial use. Water samples from 50 households' primary drinking sources were collected and analysed using standard microbiological techniques to identify bacterial contaminants. Descriptive analyses summarised water quality, household engagement, and

observed changes in knowledge and practice related to water safety and antimicrobial use.

Results: Analysis revealed that 60–70% of household water samples contained bacterial contaminants, including coliforms, *Acinetobacter baumannii*, and *Klebsiella* species, indicating substantial exposure risk. Community engagement reached multiple households, with participants demonstrating improved understanding of safe water practices, waterborne disease prevention, and the connection between contaminated water and unnecessary antibiotic consumption. Early observations suggested increased adoption of simple water purification and hygienic storage practices, reflecting the potential of pharmacist-led education to influence preventive health behaviours.

Conclusion: Clean2Earth 1.0 illustrates the feasibility and impact of pharmacist-led environmental health interventions in addressing upstream drivers of gastrointestinal illness and AMR in resource-limited settings. Integrating household water safety education with pharmacist-led community engagement may promote gut microbiota protection and strengthen antimicrobial stewardship at the population level. This model offers a scalable strategy for improving environmental determinants of health and represents a novel approach to expanding the public health role of pharmacists globally.

Emerging and re-emerging neglected tropical diseases in west Africa sub-region (1970 -2023): A narrative review

Lizette Ezenekwe¹, Amala Ofor³, Brian Ogbonna², Nkeiru Osuafor⁴

¹Nnamdi Azikiwe University Awka, Nigeria, awka, Nigeria

²David Umahi Federal University of Health Sciences, Uburu, Ebonyi State., Uburu, Nigeria

³Department of Clinical Pharmacy and Pharmacy Management, Faculty of Pharmaceutical Sciences, Enugu State University of Science and Technology, Enugu, Nigeria, Enugu, Nigeria

⁴Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmacy, University of Abuja, Abuja, Nigeria

Background: Neglected Tropical Diseases NTD are are diseases of public health importance especially in poor developing countries and tends to be obscure from major global health attention. Some of these diseases still pose serious health challenges in some countries in the West African Sub-region.

Objective: We narratively review the Neglected Tropical Diseases in West Africa sub-region from 1970 to 2023 to analyze the status, appraise the control mechanisms of the

diseases in the sub-region, explore the possible risks of contracting the infections.

Method: A retrospective study to review published articles on Neglected Tropical Diseases in West Africa sub-region from 1970 – 2023. Data was collected through literature search on Google Scholar, PubMed and Google, using “disease name”, “Causative organism” and “West Africa” using relevant Boolean operators for the period under study.

Results: Some Neglected Tropical diseases has been successfully eliminated in certain parts of West Africa. Togo eliminated four NTD using population-based treatment strategy, education, and vector control. Ghana has successfully eliminated 3 NTD while Benin and Mali has each successfully eliminated trachoma. Ghana is the first West Africa country to eliminate trachoma in 2018, followed by Gambia in 2021, and most recently Togo in 2022. As much as 99% of the infected persons live in 31 sub-sahara Africa with onchocerciasis, but it was brought under control between 1974 and 2002 in Africa through Onchocerciasis Control programme. Eradication of the disease was done through Dracunculiasis Eradication program launched in the 1980s which involved education on avoidance of contaminated water. However, isolated cases still abound in some remote coastal villages. Leprosy still abound in DR Congo followed by Nigeria. Human African Tripanozomiasis is transmitted to humans through a tsetse fly is still common withing the sub-region.

Conclusion: Overall, Onchocerciasis, leprosy, dracunculiasis, and trachoma still lead the emerging and re-emerging NTDs in the West African sub-region.

Pharmacist-led mHealth intervention for enhancing bowel preparation quality: Optimizing patient education and elucidating gender-specific efficacy

Po-yu Cheng Huang¹

¹Institute of Clinical Pharmacy and Pharmaceutical Sciences, National Cheng Kung University, Tainan, China Taiwan

Background: Inadequate bowel preparation remains a critical barrier to achieving optimal diagnostic yield in colonoscopy. Traditional instructional protocols are inherently complex, frequently leading to patient confusion and non-adherence, which imposes a repetitive educational burden on pharmacists. Pharmacist-led mHealth interventions offer a solution for streamlining clinical workflows through assisted education, real-time reminders, and interactive consultations, which have been proven to enhance preparation quality and patient satisfaction. However, their impact across diverse patient populations remains poorly

understood. Literature suggests that women are generally more proactive in health management and exhibit higher mHealth engagement. We therefore hypothesized that the technology gap between genders influences clinical efficacy, and employed the technology acceptance model (TAM) to evaluate how psychological drivers and attitudes toward chatbot use correlate with actual usage behavior and clinical results.

Method: This prospective study (N=190) compared a pharmacist-led chatbot intervention to standard care. To reflect real-world practice, patients were assigned to either the experimental or control group based on their willingness to utilize mHealth. While both groups received standardized face-to-face pharmacist education at baseline, the experimental group received continuous support via a LINE-based chatbot. The intervention featured personalized automated reminders for dietary restrictions, laxative administration and chronic medication cessation. Additionally, patients could access instructional videos, frequently asked questions and direct consultations with pharmacists through the chatbot interface. The primary outcome was high-quality bowel preparation (HQBP). Statistical analysis utilized multivariate logistic regression to adjust for potential confounders, while multi-group structural equation modeling was applied to the technology acceptance model to elucidate gender-specific psychological pathways.

Results: The experimental group achieved a significantly higher HQBP rate than the control group (72.9% vs. 55.3%, $p = 0.017$). Multivariate analysis identified the chatbot as an independent predictor of HQBP (aOR: 2.07, 95% CI: 1.06-4.13, $p = 0.035$). Stratified subgroup analysis revealed a potent clinical impact in females (aOR: 4.64, 95% CI: 1.7-14.05, $p = 0.004$), whereas the effect in males was not statistically significant (aOR: 1.36, 95% CI: 0.5-3.81, $p = 0.549$). TAM analysis revealed that female patients demonstrated proactive engagement, characterized by higher feature utilization and chatbot clicks. Beyond these quantitative metrics, women engaged in more frequent and significantly more descriptive inquiries, uniquely utilizing the platform to address procedure-related concerns compared to males. Multi-group structural equation modeling further elucidated a distinct gender-specific technology gap: attitude toward use effectively translated into actual behavior uniquely within the female cohort (beta = 0.501 vs. 0.061, $p = 0.047$ for path difference). This synergy of efficient attitude-to-behavior translation and mhealth engagement provides a robust psychological mechanism explaining the superior clinical efficacy observed in women.

Conclusion: Pharmacist-led chatbots significantly optimize bowel preparation quality and streamline clinical workflows. The discovery of the gender-specific technology gap underscores the necessity for gender-tailored digital pharmaceutical care to maximize technology acceptance and ensure equitable clinical outcomes in digital health.

Establishing a GLP-1 RA weight management pharmacy service practice pathway based on the concept of “metabolic defense”

Xia Liu¹

¹Shanxi Province, Yangquan, China

Background: Addressing metabolic risks associated with GLP-1 receptor agonists (GLP-1 RAs) in weight management—including muscle loss, gastrointestinal intolerance, and rebound effects upon discontinuation—this study establishes a pharmacy service pathway centered on proactive risk prevention based on the concept of “metabolic defense”. This pathway is designed to safeguard patients’ long-term metabolic health.

Method: A three-tiered metabolic defense system was established, comprising: pre-treatment risk stratification and individualized dosing regimens; dynamic monitoring and proactive strategies for muscle loss; and a tiered proactive prevention system for gastrointestinal adverse reactions. Inclusion Criteria: 44 obese patients (BMI ≥ 28 kg/m²) receiving GLP-1 RA treatment at hospital were randomly assigned to a control group (n=22) or a metabolic defense group (n=22). The control group received standard care, while the metabolic defense group underwent the three-tiered metabolic defense system led by the unit-based clinical pharmacist.

Results: The metabolic defense group achieved an 87.2% lean body mass retention rate, significantly higher than 71.5% observed in the control group ($p < 0.01$). The incidence of moderate-to-severe gastrointestinal reactions decreased to 13.6%, markedly lower than the 36.4% in the control group ($p < 0.05$). Treatment discontinuation rate was 0% versus 18.2% in the control group ($p < 0.05$); weight loss target achievement rate reached 90.9%, significantly higher than 68.2% in the control group ($p < 0.05$), with weight reduction magnitude ($13.5 \pm 3.8\%$) comparable to the control group ($12.1 \pm 4.2\%$). However, muscle circumference changes (AMC/CC change < 0.5 cm) were significantly better than the control group (AMC/CC change > 1.2 cm).

Conclusion: Conclusion: Pharmaceutical services guided by the concept of “metabolic defense” can effectively achieve muscle preservation and adverse reaction control during GLP-1 RA-induced weight loss, significantly enhancing treatment safety and metabolic sustainability. This provides an innovative pharmaceutical practice pathway for the long-term comprehensive management of weight loss.

Development, benchmarking, and advocacy of pharmacist-to-patient staffing ratios in the Quebec healthcare system

Nathalie Marceau¹, Matthew Hung^{1,2}

¹Association des pharmaciens des établissements de santé du Québec (A.P.E.S., Quebec Hospital Pharmacists Association), Montreal, Canada

²Department of Pharmacy, Centre intégré universitaire de santé et de services sociaux de l'Ouest-de-l'Île-de-Montréal, Montreal, Canada

Background: In Quebec, hospital pharmacy practice has evolved significantly in response to healthcare system reforms, growing patient needs, and expansion of scope of practice. Despite substantial benefits associated with pharmacist-led activities, the pharmacist shortage undermines the impact of their involvement on patients and the healthcare system. To support equitable access to medicines expertise across a variety of clinical specialties, a bundle of pharmacist-to-patient staffing ratios was developed by the Association des pharmaciens des établissements de santé du Québec (A.P.E.S.), the professional association representing health-system pharmacists in Quebec. Furthermore, to align workforce planning with expected pharmacy activities, benchmarking of staffing levels was undertaken.

Method: First, a series of literature reviews, including grey literature sources, was conducted to collect data to calculate staffing ratios. Data included the time needed to complete pharmacy activities as well as staffing recommendations from professional organisations and health authorities. Expert opinion was also gathered from members of the association's Regroupements de pharmaciens experts, professional groups of clinical pharmacists experts in specific areas of clinical practice, partner committees, and board of directors. Second, the ratios were used to conduct a cross-sectional, descriptive analysis of pharmacist workforce deployment in all of Quebec's publicly funded hospital networks. Through a workforce survey, staffing levels were compared to ministry data, such as the number of beds and hospital visits, to determine compliance with target staffing ratios and to conduct benchmarking according to regional and provincial results.

Results: Pharmacist-to-patient staffing ratios were defined in five areas of clinical practice: oncology (2016), intensive care (2018), nephrology (2021), infectious diseases (2021), and emergency medicine pharmacy (2023). The ratios take into account the breadth of activities that pharmacists are expected to deliver, including clinical care, operations, education, research, and professional affairs, as well as a maximum delegation of tasks to technical and support staff. The ratios also consider the characteristics unique to each clinical specialty. For example, in nephrology, specific ratios

were notably determined for outpatient hemodialysis, outpatient peritoneal and home dialysis, inpatient nephrology or renal transplant, and outpatient renal transplant patients. Moreover, individualised benchmarking results were calculated and disseminated to directors of pharmacy. According to the results of the 2025 iteration of the workforce survey, pharmacist staffing levels were insufficient to adequately respond to patient needs, representing between 26% and 85% of compliance with target ratios in selected areas of clinical practice across Quebec hospital networks.

Conclusion: The pharmacist-to-patient staffing ratios and benchmarking efforts undertaken by the Association des pharmaciens des établissements de santé du Québec highlight important workforce gaps in hospital pharmacy. The results are notably aligned with the practice element of FIP's Development Goal 10, Equity and Equality. As evidence-based advocacy tools, the staffing ratios continue to inform pharmacy leadership, hospital administration, government stakeholders, and media regarding equitable workforce planning. Efforts in defining pharmacist-to-staffing ratios in other clinical specialties and in measuring the economic, clinical, and humanistic impact of these ratios on the pharmacist workforce will contribute to ensuring equity in access to medicines expertise.

Vitamin D supplementation in respiratory tract infections: A systematic review and meta-analysis

Shuangshuang Yang¹, Ning Hou¹

¹Shandong Provincial Hospital Affiliated To Shandong First Medical University, Jinan City, China

Background: Respiratory Tract Infections (RTIs) are highly prevalent infectious diseases globally, posing significant threats to the health of infants, the elderly, and immunocompromised populations while increasing global healthcare burdens. As a fat-soluble steroid derivative, vitamin D exerts key immunomodulatory effects by regulating the balance between pro-inflammatory and anti-inflammatory factors, offering a potential nutritional intervention for infection prevention. However, existing clinical studies on vitamin D supplementation for RTI prevention have yielded inconsistent conclusions, with a lack of unified validation for its efficacy across different RTI subtypes.

Method: This study adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and was registered on PROSPERO on 18 October 2022 (ID: CRD42022367684). Keywords including "Vitamin D", "Respiratory Tract Infections", and "Randomized Controlled Trials" were used to search for RCTs published

from database inception to 31 December 2023. Outcome measures included the incidence of total RTIs, Upper Respiratory Tract Infections (URTIs), and Lower Respiratory Tract Infections (LRTIs). Results: A total of 1572 studies were initially retrieved, with 28 eligible RCTs (total sample size $n=53459$) included in the final analysis. Meta-analysis showed that the incidence of total RTIs was significantly lower in the vitamin D supplementation group (19.4%) than in the control group (20.8%) (RR=0.86, 95% CI: 0.79-0.93, $P=0.0002$). No statistically significant differences were observed in URTI incidence (12.4% vs 12.7%; RR=0.95, 95% CI: 0.90-1.00, $P=0.06$) or LRTI incidence (5.9% vs 6.3%; RR=0.93, 95% CI: 0.84-1.04, $P=0.21$) between the two groups.

Results: A total of 1572 studies were initially retrieved, with 28 eligible RCTs (total sample size $n=53459$) included in the final analysis. Meta-analysis showed that the incidence of total RTIs was significantly lower in the vitamin D supplementation group (19.4%) than in the control group (20.8%) (RR=0.86, 95% CI: 0.79-0.93, $P=0.0002$). No statistically significant differences were observed in URTI incidence (12.4% vs 12.7%; RR=0.95, 95% CI: 0.90-1.00, $P=0.06$) or LRTI incidence (5.9% vs 6.3%; RR=0.93, 95% CI: 0.84-1.04, $P=0.21$) between the two groups.

Conclusion: Vitamin D supplementation significantly prevents total RTIs, but its efficacy in preventing URTIs and LRTIs remains unconfirmed. This study provides high-quality evidence for vitamin D's role in immunomodulation and infection prevention. Due to limitations in included studies, further high-quality RCTs are needed to validate these findings. Key words: Vitamin D Supplementation; Respiratory Tract Infections; Systematic Review; Meta-Analysis; Immunomodulation

From transparency to resilience: A cross-sector pharmacy-led surveillance model to analyse drug shortages across hospital and community care

Yassine Dhif, Nathanaël Berciu, Julie Savary, Simona Agostini Ferrier, Rémi Lafaix, Cyril Stucki, Marie Paule Schneider, Pascal Bonnabry

¹Pharmacy, Geneva University Hospitals (HUG), Geneva, Switzerland

²Institute of Pharmaceutical Sciences of Western Switzerland, School of pharmaceutical sciences, University of Geneva, Geneva, Switzerland

³Pharma24, Academic Community Pharmacy, Geneva, Switzerland

⁴Unisanté, University Centre for General Medicine and Public Health, Unisanté, University Centre for General Medicine and Public Health, Lausanne, Switzerland

Background: Drug shortages are an increasing global threat to continuity of care and health-system resilience. Most

monitoring systems analyse shortages separately in hospital and community pharmacies, despite their strong interdependence. In Geneva, a publicly accessible drug shortage registry was implemented to enhance transparency and support coordinated cross-sector management.

Objective: To characterise drug shortage patterns across hospital and community pharmacies and evaluate the contribution of an open-source registry as a pharmacy-led surveillance model.

Method: A retrospective cross-sector analysis was conducted using all drug shortages recorded in a public open-access drug shortage registry implemented in Geneva in 2023. Shortages were analysed relative to referenced medicines in a hospital formulary (2,200 medicines) and in a community pharmacy inventory (3,819 medicines). Shortages were characterised by duration, therapeutic class (ATC classification) and substitution type to estimate clinical criticality. Sector-specific risks were compared using odds ratios with 95% confidence intervals. Data were collected weekly. Therapeutic alternatives were validated by a hospital pharmacist for hospital medicines and by two community pharmacists from different pharmacies for ambulatory medicines. A survey among community pharmacists in the canton of Geneva assessed workload related to shortages and perceived usefulness of the registry.

Results: A total of 1,140 shortages affecting 626 active substances were recorded between 01.02.2023 and 31.12.2023. Among them, 173 shortages (15.2%) occurred simultaneously in both hospital and community sectors, indicating partial overlap but largely distinct shortage patterns between sectors. Shortages affected 18.2% of hospital medicines (400/2,200) and 14.9% of community medicines (567/3,819), indicating a significantly higher shortage risk in hospitals (OR 1.27; 95% CI 1.11–1.45; $p = 0.0007$). In contrast, shortages lasted more than twice as long in community pharmacies than in hospitals (median 57 vs 27 days; $p < 0.001$). Most shortages required therapeutic substitution strategies to maintain continuity of care. However, 143 shortages (12.5%) had no therapeutic alternative, occurring more frequently in hospitals (66/400; 16.5%) than in community pharmacies (61/567; 10.8%) (OR 1.64; 95% CI 1.13–2.38; $p = 0.009$), suggesting higher clinical criticality in hospital care. Nearly 95% of shortages had no clearly identified cause, reflecting limited transparency from pharmaceutical manufacturers. In the pharmacist survey ($n = 53$), all respondents (100%) reported shortages, 87% spent ≥ 2 hours per week managing them, and 75% were satisfied with the registry.

Conclusion: Drug shortages reveal distinct but partially overlapping supply disruptions across hospital and community care. The absence of identified causes for most shortages highlights major transparency gaps in pharmaceutical supply chains. The registry is currently evolving into an automated open-access digital platform continuously fed by hospital pharmacies, community pharmacists and pharmaceutical industry partners. Such

cross-sector monitoring systems may represent a scalable model to strengthen health-system resilience and safeguard continuity of care during drug shortages.

Enhancing pharmaceutical academic competency and participation in international conferences: AI tool application course and willingness survey analysis

Yini Hsieh¹

¹Federation Of Taiwan Pharmacists Associations, Taipei, Taiwan

²Taiwan Society Of Health-system Pharmacists, Taipei, Taiwan

³Taichung City Pharmacists Association, Taichung, Taiwan

⁴Department of Pharmacy, Taichung Municipal Geriatric Rehabilitation General Hospital Managed by China Medical University, China Medical University, Taichung, Taiwan

Background: International conferences provide essential opportunities for academic exchange and professional growth, yet Taiwanese pharmacists face multiple barriers to participation. At the same time, artificial intelligence (AI) tools have emerged as valuable assets for improving research data collection, organization, and poster design. This study evaluates the effectiveness of the course "AI Creativity: Utilizing AI Tools for Research Data Collection and Poster Submission" and examines pharmacists' willingness and obstacles in attending international conferences. The findings aim to propose strategies to enhance pharmacists' academic engagement.

Method: A pre- and post-course survey assessed pharmacists' experiences with AI tools, skill acquisition, and satisfaction. The survey measured expectations and AI effectiveness in research data organization and poster design. Additionally, an online survey was distributed via the Taichung Pharmacists Association to analyze pharmacists' willingness to attend international conferences. The survey included demographic data, prior participation, and key barriers such as financial cost, time constraints, and language difficulties.

Results: The AI course significantly improved pharmacists' academic capabilities. Before the course, over 70% of participants had never used AI for research or poster creation, yet they expected AI to enhance efficiency and quality. After the course, 100% of participants reported mastering AI-assisted research data collection, and 80% felt confident in poster design. The course received an average satisfaction rating of 5/5, with recommendations for more hands-on training in future sessions. The conference participation survey collected 147 responses, with 65.3% female pharmacists. The majority worked in clinics (32%), followed by hospitals (30.6%) and community pharmacies (27.2%). Despite recognizing the value of international conferences, 85.7% had never attended due to: High costs

(38.1%) Inability to take leave (34.7%) Lack of preparation time (28.6%) Lack of guidance (27.9%) Female pharmacists exhibited higher willingness to participate, emphasizing the need for institutional and financial support mechanisms.

Conclusion: AI tools have proven effective in enhancing pharmacists' research efficiency and academic output. Future training should focus on more hands-on practice and resource-sharing to maximize learning. To increase international conference participation, strategic measures such as financial aid, flexible leave policies, early planning, and structured preparatory guidance should be implemented. By integrating AI applications into professional training and developing support systems, Taiwanese pharmacists' academic engagement can be strengthened, fostering greater global collaboration in pharmaceutical research and practice.

A comparative analysis of structural awareness among pharmacists across practice settings and training eras

Olihe Okoro¹, Zachary Neumann¹

¹University of Minnesota, College of Pharmacy, Duluth, United States

Background: Health disparities persist globally, driven by social determinants of health (SDOH) - the structural, economic, and environmental conditions that shape individuals' daily lives and health outcomes. Pharmacists are increasingly positioned as key contributors to addressing these disparities. However, effective engagement requires structural awareness (SA): the awareness of how upstream structural factors influence patient health and healthcare outcomes. In the USA, the Accreditation Council for Pharmacy Education (ACPE) Standards 2016 mandated inclusion of SDOH in pharmacy curricula. Whether this requirement translates into improved SA among practising pharmacists, and whether SA varies across practice settings, remains unexplored. This study addresses these gaps, with implications for pharmacy education and practice.

Method: This secondary analysis used cross-sectional survey data collected from 477 licensed pharmacists practising in Minnesota, USA. Participants were recruited through the Minnesota Pharmacists Association and the Minnesota Board of Pharmacy. Structural awareness was assessed using a modified Cultural Competence Self-Assessment Questionnaire (CCSAQ). Eighteen items were included, with each scored on a four-point Likert scale (0–3), yielding a maximum total score of 54. Respondents were categorised by primary practice setting (ambulatory care, n=108; community pharmacy, n=203; hospital, n=166) and licensure era (by 2016, n=254; post-2016, n=220). One-way analysis of variance (ANOVA) and pairwise Mann-Whitney U tests compared SA scores across practice settings. Independent

samples t-test compared scores between licensure eras. Item-level analyses were conducted to identify specific knowledge domains with significant variation. Statistical significance was set at $p < 0.05$.

Results: Overall mean SA score across all participants was 24.58 out of 54 (SD=9.29), indicating moderate awareness with substantial room for improvement. No statistically significant difference in overall SA scores was found between practice settings ($F=1.912$, $p>0.05$); mean scores were 23.84 (ambulatory), 23.65 (community), and 21.90 (hospital). Similarly, no significant difference between licensure eras ($t=0.877$, $p=0.34$); mean scores were 23.46 for those licensed by 2016 and 22.66 for those licensed afterwards (Cohen's $d=0.08$). Item-level ANOVA identified significant variations in 7 of 19 items across settings. Community and ambulatory pharmacists demonstrated significantly higher awareness of patient sociodemographic characteristics than hospital pharmacists ($p<0.01$). Ambulatory pharmacists scored markedly higher on utilisation of interpreter services for patients with limited English proficiency ($F=37.61$, $p<0.01$). All groups demonstrated similarly low awareness of population health metrics of the communities they served, including unemployment rates, infant and maternal mortality rates, and all-cause mortality rates.

Conclusion: Despite ACPE mandate to integrate SDOH into pharmacy curricula since 2016, structural awareness remains moderate across practice settings and training eras. These findings suggest that knowledge gaps are profession-wide rather than setting-specific, and that didactic instruction alone is insufficient to develop structural competency awareness. The low awareness of population health metrics across all groups signals a critical gap requiring targeted intervention. Community-engaged experiential learning that involves sustained partnerships with communities experiencing structural barriers, alongside explicit instruction in population health assessment, are needed to translate curricular requirements into practitioner competency. As pharmacists' roles in public health and health equity continue to expand internationally, these findings highlight priority areas for pharmacy education and continuing professional development.

Pharmacists as critical access providers and opportunities for role expansion in prevention and management of hypertension in limited resource settings

Olihe Okoro¹, Mercy Nwaodu¹, Omolayo Umaru¹, Akua Asantewaa Appiah-num Safo¹

¹University of Minnesota, College of Pharmacy, United States

Background: Hypertension affects approximately 1.4 billion individuals globally, with nearly two-thirds residing in low- and middle-income countries (LMICs). The WHO Global HEARTS initiative promotes evidence-based, team-based strategies to strengthen hypertension management in primary care settings. Pharmacists interface extensively with patients, positioning them as integral components of multidisciplinary teams for hypertension prevention and management. Understanding the extent of pharmacists' involvement in hypertension management in these limited resource settings and identifying opportunities for expanded engagement will help optimize their contributions to cardiovascular disease prevention and control.

Method: This mixed-methods study comprised a cross-sectional web-based survey and semi-structured interviews. The survey instrument was developed based on the WHO HEARTS technical package modules to assess involvement and capacity in management of hypertension. Participants were recruited through convenience and snowball sampling. In-depth interviews were conducted with a subset of the pharmacists surveyed ($n=7$). Questions explored facilitators, barriers, opportunities, and training gaps for engagement in management of hypertension. Quantitative data were analyzed using descriptive and inferential statistics - frequencies and proportions for categorical variables, measures of central tendency for continuous variables. Associations between demographic characteristics and pharmacists' involvement were assessed using chi-square and Fisher's exact tests. Qualitative interview data was thematically analyzed.

Results: A total of 126 pharmacists completed the survey (54% male; median age 28 years). Participants predominantly had practice duration of 1-5 years (71.4%), PharmD degrees (64.3%), and practiced in community/retail settings (54.8%). Blood pressure measurement was the most commonly employed cardiovascular risk management tool (92.9%). Significant associations were observed between educational qualification and engagement in patient education on self-care ($p=0.038$); and between practice setting and frequency of contact with cardiovascular disease patients ($p=0.010$). Qualitative findings revealed that pharmacists are currently engaged in blood pressure monitoring and screening, patient education on lifestyle modifications, medication therapy management (MTM), serving as accessible first points of contact in community settings, and participating in interprofessional collaboration and community outreach

programs. Key opportunities identified for further involvement included establishing formal MTM programs, structured patient follow-up and monitoring systems, standardized protocols and procedures, expanding organized community engagement and screening initiatives, leveraging media and technology platforms for broader patient education reach, and better integration into multidisciplinary healthcare teams with formal referral mechanisms. Participants identified needs for enhanced training in public health approaches, patient communication and behavior change, management of hypertension with comorbidities, and continuous professional development. Primary barriers limiting expanded pharmacist roles were systemic rather than knowledge-based: inadequate staffing, lack of reimbursement mechanisms for clinical pharmacy services, insufficient physical infrastructure for private patient consultations, fragmented healthcare delivery systems with poor integration between hospital and community pharmacy settings, lack of formal referral systems, incomplete prescription information, challenges with interprofessional collaboration, and overall underutilization of pharmacists' clinical training capabilities.

Conclusion: Pharmacists in Ghana are actively engaged in cardiovascular risk management activities. Despite possessing adequate clinical knowledge and training, pharmacists' ability to maximize contributions to hypertension prevention and management is substantially constrained by systemic barriers. Strengthening pharmacists' role in team-based hypertension care requires multi-level interventions addressing both individual competencies and critical health system-level barriers.

Strengthening Vaccination Coverage to Mitigate Antimicrobial Resistance: Insights from Stakeholder Consultations in Guyana and Jamaica

Bibi Ally-charles¹, Karishma Jeeboo¹, Shivana Lakhram¹, Narita Singh¹

¹University of Guyana, Georgetown, Guyana

Background: Antimicrobial resistance (AMR) is a growing public health threat in the Caribbean, exacerbated by suboptimal vaccination coverage across human, and animal sectors. Vaccination reduces infection incidence and subsequent antibiotic use, yet critical gaps exist in vaccine availability, uptake, and surveillance. Understanding contextual determinants influencing vaccination practices is essential for developing integrated AMR prevention strategies in low- and middle-income settings.

Objective: This study aimed to identify barriers, enablers, and data gaps in vaccination coverage across human and animal health sectors in Guyana and Jamaica, with a focus on its role

in AMR prevention. We hypothesized that strengthening vaccination systems and data integration would enhance cross-sectoral AMR mitigation efforts.

Method: Stakeholder consultations were conducted with representatives from Ministries of Health and Agriculture, veterinary services, farmers, nurses, and private industry partners in both countries. Discussions focused on vaccine availability, coverage, acceptance, and surveillance, as well as socio-cultural, structural, and operational determinants of uptake. Thematic analysis of qualitative responses identified key challenges and recommendations.

Results: Stakeholders reported that vaccines are generally available but highlighted limited reliable, disaggregated data, especially in livestock and companion animals. Barriers to uptake included service accessibility, cost, misinformation, residual distrust post-COVID-19, and gendered decision-making in households. Gaps in vaccination surveillance and weak integration with AMU/AMR monitoring were noted. Participants emphasized the preventive role of vaccination in reducing antibiotic use and recommended linking vaccination data with AMR monitoring, prioritizing high-risk populations, and implementing public awareness campaigns.

Conclusion: Improved vaccination coverage is a critical upstream intervention for AMR prevention across the One Health spectrum. Addressing structural, socio-cultural, and data system challenges can enhance vaccine uptake and surveillance. Future work should focus on cross-sectoral data integration, targeted interventions for priority populations, and embedding vaccination explicitly within national AMR strategies.

Expansion of human immunodeficiency virus post-exposure prophylaxis prescribing in Brazil: Contributions of nurses and pharmacists to enhancing access and equity

Francisco Alisson Paula De Franca^{1,2}, Nathália Pacífico De Carvalho¹, Tayrine Huana De Sousa Nascimento¹, Marihá Camelo Madeira De Moura¹, Beatriz Brittes Kamiensky¹

¹Ministry of Health, Brasília/Federal District, Brazil

²University of Brasília, Brasília/Federal District, Brazil

Background: Equitable access to Human Immunodeficiency Virus Post-Exposure Prophylaxis (HIV PEP) constitutes a public health priority, given persistent inequalities in HIV prevention programmes among historically vulnerable populations, thereby increasing their reliance on PEP. In Brazil, expanding prescribing scope to include nurses and pharmacists is part of broader strategies to reduce barriers, historically concentrated in medical practice. The objective of this study

was to analyse sociodemographic inequalities in PEP dispensing according to prescriber category.

Method: This is a descriptive cross-sectional study using publicly available data from the Ministry of Health (MoH) from January 2020 to December 2024. All PEP dispensations recorded during this period were included. Records with missing data on professional category, race/colour, or education were excluded from specific analyses. Proportions were compared according to user population (gay and other men who have sex with men (MSM), transgender individuals, sex workers), race/colour, education, age group, type of exposure, and alcohol and other drug use across prescriber categories (pharmacists, nurses, and physicians). Pearson's chi-squared test (SPSS v.29) was utilised, with $p < 0.05$ considered significant.

Results: A total of 660,824 PEP dispensations were analysed: 75.8% performed by physicians, 22.3% by nurses, and 2.0% by pharmacists. Between 2020 and 2024, a proportionally more pronounced growth was observed among pharmacists (6,752%) and nurses (1,138%) compared to physicians (19%). Most users were aged between 25 and 39 years (54.5%). Among consultations performed by physicians, 2.5% were for children aged 0–14 years, a higher proportion than among nurses and pharmacists ($p < 0.001$). Regarding key populations, nurses (40.5%) and pharmacists (39.4%) attended a significantly higher proportion of gay and other cis MSM than physicians (30.2%; $p < 0.001$). Sex workers accounted for 3.2% of consultations by nurses and pharmacists, compared to 1.9% by physicians ($p < 0.001$). Black individuals represented 12.9% of consultations by nurses and 12.4% by pharmacists, compared to 10.3% among physicians ($p < 0.001$). Users with 8–11 years of education were slightly more frequent among nurses (31.6%) and pharmacists (31.5%) than among physicians (25.8%; $p < 0.001$). Alcohol and other drug use was recorded in 36.8% of consultations by nurses and 36.6% by pharmacists, compared to 24.1% among physicians ($p < 0.001$). Regarding the type of exposure, nurses (81.4%) and pharmacists (77.6%) mainly attended consensual sexual exposures, while physicians concentrated a higher proportion of accidents with biological material (28.9%) and sexual violence (5.3%) ($p < 0.001$).

Conclusion: The findings may indicate differences in the sociodemographic profile and exposure situations across professional categories. Nurses and pharmacists showed a higher proportion of consultations for key populations and socially vulnerable groups, including Black individuals, sex workers, and individuals with intermediate levels of education, as well as higher reported alcohol and other drug use. Expanding the prescribing scope to these categories may contribute to widening access to PEP among populations with greater vulnerability to HIV and limited access to prevention strategies. Strengthening integrated training strategies and coordination within the care network may further enhance this role in reducing inequities in access to prevention.

Integrating social prescribing into pharmacy education: findings from a national environmental scan of Canadian pharmacy curricula

Tarek Hussein^{1,2,3}, Nicole D'souza⁴

¹Leslie Dan Faculty Of Pharmacy, University Of Toronto, Toronto, Canada

²International Social Prescribing Pharmacy Association (ISPPA)

³School of Pharmaceutical Sciences, University of Ottawa,, Ottawa, Canada

⁴School of Epidemiology and Public Health, University of Ottawa, Ottawa, Canada

Background: Healthcare systems increasingly recognise that up to 80% of health outcomes are shaped by social determinants of health (SDoH). Social prescribing (SP) — a structured referral pathway enabling healthcare professionals to connect patients with non-clinical community resources through trained link workers — is a critical mechanism for addressing these determinants. Pharmacists, as public-facing providers of primary healthcare services, are uniquely positioned to identify and respond to unmet social needs. Yet pharmacy education lags significantly behind this expanding role. This study presents findings from the first national environmental scan of SP integration in Canadian pharmacy curricula.

Method: A multi-method environmental scan was conducted between November 2024 and February 2025. A structured document review evaluated publicly available Canadian pharmacy programme materials against national educational outcomes (Association of Faculties of Pharmacy of Canada, 2017) and accreditation standards (Canadian Council for Accreditation of Pharmacy Programs, 2023); the presence of SDoH and SP content was mapped across courses, placements, and learning objectives. Semi-structured interviews were conducted with eight purposively selected national interest-holders, including pharmacy educators, regulatory representatives, and organisational leaders, to explore perceptions of current curricula, barriers to SP integration, and priorities for educational reform. Thematic analysis was applied to interview data.

Results: Analysis of publicly available institutional documents, including programme overviews, academic calendars, and public accreditation reports, revealed that while national standards increasingly emphasise health advocacy and culturally safe care, explicit SP competencies and structured referral training are largely absent from Canadian pharmacy curricula. SP-specific terminology, formalised link worker pathways, and assessment models focused on SDoH are rarely integrated into public-facing programme materials. Through thematic analysis of interview data, six themes were developed: (1) Curricular Gaps: significant discrepancies exist between current curricula and

the evolving requirements for SP and SDoH competencies; (2) Unmet Training Needs: pharmacists lack formalised training and standardised protocols for effective clinical referral; (3) Educational Constraints: inadequate faculty expertise and curriculum congestion impede the integration of new educational outcomes; (4) Systemic and Policy Barriers: absent reimbursement models and weak regulatory mandates disincentivise programme evolution; (5) Institutional Leadership: successful implementation depends on formalised faculty development and dedicated institutional champions; (6) Interprofessional Integration: strategic alignment with medicine, social work, and public health through interprofessional education is essential for modernising pharmacy practice. Interest-holders unanimously identify SP as a vital priority for advancing pharmacy practice and health equity. Six strategic recommendations were developed: embedding SP within AFPC and NAPRA standards; progressively integrating SDoH and SP across all years of pharmacy programmes; building faculty capacity; developing a standardised SP education toolkit; strengthening interprofessional partnerships; and establishing feedback mechanisms to evaluate competency outcomes.

Conclusion: Canadian pharmacy education requires a paradigm shift to incorporate SP as a core professional competency. The six strategic recommendations identified provide an evidence-informed roadmap for equipping future pharmacists to lead in SP, health equity, and holistic care. Adoption of these recommendations by pharmacy schools, accreditation bodies, and national associations would position Canadian pharmacy education at the forefront of a globally expanding movement to address SDoH through structured, community-connected care.

Social prescribing for pharmacy Students: Exploring personal social needs and campus-based support

Tarek Hussein^{1,2}, Tiffany Lee³, Amanda Gorgees¹, Lisa M McCarthy^{1,4}

¹Leslie Dan Faculty Of Pharmacy, University Of Toronto, Toronto, Canada

²School of Pharmaceutical Sciences, University of Ottawa, Ottawa, Canada

³Memorial University of Newfoundland, St. John's, Canada

⁴deprescribing.org, Toronto, Canada

Background: Pharmacy students are a critically overlooked population in social prescribing (SP) research. An international scoping review mapping SP in relation to students (18 studies; Canada n = 1) revealed a significant lack of evidence examining students as recipients of SP interventions, despite well-documented vulnerabilities such as transition-induced anxiety, social isolation, food insecurity,

and housing instability. Pharmacy students also face high-stakes academic environments while developing their professional identity, a combination of stressors that heightens their vulnerability to unmet social needs. Importantly, service delivery studies confirmed the feasibility of involving students in SP screening and referral (screening positivity 44–93%; linkage rates 48–82%), and educational studies consistently showed low baseline awareness of SP. These findings provide a strong rationale for conducting an SP study focused on pharmacy students. This protocol proposes a qualitative study to explore pharmacy students' personal experiences of social needs and their perceptions of SP as a campus-based upstream support.

Method: A qualitative descriptive design will be used. Purposive sampling will be employed to recruit pharmacy students from Canadian universities. Focus groups will explore pharmacy students' personal experiences of unmet social needs, including financial pressures, housing instability, and social isolation, alongside their awareness of available support pathways, perceptions of SP as a self-referral or peer-referral mechanism, views on their dual role as both potential SP recipients and future SP providers, and opinions on integrating SP skills into pharmacy training. Thematic analysis will be conducted. The study will be carried out in collaboration with a student co-investigator. Data collection has not yet started; feedback from conferences will help refine the research methods.

Results: This study is presently in the protocol development phase; data collection has not yet commenced. The research design was informed by the international scoping review delineated in the Introduction, which verified the paucity of studies examining pharmacy students as SP recipients and the persistently low baseline SP awareness documented within educational environments. Recruitment materials and an interview guide are in the process of preparation. Ethical approval will be sought prior to the initiation of data collection.

Conclusion: Pharmacy students are both potential providers and recipients of SP, yet this dual role has not been thoroughly explored in the literature. Their unique vulnerability, resulting from the overlap of transition-related stressors, academic pressures, and professional identity development, makes them a distinct group needing targeted SP research. This study will produce foundational evidence on Canadian pharmacy students' personal experiences of social needs and their preparedness to engage with SP as both a personal resource and a professional tool, an aspect explicitly incorporated into the interview guide design. Findings will directly inform campus-based peer link worker models co-created with pharmacy students and will enhance SP competency frameworks for pharmacy education

Integrating social prescribing into community pharmacy practice: A two-phase sequential qualitative study protocol

Tarek Hussein^{1,2,3}, Tiffany Lee⁴, Lisa M McCarthy^{1,5}

¹Leslie Dan Faculty Of Pharmacy, University Of Toronto, Toronto, Canada

²School of Pharmaceutical Sciences, University of Ottawa, Ottawa, Canada

³International Social Prescribing Pharmacy Association (ISPPA)

⁴Memorial University of Newfoundland, St. John's, Canada

⁵deprescribing.org, Toronto, Canada

Background: Community pharmacists in Ontario sit at a crucial intersection where medication optimisation meets unaddressed social needs. Patients prescribed medications for symptoms rooted in social conditions, such as benzodiazepines for loneliness-related insomnia, risk of prescribing cascades. Social prescribing (SP) offers a structured alternative: a formal referral pathway connecting patients to community-based resources to address health-related social needs (HRSNs). Yet deprescribing and SP have been studied separately, and their intersection remains unexamined. This Master's thesis research, conducted at the Leslie Dan Faculty of Pharmacy, University of Toronto, proposes that coupling deprescribing with SP, removing medications whilst addressing the underlying social cause, constitutes a more comprehensive clinical approach. It aims to review current evidence on this relationship and investigate how Ontario community pharmacists navigate it in practice.

Method: A two-phase sequential qualitative design will be employed within a critical realist ontology and post-positivist epistemology. Phase one will comprise a JBI scoping review mapping pharmacists' involvement in deprescribing and SP, specifically, how they identify and respond to health-related social needs (HRSNs) and whether structured SP referral pathways are integrated alongside medication optimisation. Search terms will combine deprescribing and prescribing cascade terminology with SP and HRSN terms to identify intersections or gaps. Qualitative findings will inform the theoretical framework for Phase Two. Phase two will involve semi-structured interviews (targeting n = 15–20 participants) with licensed community pharmacists in Ontario, guided by information power. Purposive maximum-variation sampling across geography, pharmacy type, and social needs engagement will be used, alongside positive deviance sampling to identify pharmacists who integrate medication optimisation with social referrals. Codebook thematic analysis, borrowing grounded theory techniques, constant comparison, simultaneous data collection and analysis, iterative interview guide refinement, and theoretical sampling, will produce themes that go beyond description to explain the mechanisms that enable or hinder this combined practice.

Results: To our knowledge, deprescribing and SP have not been formally studied as an integrated clinical process in community pharmacy. Two overarching patterns emerge: first, pharmacists consistently respond to social needs informally and reactively, without structured SP referral pathways or link worker integration; and second, prescribing cascades driven by social factors have not been examined through an SP lens, representing a critical and previously unrecognised evidence gap. These patterns inform the conceptual framework for Phase Two and highlight the timeliness of this research. Phase two preparations are underway, with data collection anticipated in 2026 and preliminary findings expected prior to the FIP congress.

Conclusion: This study will explore a previously unrecognised link between deprescribing and social prescribing in Ontario community pharmacy. By investigating how pharmacists manage the intersection of medication optimisation and social needs, and by integrating these as complementary components of a single clinical consultation, the findings may provide practical evidence for provincial reimbursement policies, regulatory standards, and scalable workflow models. Furthermore, this study champions social health as a valid pharmacy outcome alongside medication safety, advancing the profession from occasional charitable acts towards a standardised, equity-focused clinical service.

Building a global movement: The international social prescribing pharmacy association as an education, advocacy, and quality improvement programme

Tarek Hussein^{1,2,3,4}, Jenny Kirschner^{3,5}, Arun Nadarasa^{3,6}, Adam P Rathbone^{3,7}

¹Leslie Dan Faculty Of Pharmacy, University Of Toronto, Toronto, Canada

²School of Pharmaceutical Sciences, University of Ottawa, Ottawa, Canada

³International Social Prescribing Pharmacy Association (ISPPA)

⁴Canadian Association of Pharmacy for the Environment (CAPhE)

⁵PALS (Pharmacy Addressing Loneliness and Social Isolation), Melbourne, Australia

⁶Islington GP Federation / NHS, London, United Kingdom

⁷School of Pharmacy, Newcastle University, Newcastle, United Kingdom

Background: Social prescribing (SP) is expanding globally; however, pharmacists, who are uniquely positioned through their accessibility, visibility, and patient trust, remain largely absent from structured SP pathways. A significant gap persists between pharmacists' informal social support activities and the formalised, link-worker-centred referral

model that characterises SP practice. Addressing this disparity necessitates coordinated efforts across education, advocacy, and research. The International Social Prescribing Pharmacy Association (ISPPA), established in 2022, was created to bridge this gap through a structured, three-workstream quality improvement (QI) programme implemented across Canada, the United Kingdom, and Australia, with the long-term goal of integrating SP as a fundamental pharmacy competency worldwide.

Method: ISPPA operates across three interdependent workstreams. The education workstream developed a freely accessible, tiered online training programme (Levels 1–3) designed to build SP awareness, consolidate knowledge, and recruit country-level ambassadors — hosted on an established e-learning platform. The research workstream coordinates peer-reviewed publication, evidence synthesis, and collaboration with academic partners across three countries. The advocacy workstream engages national pharmacy associations, SP organisations, and policymakers to promote SP integration into pharmacy scope-of-practice frameworks and curricula. Progress is tracked against ISPPA's 2030 Development Goals, with outputs assessed against a logic model framing SP adoption as a multi-stage behaviour change process at the profession level.

Results: Since 2022, ISPPA has achieved measurable reach across three domains. In education: the flagship free online course has enrolled over 1,700 learners from 102 countries, representing one of the broadest international reaches documented for any pharmacy-specific SP training resource. In research: ISPPA members have authored a peer-reviewed practice brief in the Canadian Pharmacist Journal (CPJ 2024) that establishes the evidence base for pharmacy SP in Canada, with a larger systematic review currently under review at BMC Primary Care. In advocacy and knowledge exchange: ISPPA has convened annual virtual conferences since 2021, alongside knowledge exchange activities across Canada, the United Kingdom, and Australia, and maintains an advisory board including representation from the National Academy for Social Prescribing, the Royal Pharmaceutical Society, the University of Oxford, and the Global Social Prescribing Alliance.

Conclusion: ISPPA's programme demonstrates that a small, internationally distributed, volunteer-led pharmacy association can achieve meaningful global reach in SP education and advocacy within three years. The 102-country learner footprint establishes both the demand for pharmacy SP training and the feasibility of a low-cost digital dissemination model. The next phase of the programme will focus on translating awareness into structured practice by developing standardised SP workflow tools, supporting national regulatory integration, and building an evidence base for pharmacy-based SP outcomes. ISPPA's model offers a replicable blueprint for profession-level SP advocacy in any country where pharmacy teams engage with social need.

Social prescribing and students: A scoping review

Caitlin Muhl^{1,2}, Tarek Hussein^{1,3,4}, Hanshu Pu^{1,2,5}, Bahja Farah^{1,6}, Stephanie Wadge^{1,7}, Sarah Ponton^{1,6}, Daniel Hayes⁸

¹Canadian Social Prescribing Student Collective (CSPSC), Toronto, Canada

²Faculty of Health Sciences, Queen's University, Kingston, Canada, Kingston, Canada

³Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, Canada

⁴School of Pharmaceutical Sciences, University of Ottawa, Ottawa, Canada

⁵Department of Occupational Therapy, University of Alberta, Edmonton, Canada

⁶Dalla Lana School of Public Health, University of Toronto, Toronto, Canada

⁷Faculty of Applied Health Sciences, Brock University, St. Catharines, Canada

⁸Department of Behavioural Science and Health, University College London, London, UK

Background: Social prescribing (SP) has expanded internationally as a structured mechanism to address social needs, connecting individuals to non-clinical community resources via trained link workers. Students are increasingly engaged in SP initiatives as learners, advocates, and service providers. However, the extent and nature of empirical evidence examining SP in relation to students had not previously been systematically mapped. This scoping review addresses that gap.

Method: A scoping review was conducted in accordance with JBI methodology and reported using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) framework. Electronic databases and grey literature sources were searched from inception to 2 June 2025. Studies were eligible if they examined SP in relation to students in any context. Data were synthesised using descriptive numerical summaries and thematic grouping by student role.

Results: Eighteen studies met the inclusion criteria. Eleven (61%) were conducted in the United States, four (22%) in the United Kingdom, two (11%) in Iran, and one (6%) in Canada. Studies clustered into three roles: educational exposure (n = 8; 44%), structured training (n = 1; 6%), and active service delivery (n = 9; 50%). Educational studies reported low baseline awareness of SP and documented short-term increases in self-reported knowledge and perceived relevance following educational interventions. The single structured training study described improved self-reported preparedness among 24 trainees. Service delivery studies demonstrated the feasibility of supervised student involvement in screening and referral activities, with screening positivity rates ranging from 44% to 93% and

linkage rates from 48% to 82%. Outcomes were predominantly short-term and process-oriented. No studies reported longitudinal follow-up, validated patient-reported outcome measures, economic evaluations, or system-level impact assessments. Critically, no studies examined students exclusively as recipients of SP interventions.

Conclusion: The evidence base on SP and students is geographically concentrated in high-income settings and primarily describes educational initiatives and pilot service delivery models in post-secondary contexts. While the feasibility of student involvement in SP screening and referral is demonstrated, evaluation remains limited to short-term, descriptive outcomes. Further research is needed to establish competency frameworks, assess patient and system-level impact, and examine SP interventions targeting students themselves as recipients, a critical and overlooked gap in the literature.

Knowledge and roles of pharmacists in antimicrobial stewardship: A cross-sectional survey in a Ghanaian tertiary hospital

Josephine Mensah^{2,3}, Anabelle N.t.a. Hammond², Nana Ama Buadiba Osei³, Thelma Ohene-agyei²

¹Department of Pharmacy, Korle Bu Teaching Hospital, Accra, Ghana, Accra, Ghana

²School of Pharmacy, University of Ghana, Legon, Accra, Ghana, Accra, Ghana

³Pharmacy Directorate, University of Ghana Medical Centre, Legon, Accra, Ghana, Accra, Ghana

Background: Antimicrobial resistance (AMR) is a major global health threat largely caused by the inappropriate use of antimicrobials, resulting in increased morbidity, mortality, and healthcare costs. Antimicrobial stewardship programs (AMS) are essential to address this challenge and pharmacists, as medication experts, play a critical role in AMS through antimicrobial selection, prescription review, monitoring, and patient education.

Objective: To assess pharmacists' knowledge of and roles in antimicrobial stewardship at Korle-Bu Teaching Hospital (KBTH).

Method: This was a descriptive cross-sectional study designed to assess pharmacists' knowledge and roles in antimicrobial stewardship at KBTH. In total, 98 pharmacists were purposively selected from 18th August to 7th October, 2025. Data were exported to STATA version 18 for analysis, where descriptive and inferential statistics were employed.

Results: The median age of pharmacists was 35 years (range 27–58), with most aged 30–39 years. Females constituted 55.1% (n=54). Educational qualifications included master's degrees (n=36, 36.7%) and Doctor of Pharmacy degrees (n=32, 32.7%). Nearly half (n=44, 44.9%) had over ten years of practice experience, and 38.8% (n=38) had worked at KBTH for at least five years. Most practiced in the ward (n=34, 34.7%) or outpatient settings (n=25, 25%). Out of the 14 pharmacists who had specialized, there was an equal number of residents (n=5, 35.7%) and specialists (n=5, 35.7%). The majority (n=85, 86.7%) had received AMS training, mainly post-COVID-19 through institutional sponsorship (n=41, 48.2%) or on-the-job training (n=36, 42.4%), though 78.8% (n=77) reported receiving refresher training only occasionally. Knowledge of AMS principles was high overall (n=93, 94.9%). All participants (n=98, 100%) recognized the importance of a multidisciplinary AMS team, educational resources, regular clinician feedback, and an updated antimicrobial formulary. However, misconceptions were noted: 9.2% (n=9) believed AMS programs do not require hospital management support, and all respondents (100%, n=98) incorrectly perceived antimicrobial stewardship as solely the responsibility of pharmacists despite acknowledging multidisciplinary collaboration. In practice, 68.3% (n=67) rarely or never dispensed antimicrobials without prescription. Over half (n=56, 57.1%) frequently screened prescriptions using guidelines, 71.5% (n=70) collaborated with other healthcare professionals on infection control and AMS activities, and 90.8% (n=89) communicated with prescribers when antibiotic appropriateness was uncertain. Most pharmacists regularly educated patients on antimicrobial use (n=93, 85.9%) and participated in AMR awareness activities (n=74, 75.5%). Barriers to participation in AMS activities were organizational, knowledge and capacity, and awareness-related. Organizational barriers included lack of internal policies (n=80, 81.6%), limited time (n=76, 77.6%), and financial constraints (n=71, 72.5%). Knowledge and capacity barriers included limited training opportunities (n=60, 61.2%), lack of specialized AMS resources (n=63, 64.3%), and low confidence in AMS participation (n=22, 22.5%). Inadequate personnel were identified as a barrier by 53.1% (n=52), while 40.8% (n=40) disagreed that administrative lack of awareness was a challenge.

Conclusion: Pharmacists at KBTH demonstrated high knowledge of antimicrobial stewardship and actively engaged in prescription screening, interprofessional collaboration, prescriber communication, and patient education. However, misconceptions regarding shared responsibility and substantial organizational and capacity-related barriers persist. Addressing these gaps is critical to strengthening pharmacists' contributions to antimicrobial stewardship and combating antimicrobial resistance.

Management of psychosis at the intensive care unit of a Ghanaian Teaching Hospital

Desmond Kwakye¹, Josephine Mensah², Samuel Darko², James Odame Aboagye³, Ernest Ofosu-appiah⁴, Peggy Asiedu Ekremet⁵, Mercy Naa Aduelle Opare-addo⁶

¹Florida A&M University, College of Pharmacy and Pharmaceutical Sciences,, Tallahassee, Florida, USA

²University of Ghana Medical Centre, Pharmacy Directorate, Legon, Accra, Ghana

³University of Ghana Medical Centre, Research Directorate, Legon, Accra, Ghana

⁴University of Ghana Medical Centre, Medical Affairs Directorate, Legon, Accra, Ghana

⁵Accra Psychiatric Hospital, Accra, Ghana

⁶Kwame Nkrumah University of Science and Technology, Faculty of Pharmacy and Pharmaceutical Sciences, Department of Pharmacy Practice, Kumasi, Ghana

Background: Psychosis in the intensive care unit (ICU) presents a multifaceted challenge within critical care medicine. While managing severe and life-threatening illnesses, patients grapple not only with their immediate health crises but also with the emergence of hallucinations, delusions, and disorganized thoughts. Despite its profound impact on patient outcomes, studies on psychosis in the ICU remain relatively scarce in Ghana.

Objective: To assess the incidence and management of psychosis in critically ill patients at the University of Ghana Medical Centre.

Method: A retrospective study was conducted at the University of Ghana Medical Centre. Medical records of patients admitted to the ICU from January 1, 2021, to March 31, 2024, were extracted from the electronic medical records (Healthpro) software. Data regarding patient demographics, the incidence of psychotic episodes, presenting features, contributing factors, management strategies, and outcomes were extracted and analysed using utilizing descriptive statistics and regression analysis.

Results: Out of the total number of 342 ICU patients, 58 (17.0%) developed psychosis during their admission. The incidence was significantly higher in male patients ($n = 39/177$, 22.0%) compared to female patients ($n = 19/165$, 11.5%) ($p = 0.007$). The most prominent clinical presentations significantly associated with development of psychosis included aggression ($p < 0.001$), altered levels of consciousness ($p < 0.001$), disorganized speech and thought ($p < 0.001$), as well as visual ($p < 0.001$) and tactile ($p < 0.001$) hallucinations. Primary factors contributing to the development of psychosis included electrolyte imbalances ($n=22$, 37.9%), pain ($n=19$, 32.8%), and anaemia ($n=17$, 29.3%). Management predominantly involved the use of medications ($n=44$, 77.6%), specifically antipsychotics ($n=25$,

43.1%). The most frequently used antipsychotics were haloperidol ($n=23$, 92%) and olanzapine ($n=2$, 8%). Common non-pharmacological approaches included the use of physical restraints ($n = 23$, 39.7%), psychosocial interventions ($n = 17$, 29.3%), and environmental modifications ($n = 13$, 22.4%). Following intervention, psychosis resolved in 63.8% ($n= 37$) of the patients, while 25.9% ($n=15$) remained unresolved and 10.3% ($n=6$) worsened. Duration of psychotic episodes were relatively brief, with 48.3% ($n=28$) lasting up to 3 days, 43.1% ($n=25$) lasting between 4 and 14 days, and only 8.6% ($n=5$) extending beyond 14 days. Development of psychosis in the ICU was not significantly associated with an increase in patient mortality ($p=0.676$).

Conclusion: Psychosis is a prevalent complication among critically ill patients at the University of Ghana Medical Centre, disproportionately affecting males and frequently driven by correctable clinical factors such as electrolyte imbalances and pain. While pharmacological management remains the cornerstone of treatment and yields a high-resolution rate, the substantial reliance on physical restraints accentuates the need for standardized, evidence-based protocols that prioritize the early identification of risk factors and emphasize proactive environmental and non-pharmacological preventive strategies.

Quality of life in patients with epilepsy in Lebanon: The impact of socioeconomic challenges

Samar Younes^{1,2,3}, Chadai Haddad^{2,3,4,5}, Jalal Dahham^{2,6}, Nisreen Mourad^{1,2,3,7}, Pascale Salameh^{2,8,9,10}, Pierre-marie Preux³

¹School of Pharmacy, Lebanese International University, Bekaa, Lebanon

²INSPECT-LB (Institut National de Santé Publique, d'Épidémiologie Clinique et de Toxicologie-Liban), Beirut, Lebanon

³Inserm U1094, IRD UMR270, Univ. Limoges, CHU Limoges, EpiMaCT - Epidemiology of Chronic Diseases in Tropical Zone, Institute of Epidemiology and Global Health – Michel Dumas, OmegaHealth, Limoges, France

⁴Research Department, Psychiatric Hospital of the Cross, Jal-Eddib, Lebanon

⁵Faculty of Public Health, Lebanese University, Fanar, Lebanon

⁶Department of Health Services Research, Care and Public Health Research Institute (CAPHRI), Faculty of Health Medicine and Life Sciences, Maastricht University, Maastricht, Netherlands

⁷IVPN-Network, Fujairah, United Arab Emirates

⁸School of Medicine, Lebanese American University, Beirut, Lebanon

⁹Faculty of Pharmacy, Lebanese University, Hadath, Lebanon

¹⁰Department of Primary Care and Population Health, University of Nicosia Medical School, Nicosia, Cyprus

Background: Epilepsy is a chronic neurological condition affecting more than 50 million people worldwide, with a disproportionately higher burden in low- and middle-income countries (LMICs). Lebanon presents a uniquely challenging context: an ongoing economic crisis, widespread unemployment, recurrent medication shortages, and a fragmented healthcare system. These factors are likely to compound the impact of epilepsy on patients' health-related quality of life (HRQoL); however, this intersection remains poorly investigated in the Lebanese setting. This study aimed to assess HRQoL in patients with epilepsy across Lebanon and to identify socioeconomic, clinical, and demographic determinants of HRQoL using both a disease-specific instrument; the Quality of Life in Epilepsy-10 (QOLIE-10), and the generic EQ-5D-5L utility measure.

Method: A national cross-sectional study was conducted across all regions of Lebanon. Adults with a clinically confirmed diagnosis of epilepsy were recruited. Data were collected on sociodemographic and socioeconomic characteristics (income, employment status, health insurance, education), clinical variables (seizure type, frequency, duration, medication adherence, and medication shortages), and HRQoL using the validated QOLIE-10 scale and the EQ-5D-5L utility index. Descriptive statistics, independent-samples tests, and correlation analyses were performed. The Household Crowding Index (HCI) was used to quantify household socioeconomic adversity.

Results: A total of 578 patients were enrolled (mean age 34.6 ± 14.5 years; 58.7% female). The mean QOLIE-10 score was 2.4 ± 0.8 . Nearly half of participants (46.4%) lacked any health insurance, and 50.5% reported shortages in their prescribed antiseizure medication. Significantly lower HRQoL (higher QOLIE-10 scores) was observed in patients with lower household income (<500 USD/month: 2.7 ± 0.9 vs. ≥ 1500 USD: 2.2 ± 0.7 ; $p < 0.001$), lower education level (intermediate or below: 2.6 ± 0.8 vs. university: 2.2 ± 0.7 ; $p < 0.001$), and unemployment (2.5 ± 0.8 vs. employed 2.3 ± 0.7 ; $p < 0.001$). Patients on permanent sick leave had markedly worse HRQoL (3.0 ± 0.9 ; $p < 0.001$). Medication shortage was significantly associated with poorer HRQoL (2.5 ± 0.8 vs. 2.3 ± 0.7 ; $p < 0.001$), as was experiencing social stigma (2.8 ± 0.8 vs. 2.2 ± 0.7 ; $p < 0.001$) and having a seizure in the past 12 months (2.5 ± 0.8 vs. 2.2 ± 0.7 ; $p < 0.001$). Correlation analysis showed that higher HCI scores ($r = 0.18$; $p < 0.001$), anti-epileptic drug side-effect burden (LAEP score, $r = 0.58$; $p < 0.001$), and medication adherence difficulties (LMAS-14, $r = 0.29$; $p < 0.001$) were associated with worse HRQoL, while health literacy was strongly and inversely correlated ($r = -0.35$; $p < 0.001$). Convergent findings were obtained using the generic EQ-5D-5L utility index (mean 0.79 ± 0.24), with significantly lower utility scores associated with lower income ($p < 0.001$), lower education ($p < 0.001$), unemployment ($p = 0.009$), medication shortage ($p < 0.001$), social stigma ($p < 0.001$), and recent seizure activity ($p = 0.032$), reinforcing the robustness of the findings.

Conclusion: HRQoL in Lebanese patients with epilepsy is significantly associated with socioeconomic deprivation, medication insecurity, and health literacy deficits; factors particularly pronounced in the Lebanese crisis context. Consistent findings across both a disease-specific and a generic instrument strengthen confidence in these conclusions. These findings highlight the need for targeted pharmacist-led interventions, including medicines management support, patient education, and advocacy for uninterrupted medication supply, to improve outcomes for this vulnerable population.

Depressive symptoms in Lebanese patients with epilepsy: The role of antiseizure medication shortage and socioeconomic adversity

Samar Younes^{1,2,3}, Chadia Haddad^{2,3,4,5}, Jalal Dahham^{2,6}, Nisreen Mourad^{1,2,3,7}, Pascale Salameh^{2,8,9,10}, Pierre-marie Preux³

¹School of Pharmacy, Lebanese International University, Bekaa, Lebanon

²INSPECT-LB (Institut National de Santé Publique, d'Épidémiologie Clinique et de Toxicologie-Liban), Beirut, Lebanon

³Inserm U1094, IRD UMR270, Univ. Limoges, CHU Limoges, EpiMaCT - Epidemiology of Chronic Diseases in Tropical Zone, Institute of Epidemiology and Global Health – Michel Dumas, OmegaHealth, Limoges, France

⁴Research Department, Psychiatric Hospital of the Cross, Jal-Eddib, Lebanon

⁵Faculty of Public Health, Lebanese University, Fanar, Lebanon

⁶Department of Health Services Research, Care and Public Health Research Institute (CAPHRI), Faculty of Health Medicine and Life Sciences, Maastricht University, Maastricht, Netherlands

⁷IVPN-Network, Fujairah, United Arab Emirates

⁸School of Medicine, Lebanese American University, Beirut, Lebanon

⁹Faculty of Pharmacy, Lebanese University, Hadath, Lebanon

¹⁰Department of Primary Care and Population Health, University of Nicosia Medical School, Nicosia, Cyprus

Background: Depression is among the most prevalent and disabling comorbidities in people with epilepsy, yet it remains underdiagnosed and undertreated, particularly in resource-limited settings. Lebanon's ongoing socioeconomic crisis which is marked by widespread poverty, recurrent antiseizure medication (ASM) shortages, and a fragmented healthcare system may substantially amplify the risk of depressive symptoms in this population. Evidence on the burden and determinants of depression among Lebanese patients with epilepsy is currently lacking. This study aimed to assess the prevalence and severity of depressive symptoms in patients with epilepsy across Lebanon, with a particular focus on the impact of ASM shortages, and to identify their clinical, socioeconomic, and epilepsy-related determinants using the Patient Health Questionnaire-9 (PHQ-9).

Method: A national cross-sectional study was conducted across all regions of Lebanon, enrolling 578 adults with a confirmed diagnosis of epilepsy. Depressive symptoms were measured using the validated PHQ-9, with scores categorised as minimal (0–4), mild (5–9), moderate (10–14), moderately severe (15–19), and severe (20–27). Clinically significant depression was defined as a PHQ-9 score ≥ 10 . Independent-samples tests and correlation analyses were used to examine associations with sociodemographic, clinical, and epilepsy-related variables, including seizure frequency, medication shortage experience, social stigma, ASM side-effect burden (Liverpool Adverse Events Profile; LAEP), medication

adherence (LMAS-14), health literacy, and quality of life (QOLIE-10).

Results: The mean PHQ-9 score was 7.4 ± 5.9 . Clinically significant depression (PHQ-9 ≥ 10) was present in 32.2% of participants, with 20.9% meeting criteria for moderate, 7.6% for moderately severe, and 3.6% for severe depression. Notably, 37.9% of participants endorsed suicidal ideation (PHQ-9 item 9 > 0). Significantly higher depressive symptom scores were observed in patients who experienced a seizure in the past 12 months (8.2 ± 6.0 vs. 6.1 ± 5.5 ; $p < 0.001$), those who faced ASM shortages (8.4 ± 6.2 vs. 6.3 ± 5.2 ; $p < 0.001$), those reporting social stigma (9.7 ± 6.2 vs. 6.3 ± 5.4 ; $p < 0.001$), and those with lower household income (< 500 USD/month: 9.3 ± 6.5 vs. $\geq 2,000$ USD: 5.2 ± 5.5 ; $p < 0.001$). PHQ-9 scores were strongly correlated with poorer quality of life ($r = 0.66$; $p < 0.001$), higher ASD side-effect burden ($r = 0.62$; $p < 0.001$), and medication non-adherence ($r = 0.41$; $p < 0.001$), while health literacy was inversely associated ($r = -0.30$; $p < 0.001$).

Conclusion: Depressive symptoms are highly prevalent among Lebanese patients with epilepsy, with nearly one-third meeting criteria for clinically significant depression and over a third endorsing suicidal ideation. Depression is significantly associated with seizure activity, medication shortages, social stigma, and socioeconomic adversity which are factors exacerbated by Lebanon's ongoing crisis. These findings emphasize the urgent need for integrated mental health screening and pharmacist-led psychosocial support within epilepsy care in Lebanon.

Evaluation and impact of an educational intervention on methamphetamine use disorder for pharmacy students

Ali Makki¹, Jessica Pace¹, Jocelyn Bussing¹, Carolyn Day², Betty Chaar¹

¹School of Pharmacy, Faculty of Medicine and Health, The University of Sydney, Sydney, Australia

²Specialty of Addiction, Faculty of Medicine and Health, The University of Sydney, Sydney, Australia

Background: The use of methamphetamine in Australia poses a serious public health concern. Barriers exist to the treatment and management of Methamphetamine Use Disorder (MUD) including stigmatizing attitudes and a lack of knowledge and required skill set amongst healthcare providers. Despite these barriers, the role of pharmacists in the delivery of harm reduction services is expanding to help increase access to healthcare services and decrease harms associated with substance use. The aim of this study was to develop, pilot and evaluate the impact of an educational course on student pharmacists' attitudes and perceptions towards the treatment and management of MUD.

Method: An active learning pedagogical approach was utilized to deliver MUD educational content. The research methodology involved utilising pre- and post-training surveys that consist of an adapted version of the Perceived Stigma Towards Substance Users Scale (PSAS) questionnaire and open-ended questions. The questionnaire and open-ended questions were used to evaluate the effectiveness of the educational workshop and explore student attitudes and perceptions of MUD. Data generated from pre- and post-training survey responses was analysed using the statistical software Jamovi. Data analysis for pre- and post-training open ended questions was achieved with the use of The IBM Statistical Package for Social Sciences software. Additionally, student open-ended question responses were thematically analysed using an inductive approach and categorized under common themes that had emerged.

Results: Paired data for pre- and post-training questionnaire responses were available for 195 students. Although there was a slight decrease in the mean total PSAS score from a pre-training value of 14.0 to a post-training value of 13.8, a paired samples t-test revealed no statistically significant difference in students' perceptions of public stigma towards people with MUD ($p=0.237$). A total of 132 students responded to both pre- and post-training open-ended questions. The McNemar-Bowker test revealed a statistically significant difference in student perceptions between pre- and post-training regarding their personal views of people with MUD, with an overall increase in those reporting positive perceptions towards people with MUD post-training ($X^2=126$, $p<0.001$). Three themes emerged from student pharmacist responses to open-ended questions: 1) Stigma reduction interventions empower student pharmacists to provide compassionate care, 2) Confidence in the provision of accessible MUD healthcare services by pharmacists, and 3) Interactive workshops increase engagement with and retention of MUD workshop material.

Conclusion: Student pharmacists showed a significant shift in their personal views towards more positive perceptions on treating and serving people with MUD. Awareness and understanding of treatment and services, stigma and psychosocial aspects of MUD increased student confidence in a role for pharmacists providing accessible harm reduction services for MUD, and highlighted the importance of a compassionate approach towards the treatment and management of MUD. The delivery of MUD educational content using an active learning pedagogy may help prepare future pharmacists for a role in the provision of person-centred healthcare services for MUD.

A pharmacist-led algorithmic pathway for guideline-directed diabetes management in community pharmacy: The D-PATH study

Stephanie Gysel¹, Ross Tsuyuki¹, Lorena Holtz¹

¹University of Alberta, Calgary, Alberta, Canada

Background: Type 2 diabetes mellitus (T2DM) is a rapidly increasing major global health problem leading to significant morbidity and mortality. Despite the availability of effective therapies, many individuals with T2DM do not achieve recommended glycemic and cardiometabolic targets. Clinical inertia and limited access to timely treatment optimization remain major barriers to optimal care. Community pharmacists are highly accessible healthcare professionals and, in jurisdictions such as Alberta, Canada, have prescribing authority and the ability to manage chronic disease. However, structured models to support pharmacists in delivering comprehensive, guideline-directed diabetes care in routine practice are limited. The Diabetes Pharmacist-Led Algorithmic Treatment Pathway (D-PATH) is an electronic tool developed to evaluate a pharmacist-led care model designed to improve diabetes management within community pharmacy practice.

Method: D-PATH is a pragmatic, multi-site randomized controlled trial conducted in community pharmacies across Alberta, Canada. Adults aged ≥ 18 years with type 2 diabetes and hemoglobin A1C above target ($>7.0\%$) are eligible to participate and are randomized 1:1 to either a pharmacist-led intervention or usual care. The intervention uses a structured web-based clinical pathway based upon the Diabetes Canada clinical practice guidelines to facilitate guideline-directed therapy and achievement of key diabetes quality indicators. Pharmacists conduct standardized patient assessments, cardiometabolic risk evaluation, and shared decision-making to guide treatment optimization. Pharmacists may independently initiate or adjust pharmacotherapy, provide lifestyle counselling, and monitor clinical outcomes through structured follow-up visits every six weeks for six months. Participants in the control group receive usual pharmacy care with communication of clinical findings to their primary care physician. The primary outcome is change in A1C from baseline to six months. Secondary outcomes include changes in cardiovascular risk, blood pressure, LDL cholesterol, medication optimization, completion of recommended preventive care measures, and patient-reported shared decision-making. Results / Implementation Status To date, 47 community pharmacies across Alberta have enrolled in the study, representing diverse urban and rural practice settings. Ongoing implementation efforts focus on pharmacist training, workflow integration, and proactive recruitment strategies and case-finding to facilitate patient identification and enrollment in community pharmacy practice.

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rural practice settings. Ongoing implementation efforts focus on pharmacist training, workflow integration, and proactive recruitment strategies and case-finding to facilitate patient identification and enrollment in community pharmacy practice.

Conclusion: D-PATH evaluates a scalable pharmacist-led model for implementing guideline-directed diabetes management in community pharmacy. By leveraging pharmacist accessibility, prescribing authority, and structured clinical decision support, this pathway may reduce therapeutic inertia and expand access to evidence-based diabetes care. Findings from this study may inform broader implementation of pharmacist-led chronic disease management programs internationally.

Pharmacist-led stroke pharmacotherapy optimization strategy reduces polypharmacy and enhances value-based care in the acute phase of ischemic stroke

Cheng Guo^{1,2}, Zhongqiu Zhang^{1,2}, Xincui Zhao^{1,2}, Mengqi Jia³, Miaomiao Zhou^{1,2}, Jianping Zhang^{1,2}, Li Cao^{4,5}, Jin Lu^{1,2}

¹Department of Pharmacy, Shanghai Sixth People's Hospital Affiliated to Shanghai Jiao Tong University School of Medicine, Shanghai, China

²Neurology and Genetics Clinical Pharmacy Team, Shanghai Sixth People's Hospital Affiliated to Shanghai Jiao Tong University School of Medicine, Shanghai, China

³Department of Clinical Pharmacy, Shanghai General Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai, China

⁴Department of Neurology, Shanghai Sixth People's Hospital Affiliated to Shanghai Jiao Tong University School of Medicine, Shanghai, China

⁵Shanghai Neurological Rare Disease Biobank and Precision Diagnostic Technical Service Platform, Shanghai, China

Background: Polypharmacy involving cerebrovascular agents is common in acute ischemic stroke, but its clinical and economic value remains unclear. This study evaluated the effectiveness of a pharmacist-led Stroke Pharmacotherapy Optimization Strategy (SPOS) in reducing polypharmacy, drug-related costs, and adverse events while preserving neurological recovery.

Method: A pre-post study was conducted at a tertiary hospital from June 2024 to April 2025. The control cohort included patients admitted from June to October 2024, and the SPOS cohort included patients admitted from December 2024 to April 2025. SPOS followed the "3-2-1" principle (≤ 3 non-recanalization cerebrovascular drugs, [NR-CVDs]; ≤ 2 cerebrovascular-related traditional Chinese medicines, [CR-TCMs]) to simplify pharmacotherapy and integrated

pharmacist-led medication monitoring, patient education, and individualized adjustments.

Results: A total of 416 patients were included (204 control, 212 SPOS). The SPOS group received significantly fewer NR-CVDs (SPOS group: 3.03 ± 1.18 vs control group: 4.62 ± 1.15 ; $P < 0.001$) and CR-TCMs (SPOS group: 1.04 ± 0.90 vs control group: 1.93 ± 1.02 ; $P < 0.001$), without difference in Δ NIHSS or overall neurological recovery. Although the length of hospital stay was similar between groups, total hospitalization costs, drug costs, and the proportion of drug-related expenditures were markedly reduced in the SPOS group (all $P < 0.001$), and adverse events were reduced ($P = 0.034$).

Conclusion: Pharmacist-led SPOS optimized stroke pharmacotherapy by reducing polypharmacy, drug costs, and adverse events without compromising neurological outcomes, highlighting the critical role of clinical pharmacists in promoting rational, value-based care in acute stroke.

A pharmaceutical care knowledge graph tool to support pharmacists in managing metabolic syndrome: Insights from pharmacist and patient surveys in underserved areas of China

Wei Zhang¹, Ya-jing Wang¹, Yan Li²

¹China Pharmaceutical University, Nanjing, China

²Jiangsu Province Center for Disease Control and Prevention, Nanjing, China

Background: Metabolic syndrome (MetS) is a cluster of metabolic abnormalities, including abdominal obesity, hypertension, impaired glucose metabolism, and dyslipidaemia. It is associated with an increased risk of diabetes and cardiovascular diseases, highlighting the need for effective management. In the researchers' group previous cohort study of approximately 22,000 underserved rural residents aged ≥ 60 years in Jiangsu Province, China (2018–2022), more than 80% had MetS and about 25% had persistent MetS, indicating suboptimal management. A subgroup of 549 patients with persistent MetS was further analysed. Their Use of guideline-recommended first-line medications was low across most components. Evidence also suggests gaps in medication knowledge among primary care pharmacists and limited health literacy in rural populations in China. These factors may contribute to the underuse of guideline-recommended therapies. This study aimed to identify knowledge gaps and information barriers and to propose strategies to improve pharmaceutical care.

Method: The study included two parts. First, the researchers' group conducted cross-sectional surveys in underserved areas of Jiangsu Province. Questionnaires were administered

to pharmacists (n=50) and patients with persistent MetS (n=200). Pharmacists were surveyed on knowledge of MetS, related medications, and drug information sources. Patients were surveyed on disease knowledge, medication-related problems, and perceptions of medication use. Second, A knowledge graph was developed using the latest MetS guidelines and structured according to a pharmaceutical care model. It was implemented using a Neo4j graph database for data storage, with NRD Studio used for data export and visualisation.

Results: A total of 46 valid questionnaires from pharmacists (92%) and 181 from patients (90.5%) were obtained. Among pharmacists, 19% could state diagnostic criteria for MetS. Only 4% correctly identified all guideline-recommended first-line medications for hypertension, diabetes, and dyslipidaemia. None recognised pharmacological options for weight loss. In addition, 63% relied on artificial intelligence tools as their primary drug information source. Among patients, 61% had never heard of MetS, while 90% were willing to take medications under professional guidance and accept potential adverse effects. These findings indicate substantial knowledge gaps in both groups. Given the key role of pharmacists in medication guidance and the high willingness of patients to follow advice, improving pharmacists' knowledge is essential. The researchers' group developed a knowledge graph based on current guidelines and a cyclical pharmaceutical care model (assessment–action–follow-up). It included 238 entities and 404 relationships, covering assessment parameters, medications with patient education information, and monitoring plans. It enables structured representation and visualisation of pharmaceutical care knowledge, facilitating large-scale knowledge storage, clear pathway representation, portability, and efficient retrieval.

Conclusion: Knowledge gaps among pharmacists in underserved areas of China may contribute to the underuse of guideline-recommended therapies in patients with persistent MetS. Strengthening pharmacists' knowledge support is essential to improve pharmaceutical care. The knowledge graph could provide a structured framework for organising and retrieving MetS-related evidence-based pharmaceutical care knowledge. It enables intuitive visualisation of care pathways, supports portable deployment across settings, and allows efficient knowledge access and updating. Future work will integrate this tool into pharmacist training and clinical practice to improve medication management and patient outcomes.

Parental perspectives on self-medication with antibiotics for children in the Ayawaso West District, Ghana: A cross-sectional study

Gideon Owusu Boateng¹, Maame Araba Wose Amfo¹

¹University Of Ghana, Accra, Ghana

Background: Antimicrobial resistance (AMR) is a critical global health threat driven by the inappropriate use of antibiotics. This problem is further exacerbated by the widespread practice of self-medication in low and middle-income countries. In Ghana, parental behaviour is a primary driver of antibiotic misuse in children, yet the relationship between socio-demographic factors and self-medication practices remains under-researched. This study explores factors driving parental administration of antibiotics to children and the knowledge-practice gap in an urban Ghanaian context to inform targeted public health interventions.

Objective: The objective of this study was to determine the prevalence of antibiotic use in children and investigate the relationship between parental demographics, knowledge levels, and self-medication practices within the Ayawaso West District in the Greater Region of Ghana.

Method: A cross-sectional survey was conducted between April and July 2023, involving 232 parents and guardians recruited from 16 community pharmacies in the Ayawaso West District. Ethical approval was obtained from the Ethics Committee of the University of Ghana School of Pharmacy prior to data collection. Data was collected via structured interviews using a tool adapted from the World Health Organisation (WHO) 'Antibiotic Resistance: Multi-Country Public Awareness Survey'. Statistical analysis was performed using SPSS (V.25), employing Pearson's Chi-square test to examine associations between categorical variables.

Results: The survey revealed that 123 (56.9%) parents had administered antibiotics to their children within the last six months, with 44 doing so within the past month. While 98 (79.7%) obtained antibiotics via professional prescription, significant misconceptions were identified: 48 (50.0%) believed it was acceptable to use antibiotics prescribed for friends or family, and 90 (91.8%) thought it appropriate to reuse the same antibiotics for recurring symptoms. Chi-square analysis demonstrated a significant relationship between educational level and the source of antibiotics ($\chi^2 = 5.88$, $p = 0.015$). Notably, parents with higher educational attainment were significantly more likely to engage in self-medication (34.4%) compared to those with basic or secondary education (17.9%). Furthermore, 148 (64%) incorrectly believed antibiotics treat viral infections, and 83 (35.8%) believed treatment should stop upon symptomatic relief. Additionally, 176 (76%) respondents mistakenly believed that the human body, rather than the bacteria, develops resistance.

Conclusion: This study highlights a substantial prevalence of antibiotic use among children in the Ayawaso West District, with many parents engaging in self-medication and demonstrating significant misconceptions about appropriate antibiotic use and antimicrobial resistance. These findings underscore the urgent need for targeted public health interventions, including community-based education to improve parental knowledge and promote responsible antibiotic use and strengthen antimicrobial stewardship efforts. In addition, stricter enforcement of existing regulation governing antibiotic use, particularly those outlined in Ghana's National Action Plan on Antimicrobial Resistance, is essential to reduce non-prescription access to antibiotics and curb practices that contribute to antimicrobial resistance.

Environmental concerns are not yet prominent in Belgian community pharmacies: Findings from a qualitative study

Estelle Wéry¹, Frédéric Lecomte¹, Geneviève Philippe¹

¹Department of Pharmacy, Center for Interdisciplinary Research on Medicines, Faculty of Medicine, University of Liège, Belgium, Liège, Belgium

Background: Climate change is widely recognised as a major public health threat, encompassing adverse mental health effects such as eco-anxiety. In parallel, recent studies have documented the significant environmental footprint of the pharmaceutical sector, highlighting both its considerable carbon emissions and its contribution to drug contamination of soil, water, and air, which is a major driver of ecosystem degradation. Community pharmacists (CPs) could play a key role in the transition toward sustainable healthcare by fostering rational medicine use, providing adherence support, thereby indirectly reducing drug consumption, supporting eco-responsible prescribing practices, and promoting the collection of expired and unused medicines.

Objective: As part of broader research on CPs' potential role in mental health, this study explored French-speaking Belgian pharmacists' knowledge of eco-anxiety and of the environmental impact of medicines, as well as whether patients bring up these issues during interactions at the pharmacy counter.

Method: A qualitative study was conducted, comprising twenty-two face-to-face semi-structured interviews with community pharmacists. Respondents displayed a wide and balanced range of demographic and professional profiles. Interviews were audio-recorded and transcribed verbatim. Pseudonymised transcripts were subjected to inductive content analysis supported by Taguette® software.

Results: Eco-anxiety is known by some CPs but unfamiliar to others, and pharmacists reported that patients rarely mention such concerns. Likewise, patients are generally unaware of pharmaceutical environmental impacts and do not spontaneously mention the issue, whereas pharmacists' awareness of drug ecotoxicity varies. Pharmacists who are mindful of these impacts, particularly those informed through education, tend to encourage more responsible patient behaviour. Despite the wide variety of knowledge and perceptions, an essential point emerged from the interviews: both pharmacists and patients appear to be actively involved in the environmentally sound disposal of expired and unused medicines.

Conclusion: The study suggests that improved training could raise pharmacists' awareness of drug pollution. Understanding how active ingredient choice, administration route, and dosage form affect the environmental impact of drugs would enable them to guide patients toward more sustainable medication use when a non-pharmacological alternative is lacking. It might also create opportunities for pharmacists to support prescribers in considering the environmental footprint of medicines when evaluating treatment options.

Australian trends and costs of potentially inappropriate medication use in older adults

Yannee Liu¹, Justin Turner¹, Zanfina Ademi¹, Emily Reeve¹

¹Monash University, Melbourne, Australia

Background: Potentially inappropriate medications (PIMs) are defined as medications where the potential for harm outweigh the potential for clinical benefits, particularly when used in older adults. Prevalence of PIM use is increasing in developing countries. Globally, PIMs are associated with increased costs for patients, the government and health systems. The aim of this project is to identify trends in utilisation and costs of commonly dispensed PIMs in Australia.

Method: This is a retrospective analysis of publicly available data from the Pharmaceutical Benefits Scheme (PBS). This dataset captures all Australians who received medications dispensed and subsidised under the PBS from 2014 and 2024. Variables include the top fifty medications dispensed by volume for all ages, top ten medications dispensed for older adults (≥60 years, age and sex breakdown) and top 10 PBS medications dispensed for residents of aged care facilities. Government and patient costs for PIMs were also extracted. PIMs were defined using explicit tool such as the American Geriatrics Society Beers 2023 and STOPP version three criteria.

Results: In 2024, the majority (67%) of medications dispensed via the PBS were to people aged 60 years or older. In 2014, thirteen of the top fifty highest volume PBS medications were considered PIMs. In comparison, eight of the top fifty higher volume medications were categorised as PIMs in 2024. The cumulative cost of these eight PIMs was approximately more than \$400 million for the Australian Government. The cumulative patient contribution was approximately greater than \$110 million. In 2024, two of the top ten medications dispensed to both older males and females were PIMs, being pantoprazole and esomeprazole. In residential aged care facilities, two of the top ten PBS medications dispensed by highest prescription count are PIMs in 2024. These are pantoprazole and buprenorphine. In both years, frequently dispensed PIMs included proton pump inhibitors, gabapentin, opioids, NSAIDs, benzodiazepines and sulfonylureas. In 2024, one in two older adults (52%) have been dispensed a PIM.

Conclusion: Nationally, of the top fifty highest volume PBS subsidised medications, 26% are classified as PIMs in 2014, reducing to 16% in 2024. Proton pump inhibitors are the most commonly dispensed PIM. One strength of this data is the use of national dispensing data. The term “potentially” inappropriate is used because the data does not contain duration of use or patients’ clinical data. Additionally, PIMs lists are designed specifically for older adults, however, the top fifty high volume PBS medication list reflects prescribing across all age groups. This study demonstrates that PIMs are becoming less prevalent in the top fifty high volume dataset, yet, use remains high among older adults. However, a more detailed analysis of pharmacy claims data is required to assess the trends in utilisation and costs of PIMs in older Australians nationally.

Community pharmacist-delivered mental health care under a collaborative practice agreement: a retrospective chart review

Holly Mansell¹, Katelyn Halpape, Kelly Buxton, David Blackburn

¹University Of Saskatchewan, Saskatoon, Canada

Background: Community pharmacists in Canada are increasingly integrating clinical services into their everyday practice. In Saskatchewan, a collaborative practice agreement (CPA) between community pharmacists and a regional psychiatrist was established within a provincial pilot project to improve access to timely mental health assessment and medication management. While the service was implemented to address gaps in follow up and continuity of care, the specific activities delivered under the CPA had not been formally described.

Objective: This study aimed to characterize patients accessing the service, summarize pharmacist interventions, and evaluate visit level outcomes.

Method: A retrospective chart review was conducted of all patients receiving mental health services under the CPA at a pilot pharmacy between February 1, 2024, and July 15, 2025. Clinical data were abstracted from the provincial mental health record and pharmacy dispensing software. A data collection tool created by the research team was piloted and refined prior to full abstraction. Two research-trained pharmacy students completed data extraction, with early entries reviewed by the research coordinator to ensure quality and consistency. Extracted variables included demographics, psychiatric diagnoses, chief complaint, visit type, and the pharmacist’s assessment summary. Pharmacist interventions were categorized as medication management, medication education, collaboration, referral, system navigation, or triage. Clinic documentation was reviewed to determine whether the patient’s chief complaint was resolved during the encounter; for those with multiple visits, documentation was reviewed for evidence of symptom improvement over time.

Results: Twenty-four patients accessed the community pharmacy mental health service over the 17 months, accounting for 61 clinic visits (mean 2 visits per patient; range 1–8). Most patients self-referred (71%) and were seen in person (85%). Common psychiatric diagnoses included depression (71%), anxiety (54%), borderline personality disorder (33%), bipolar disorder (25%), and substance use disorders (21%), with many patients presenting with more than one diagnosis. A total of 111 pharmacist interventions were documented. Medication management activities were the most frequent interventions, occurring in 70% of visits. They included medication initiation or discontinuation (42%), dose or formulation changes (39%), and laboratory monitoring (20%). Patient education was provided in 39% of visits and referrals were made in 11% of visits. Direct communication with the psychiatrist’s office was documented in 8% of encounters. A follow up plan was included in 90% of all visits. Overall, the patient’s chief complaint was assessed as resolved in approximately two-thirds of visits (65%). Among the 12 patients with more than one visit, 67% demonstrated documented improvement in mental health symptoms over time, while the remaining patients were stable (n=3) or reported worsening symptoms (n=1), prompting a medication change.

Conclusion: Community pharmacists practicing under a CPA provided diverse mental health services, with medication management and patient education being the most frequently reported interventions. Most patient concerns were resolved during the visit, and the majority of patients seen for multiple encounters experienced symptom improvement. These findings demonstrate the value of pharmacist delivered mental health care in collaborative models in rural communities. Further research should examine longer term patient outcomes and scalability across additional practice sites.

Task shifting of pharmaceutical supply management in low- and middle-income countries: A scoping review to guide a training programme in South Africa.

Tiisetso Chuene¹, Tshifhiwa. S Netshapapame¹, Linneth. N Mabila²

¹University Of Limpopo, Department of Public Health, Polokwane, South Africa

²University of Limpopo, Department of Pharmacy, Polokwane, South Africa

Background: Shortages of healthcare personnel in primary healthcare (PHC) clinics remain a major challenge in low- and middle-income countries (LMICs). To maintain continuous service delivery, nurses and pharmacist assistants are increasingly taking on responsibilities for pharmaceutical supply management through task shifting. These tasks include stock management, medicine dispensing, ordering, and reporting. While task shifting can improve access to essential medicines, concerns about the preparedness, training, and support of healthcare workers performing these tasks persist. Evidence on the implementation of pharmaceutical supply management in PHC clinics in LMICs and the training requirements associated with it is limited.

Objective: To map existing evidence on task shifting in pharmaceutical supply management in PHC clinics in LMICs, and to identify related training needs to guide the development of a targeted training programme for healthcare workers in Limpopo Province, South Africa.

Method: The scoping review was conducted using the Arksey and O'Malley framework and reported in accordance with the PRISMA Extension for Scoping Reviews (PRISMA-ScR) guidelines. Electronic databases, including PubMed, Web of Science, Sabinet, Google Scholar, and EBSCOhost, were searched for studies published in English between 2015 and 2026 that examined task shifting of pharmaceutical supply management in PHC settings in LMICs. Titles, abstracts, and full texts were screened by the primary investigator, with verification by two reviewers to ensure methodological rigor. Data were extracted using a standardised form and synthesised through descriptive statistics and thematic analysis.

Results: A total of 33 studies met the inclusion criteria. Four main themes were identified: (1) pharmaceutical supply management practices carried out by healthcare workers, (2) challenges and barriers related to task shifting, (3) policy, governance, and support structures, and (4) effects on service delivery and patient outcomes. Although task shifting improved access to essential medicines in PHC settings, inconsistencies in implementation and gaps in training were frequently reported across LMICs, underscoring the need for targeted training programmes to strengthen pharmaceutical

supply management competencies among nurses and pharmacist assistants in PHC settings.

Conclusion: Task shifting in pharmaceutical supply management is common in PHC clinics in LMICs; however, the review identified frequent inconsistencies in implementation and a lack of formal training and structured support for healthcare workers performing these duties. These findings highlight critical gaps in workforce capacity and emphasise the need to develop targeted training programmes and strengthen supervision and support mechanisms to improve pharmaceutical supply management practices among nurses and pharmacist assistants in PHC clinics in Limpopo Province, South Africa.

Pharmacy practice in one health: A scoping review of collaborative roles between veterinarians and pharmacists

Dan Kambayashi¹, Shota Suzuki², Masayoshi Hirohara¹

¹Showa Pharmaceutical University, Machida, Tokyo, Japan

²Wakayama Medical University, Wakayama, Japan

Background: In recent years, the "One Health" concept has gained significant global traction, highlighting the interconnectedness of human, animal, and environmental health. Within this framework, pharmacists are increasingly recognised as vital contributors to veterinary healthcare teams, moving beyond traditional dispensing roles to provide specialised clinical support. However, despite the potential benefits for patient safety and therapeutic outcomes, the specific scope of these collaborative practices and the degree of mutual professional recognition between veterinarians and pharmacists vary substantially across different regions and regulatory environments. This lack of a consolidated evidence base hinders the development of standardised collaborative models.

Method: A systematic scoping review was conducted to examine the roles, practices, and professional perceptions associated with veterinarian–pharmacist collaboration in veterinary medicine. Following the PRISMA-ScR (Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews) guidelines, two independent researchers performed a comprehensive search across multiple electronic databases, including PubMed, Web of Science, the Cochrane Library, and Ichushi-Web. Additionally, Google Scholar was utilised to identify relevant grey literature to ensure a broad capture of international practices. The search covered the period from database inception to August 2025, including studies published in both English and Japanese. Records were independently screened at the title/abstract and full-text levels using predefined eligibility criteria to identify relevant peer-reviewed and professional literature.

Results: The initial search yielded 239 records, from which 16 studies published between 2007 and 2024 were ultimately included in the review. The majority of the evidence originated from the United States ($n = 7$), New Zealand ($n = 3$), and Japan ($n = 3$), with most studies employing cross-sectional survey designs. Data analysis revealed that pharmacist roles most frequently involved the compounding and dispensing of medications for animal patients (62.5% of included studies). This was followed by the provision of drug information (DI) and clinical consultation support (37.5%), inventory and supply chain management (25.0%), and client education regarding medication administration (18.8%). A smaller proportion of studies addressed safety protocols and exposure control for hazardous substances (12.5%). The findings highlight that while there is an emerging interest in collaboration, mutual understanding of professional boundaries remains a significant challenge.

Conclusion: This scoping review demonstrates that veterinarian–pharmacist collaboration is currently described within a limited and regionally variable evidence base. While pharmacists primarily contribute through compounding, dispensing, and drug information support, there is a clear opportunity to expand these roles to enhance medication safety in the veterinary sector. To achieve sustained and scalable implementation of such collaborative models, it is essential to improve mutual understanding of professional competencies, strengthen veterinary-specific education within pharmacy curricula, and conduct more robust empirical research. These efforts are crucial for integrating pharmacy expertise effectively into the One Health agenda and ensuring the highest standards of care for all species.

Clinical pharmacy services in an urgent care centre in Saskatchewan, Canada

Zack Dumont¹

¹Saskatchewan Health Authority, Regina/Saskatchewan, Canada

Background: Shortages of care providers are widely reported in Canada. Data indicates the province of Saskatchewan is behind the national average for family physicians per 100000 residents (115 vs 119). This shortage was partially addressed through the Saskatchewan Health Authority's (SHA) opening of an Urgent Care Centre (UCC) in the provincial capital, Regina. It was designed to provide patient care in non-life-threatening situations requiring same-day attention but not warranting a trip to the emergency department; somewhere between primary care and acute emergency services. Through engagement and advocacy, it was decided that clinical and distributive pharmacy services would be included in the model of care at the UCC. There was a known need for medication supply, but a question remained as to what clinical pharmacy services should be offered. Ultimately, it was determined the UCC would include a dedicated, on-site,

integrated clinical pharmacist 12 hours/day, 7 days/week, with relief. Pharmacists practicing at UCC follow a provincial clinical standard, which outlines fundamental pharmacist services for patients within the healthcare-system, as well as providing enhanced clinical services such as responding to medication management consults, providing education, and aiding in transitions of care. We aim to continuously collect and share metrics and data to complement qualitative and anecdotal reports, all as part of a) ongoing efforts to demonstrate the value of clinical pharmacists, as well as, b) to ensure continuous quality improvement of pharmacy practice.

Method: SHA Provincial Pharmacy Services use an electronic system, referred to as AIM-High, to capture clinical pharmacy key performance indicators and activities/functions with pharmacist involvement, for example, resolution of drug-related problems, use of prescriptive authority, documentation in the medical record, and more. We used reports from the AIM-High system to evaluate practice and report herein the results from the first year of operation.

Results: In the first year of operation – Jul 2024 to Jul 2025 – a total of 1202 pharmacist interventions resulting in a change to medication therapy were tracked. Most commonly, pharmacists intervened to 'Initiate medication therapy' (58% of interventions recorded). The three next most common interventions were 'dose changed', 'Patient/family education provided', and 'Monitoring ordered'. The least common interventions (starting with the most infrequent and ascending): 'Adverse event or drug interaction', 'Drug discontinued', and 'Route or drug changed within class'. The proportion of interventions using pharmacist prescriptive authority were low; pharmacist prescriptive authority at the time of this monitoring was limited to high-risk, inpatient-use medications (eg, vancomycin and aminoglycoside).

Conclusion: This UCC clinical pharmacy practice provides further evidence for integration of on-site pharmacy services rather than remote ad hoc services and/or only private community pharmacy support. A UCC pharmacy practice roadmap has been developed, and these data will be used to measure practice change initiatives. For example, as policy evolves, there may be opportunities to increase the proportion of pharmacy interventions that include prescriptive authority. Lastly, planning is underway for the establishment of additional UCCs throughout the province. This demonstrated clinical pharmacy practice will bolster advocacy efforts to ensure funding and resourcing are in place.

Pharmacist interventions in ambulatory cancer care

Ylenia Marie Xerri, Anthony Serracino-inglott¹

¹Department of Pharmacy, Faculty of Medicine and Surgery, University Of Malta, Msida, Malta

Background: Cancer treatment has drastically evolved over the years, leading to the transition of cancer care from an inpatient to an outpatient setting. Intravenous chemotherapy can now be safely administered at home with the use of ambulatory chemotherapy pumps, whilst many anticancer medications are available orally and dispensed from community pharmacies. The aims were to identify pharmacist interventions that support cancer patients in the community, analyse challenges associated with pharmacist interventions in cancer care and propose solutions to address the associated challenges.

Method: A questionnaire was developed to investigate the interventions carried out by community pharmacists to support cancer patients and to determine their perceptions regarding future roles in cancer care. The questionnaire was validated through a pilot study and disseminated to community pharmacists in Malta and Gozo. Collected responses were analysed and the challenges associated with pharmacist interventions in cancer care were identified. A focus group was then conducted with a doctor, a nurse and a clinical pharmacist working at Sir Anthony Mamo Oncology Centre (SAMOC). During the first part of the discussion, the panel reviewed the questionnaire findings. In the second part, the discussion focused on the use of ambulatory chemotherapy pumps in Malta, particularly the current and potential roles of pharmacists in this service.

Results: A total of 81 community pharmacists responded to the questionnaire. Patients seek advice from community pharmacists regarding medications (n=63), side effects management (n=62) and guidance on nutrition and lifestyle (n=34). A small percentage of pharmacists feel highly confident in providing cancer-related advice (n=6) and in dispensing anticancer medications (n=7). Lack of training and knowledge (n=65) and limited collaboration with other healthcare professionals (n=59) were the most prevalent barriers to carrying out cancer care interventions. During the focus group, the panel proposed initiatives to target the associated challenges. Educational initiatives could include targeted lectures and the inclusion of community pharmacists in oncology conferences. Collaboration could be strengthened through regular meetings between primary and secondary care representatives, as well as providing community pharmacies with access to relevant patient information from the oncology specialists. The panel further proposed the establishment of an online database with monographs for each oral anticancer agent. Three clinical pharmacists are currently working at the oncology hospital. Their role primarily involves validating prescriptions and verifying treatment protocols. The panel agreed that

pharmacists should have a greater clinical role, including patient counselling, medication management and reconciliation, monitoring of adverse effects and drug interactions and enhanced clinical presence on the wards.

Conclusion: The findings of this study highlight that lack of training and knowledge is the most significant challenge community pharmacists face in cancer care interventions. Despite their lack of confidence, community pharmacists are willing to intervene, emphasising the need for targeted training programmes and enhanced collaboration with healthcare teams. Clinical pharmacists' roles in ambulatory care also have the potential to expand to include direct patient care activities. Addressing these gaps would allow pharmacists' expertise to be fully utilised, which not only strengthens multidisciplinary care but ultimately enhances patients' quality of life.

Evaluation of a multidisciplinary international webinar training healthcare professionals to help patients take their 'pills' with ease

Alice McCloskey¹, Peter Penson¹, Michaela Nuttall², Una O'Connor², Emma Lim³

¹School of Pharmacy and Biomolecular Sciences Liverpool John Moores University, Liverpool, United Kingdom

²Learn With Nurses, London, United Kingdom

³Great North Children's Hospital, Newcastle, United Kingdom

Background: Up to 54% of adults globally struggle to swallow solid oral dosage forms (commonly referred to as pills). Healthcare professional education assumes that this is a known skill and routinely these are prescribed for adult patients. However, there is a clear need to screen for and address pill swallowing difficulties using validated techniques. There are several screening tools reported in the literature including PILL-5, SWAMECO and the Sydney Swallow Questionnaire. In terms of teaching pill swallowing, KidzMed is an example of such a technique that has proven effective in training both children and adults to swallow pills with ease. Despite reference to medicines management in healthcare curricula there is typically no specific mention of pill swallowing therefore this is often overlooked. This study sought to address the knowledge gap and train healthcare professionals about identifying and addressing pill swallowing using an international multidisciplinary webinar facilitated by Learn With Nurses.

Method: Ethical approval was obtained (22/PBS/006) and participants recruited when registering for a pill swallowing webinar on the "Learn With Nurses" training platform. They were invited to complete three e-questionnaires: 1. pre-webinar to determine own pill swallowing experiences, 2. post-webinar to explore views of the training, and 3. follow-

up to measure impact on practice. All healthcare professionals attending the webinar were eligible to participate in the study- and participation was not essential for attendance. During the webinar delegates were introduced to key statistics relating to pill swallowing difficulties in the general population, and taught about the KidzMed technique to help patients overcome this issue. All data was captured via MSForms and exported to MSExcel where qualitative data was collated then tabulated, and descriptive statistics applied to quantitative data.

Results: Overall, 59 people completed the pre-questionnaire, most were nurses with global representation from nine countries. Some participants self-reported pill swallowing difficulties (17, 28.8%), and few had received formal training on the topic. The webinar was well-received with many commenting on its usefulness for practice. It also significantly increased confidence on the topic ($p < 0.001$). Participants were enthusiastic to apply their learning in practice. The follow-up questionnaire outlined its positive patient impact, participants reported sharing their learning with colleagues, and applying their learning to family and patients. This highlights the immediate impact and change to practice following the learning.

Conclusion: Pill swallowing training is a global problem and a missing element in healthcare professional education. Webinars are a useful tool for qualified healthcare professionals to continue learning once in practice. It is facile to deliver a workshop such as this online to a multidisciplinary and international audience with benefits for education and practice.

Pharmacokinetic characteristics and clinical benefits of an over-the-counter long-acting ibuprofen as an alternate to naproxen

Richard Petruschke¹, Karin Nicholson¹, Peter Gao²

¹Haleon, Quakertown, Pennsylvania,, United States

²Medical Affairs, Haleon, Mississauga, ON,, Canada

Background: Historically, naproxen has been the only over-the-counter (OTC) oral analgesic that provides 12 hours of pain relief. Recently in Canada, an OTC analgesic was introduced with ibuprofen as that has a bilayer design with a immediate release (IR) 200 mg layer and an extended release (ER) 400 mg layer (IBU IR/ER) that provides an initial bolus of ibuprofen followed by gradual delivery of ibuprofen over 12 hours. In clinical studies of IBU IR/ER, the product provided 12 hours of continuous pain relief with a single tablet. The purpose of this evaluation was to review the single dose (SD) and multidose (MD) pharmacokinetics of IBU IR/ER, and how it's clinical performance compares to naproxen 220 mg IR (NAP).

Method: The IBU IR/ER was formulated to deliver IBU continuously and gradually over 12 hours. Single dose and MD pharmacokinetic (PK) studies were conducted to quantify the absorption and distribution of IBU, and documented AUC, Cmax, and Tmax as key measures. Both PK studies compared the IBU IR/ER to comparable doses of IBU 200 mg given every 4 hours. A SD clinical study using the dental pain model (third molar extraction) was conducted to compare IBU IR/ER, NAP, and placebo (PBO). The key endpoints in the clinical study were sum of pain intensity difference scores from 0 to 12 hours (SPID 0–12), time to first perceptible relief (TFPR), and time to treatment failure (TTF).

Results: The SD and MD PK studies confirmed the comparable AUC and Cmax of IBU IR/ER (AUC SD 195.7, MD 210.5, and Cmax SD 33.0, MD 37.3), and IBU 200 mg (AUC SD 193.4, MD 235.0, and Cmax SD 29.2, MD 34.4). In both PK studies, Tmax was shorter with IBU IR/ER (Tmax SD 2.7, MD 2.1) compared to IBU 200 mg (Tmax SD 5.1, MD 4.8). In the clinical study, IBU IR/ER had a SPID 0–12 significantly better than NAP ($p=0.003$) and PBO ($p<0.001$). The TFPR was significantly faster with IBU IR/ER (29.4 minutes) than NAP (32.1 minutes, $p=0.026$) and PBO (>6 hours, $p<0.001$). The TTF was comparable with IBU IR/ER and NAP (>24 hours), and significantly longer than PBO (1.7 hours, $p<0.001$). Implications: The SD and MD PK studies demonstrated with the AUC curves and Cmax that the IBU IR/ER and IBU 200 mg three doses every 4 hours have similar absorption and distribution. The Tmax values demonstrated the IBU IR/ER reaches peak exposure faster than IBU 200 mg three doses every 4 hours. The clinical study confirmed that IBU IR/ER works faster (TFPR) and better (SPID 0–12) than NAP for pain relief, with similar duration (TTF) of pain relief. These benefits support IBU IR/ER as a long-acting pain reliever (that maintains IBU's fast onset) and an alternative to NAP, which is as an option to manage common pain types OTC.

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An assessment of the level of stress and coping strategies among college of health sciences students

Mercy Opare-addo¹, Afia Frimpomaa Asare Marfo¹, Deborah Oghenetejiri Akpovwovwo¹, Kwabena Offe Amponsah¹, Janet Ofosua Ameyaw¹, Pauline Boachie -ansah¹

¹Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

Background: Stress is a psychological state of worry or tension triggered by challenging situations (World Health Organization, 2023). While stress is a natural human response that helps individuals confront threats, reactions vary. For some, stress diminishes as situations improve or coping strategies develop; for others, it may escalate, leading to substance use or aggravating mental health conditions such as depression and anxiety.

Objective: This study assessed the prevalence, causes, and coping strategies of stress among students in the College of Health Sciences, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana.

Method: This study employed a cross-sectional quantitative design using purposive and convenience sampling to recruit 351 undergraduate students from the College of Health Sciences, KNUST. Purposive sampling ensured inclusion of relevant participants, while convenience sampling was based on availability and willingness. Students who were mentally ill or unwell at the time of data collection were excluded. Data were collected using structured questionnaires administered via Google Forms, adapted from the Undergraduate Stress Questionnaire (USQ) and the Brief-COPE scale, along with demographic information. Data analysis was conducted using Microsoft Excel and chi-square tests to examine associations between stress, coping strategies, and demographic variables. Coping strategies were categorized into problem-focused and emotion-focused approaches.

Results: The study involved 351 College of Health Sciences students at KNUST, predominantly aged 21–25 years and mostly female. A high prevalence of stress was observed, with 94% of students reporting experiencing stress. Although females reported slightly higher stress levels than males, no statistically significant association was found between stress and gender or academic year, despite stress peaking in the fourth year. Ghanaian students reported higher stress levels compared to international students. Pharmacy and Medical students experienced the highest levels of stress. The main stressors identified were financial constraints, academic workload (including exams and unfinished work), sleep deprivation, and concerns about the future. While stressors did not significantly differ by gender, some, such as isolation, lack of social support, peer pressure, and working while in school, were significantly associated with programme of

study. Emotion-focused coping was the most used strategy, followed by problem-focused and avoidant coping. Overall, stress among students is widespread and primarily driven by academic and financial pressures.

Conclusion: The study revealed very high stress levels (94%) among health science students, mainly linked to financial strain, heavy academic workload, isolation, weak social support, and difficulty following lectures. Stress affected both genders, slightly more in females, and was most pronounced among pharmacy students. Levels rose steadily from first to fourth year, peaking with academic demands, then declined as students adapted. Most relied on emotion-focused coping, sometimes maladaptive, underscoring gaps in effective stress management. The study recommends stronger counselling and stress-management programmes, better academic support through feedback and tutorials, recreational activities, financial aid, and regular monitoring of stress trends to guide interventions.

Disposal of unused medications among students in the college of health sciences, KNUST

Mercy Opare-addo¹, Derick Kwaku Obeng Adjei¹, Obed Kwabena Amponsah¹, Janet Ofosua Ameyaw¹, Akua Asantewaa Appiah-num Safo¹

¹Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

Background: Improper disposal of unused and expired medications poses serious environmental and public health risks, contributing to contamination of water systems, antimicrobial resistance, and accidental poisonings. Globally, safe medicine disposal has become a pressing concern, yet practices remain inconsistent and poorly regulated, particularly in low- and middle-income countries. In Ghana, where pharmaceutical access is expanding, evidence on the knowledge, attitudes, and practices of medicine disposal among healthcare students, the future custodians of rational and safe medicine use remain limited. Understanding their awareness and behaviors is critical to shaping effective educational interventions, strengthening policy frameworks, and safeguarding both public health and the environment.

Objective: To assess knowledge, attitudes, and practices regarding medication disposal among students of the College of Health Sciences at KNUST, and to identify barriers to safe disposal practices.

Method: A cross-sectional descriptive study was conducted from June to August 2025 among 400 undergraduate students of the College of Health Sciences at KNUST. Participants were recruited using stratified random sampling across five disciplines: pharmacy, medicine, nursing, public health, and medical laboratory sciences. Informed consent

was obtained from all participants prior to data collection. Data were collected through structured, self-administered questionnaires and analyzed with SPSS version 25. Descriptive statistics were used to summarize participants' characteristics and responses.

Results: The study revealed that half of the students (50.8%) had unused or expired medications. The most common disposal method reported was discarding medicines in household trash (56.2%), while only 7.8% returned them to pharmacies or health centers. Although 68.5% of respondents had received some education on proper disposal, just 50.2% correctly identified returning unused drugs to pharmacies as the recommended practice. Nearly half (46.8%) consistently checked expiry dates, but awareness of national drug disposal policies was very low (21.5%). A majority (76.5%) recognized improper disposal as a public health issue, 96.2% supported incorporating drug disposal education into the health sciences curriculum, and 70% expressed personal responsibility for safe disposal. The main barriers identified were lack of awareness (80%) and inaccessible disposal options (46.8%), though a majority expressed willingness to join campus (57.2%) and community (61%) take-back programs.

Conclusion: The study concluded that despite moderate awareness and positive attitudes, unsafe disposal practices remain widespread among health science students, primarily due to knowledge gaps, poor infrastructure, and limited policy visibility. The findings highlight the urgent need for structured education, accessible disposal systems, and stronger policy enforcement to reduce risks of accidental ingestion, misuse, and environmental contamination. Students' strong support for disposal education and willingness to participate in take-back programs suggest that targeted interventions could significantly improve safe medication disposal practices.

Depressive symptoms and associated factors among Pharmacy students at a Brazilian public university: a cross-sectional study

Pedro Douglas Alves Braga¹, Vinícius Ribeiro¹, João Pedro Hermes Moraes¹, Paulo Henrique De Lima Gomes¹, Ernani Vieira Vasconcelos Filho¹, Thais Teles De Souza¹, Walleri Christini Torelli Reis¹

¹UFPB, João Pessoa, Paraíba, Brazil

Background: Depressive disorders among university students have been recognised as a significant public health issue, particularly in health-related courses characterised by high academic and emotional demands. In Pharmacy programmes, this issue is especially relevant, as training involves intensive theoretical workload, increasing responsibilities and progressive exposure to healthcare-

related contexts. Identifying the magnitude of depressive symptoms and their associated factors in this group may support institutional strategies for mental health promotion, prevention and support. This study aimed to assess the frequency of depressive symptoms and their association with sociodemographic and academic characteristics among Pharmacy students.

Method: This was a cross-sectional observational study conducted at a public university in Brazil. A total of 122 participants were included. Depressive symptoms were assessed using the Patient Health Questionnaire-9 (PHQ-9), considering both the total score and the cut-off point of ≥ 10 for clinically relevant symptomatology. The variables analysed included age, academic year, gender, income, race/ethnicity and suicidal ideation. As PHQ-9 scores were not normally distributed, non-parametric tests and Spearman's correlation were used, adopting a 5% significance level.

Results: The mean age was 21.3 ± 3.89 years. The mean PHQ-9 score was 11.1 ± 6.89 , with a median of 10.0 and a range from 0 to 27. Non-normal distribution was observed (Shapiro-Wilk = 0.952; $p < 0.001$). Overall, 65 students (53.3%) had PHQ-9 scores ≥ 10 . Regarding gender, 35 (28.7%) were male, 86 (70.5%) female and 1 (0.8%) non-binary; for inferential analysis, males and females were compared, with significantly higher scores among females (12.1 vs 8.26; Mann-Whitney U = 1024; $p = 0.006$). Suicidal ideation was reported by 27 students (22.1%), who presented higher scores (19.3 vs 8.81; U = 228; $p < 0.001$). A negative correlation was found between academic year and PHQ-9 score ($\rho = -0.225$; $p = 0.013$). No significant associations were found with age ($p = 0.315$), income ($p = 0.540$) or race/ethnicity ($p = 0.367$).

Conclusion: A high frequency of depressive symptoms was observed among Pharmacy students, with more than half of the sample presenting clinically relevant scores. Higher symptom severity among females and students with suicidal ideation highlights the importance of mental health screening in university settings. The inverse association with academic year suggests greater vulnerability in earlier stages of training, reinforcing the need for continuous institutional strategies for mental health support, monitoring and care.

Pedagogical quality and alignment with scientific evidence in health content produced by pharmacist influencers in Brazil: a cross-sectional study

João Pedro Hermes Morais¹, Wallace Entringer Bottacin², Pedro Douglas Alves Braga¹, Paulo Henrique De Lima Gomes¹, Vinícius Ribeiro¹, Ernani Vieira Vasconcelos Filho¹, Thais Teles De Souza¹, Walleri Christini Torelli Reis¹

¹UFPB, João Pessoa, Paraíba, Brazil

²UFPE, Recife, Pernambuco, Brazil

Background: Social media has assumed a central role in the dissemination of health information and in shaping public attitudes. While it expands access to knowledge, it also facilitates the spread of content with heterogeneous scientific quality, particularly in short and widely disseminated formats. In the field of Pharmacy, this context is especially relevant, as information on medicines and self-care may influence decisions and directly impact patient safety. In this scenario, pharmacists may play a strategic role in addressing misinformation by translating scientific evidence into accessible digital content. This study aimed to evaluate the pedagogical quality and alignment with scientific evidence of health information disseminated by pharmacist influencers in Brazil.

Method: A cross-sectional observational study was conducted using content from Instagram and TikTok. Between November 2024 and March 2025, 70 Brazilian pharmacist influencer profiles were identified, and the 20 with the highest engagement were selected. From each profile, 20 health education videos were analysed, totalling 400 videos. Transcriptions were evaluated using the Health Educational Content Validation Instrument (IVCES) and the Evidence-Based Health Assessment Section (SASBE). Descriptive statistics, Pearson correlation and simple linear regression were applied.

Results: The 400 analysed videos demonstrated high performance in both instruments. The mean IVCES score was 32.04/36 (95% CI 31.64–32.45), corresponding to 89.0% pedagogical adequacy. The mean SASBE score was 9.25/12 (95% CI 9.00–9.49), equivalent to 77.08% alignment with scientific evidence. A significant positive correlation was observed between the scores ($r=0.647$; $p<0.001$). Linear regression showed that IVCES scores significantly predicted SASBE scores ($R^2=0.418$; $b=0.391$; $p<0.001$). Higher performance was observed in thematic adequacy, accessible language and engagement, whereas lower scores were found in critical appraisal of evidence and stimulation of reflective thinking.

Conclusion: Brazilian pharmacist influencers demonstrate relevant potential in digital health education by combining

pedagogical quality with satisfactory scientific alignment. However, gaps remain in the critical and contextualised presentation of evidence and in translating knowledge into decision-making support. Strengthening transparency and critical approaches may enhance the reliability of such content and contribute to safer self-care practices.

Pharmacists' role in mental health services in Brazil: where are we and where are we going? An experience report on a national integrated agenda

Vinícius Ribeiro¹, Wallace Bottacin³, Aline De Fátima Bonetti⁵, Thais Teles De Souza⁴, João Samuel De Morais Meira², Walter Jorge João², Walleri Christini Reis¹

¹Post Graduate Program in Health and Decision Models, João Pessoa, Paraíba, Brazil

²Brazilian Federal Council of Pharmacy, Brasília, Distrito Federal, Brazil

³Universidade Federal de Pernambuco, Recife, Pernambuco., Brazil

⁴Universidade Federal da Paraíba, João Pessoa, Paraíba., Brazil

⁵Complexo de Hospitais de Clínicas da Universidade Federal do Paraná, Curitiba, Paraná., Brazil

Background: Mental health has become a major public health priority, requiring long-term care, safe use of medicines, support for adherence and stigma reduction. In this context, pharmacists can play a strategic role through medication management, health education, pharmacotherapy review and collaborative practice within healthcare networks. In Brazil, Resolution CFF No. 6/2025 marked an important milestone by regulating pharmacists' qualification in mental health and defining specific clinical responsibilities. However, translating this regulatory advance into nationwide practice requires more than formal recognition, demanding coordinated action across education, evaluation, research and evidence generation. This raises a key question: where are we and where are we going?

Objective: To describe the development of a national agenda aimed at strengthening pharmacists' role in mental health services in Brazil through continuing professional development, evaluation, research and evidence production.

Method: This experience report describes the development of a national strategy to strengthen pharmacists' practice in mental health, implemented within continuing professional development and led by the Federal Pharmacy Council in partnership with the Federal University of Paraíba and the Federal University of Pernambuco. The initiative integrated four components: a mental health certification course; an evaluation study using a pre- and post-intervention design with follow-up; the planning of a national survey to

characterise pharmacists' practice in mental health; and the development of evidence syntheses to support practice and decision-making. A macroscopic analytical approach was adopted, focusing on the organisational arrangement and its capacity to integrate education, research and evidence within a national agenda.

Results: The initiative consolidated an integrated model to characterise, strengthen and promote pharmacists' role in mental health, addressing gaps in training, service provision and knowledge production simultaneously. Rather than isolated actions, a coordinated framework was established linking continuing professional development, evaluation, research and evidence synthesis. The 120-hour mental health certification course functioned as the central driver of the strategy and was initially implemented across pilot sites in different regions of the country. In this phase, 2,107 individuals enrolled, with 1,155 active participants, demonstrating strong initial engagement and scalability. An evaluation process was designed to generate evidence on changes in knowledge, perceptions and readiness to implement services. In parallel, a national survey was planned to map pharmacists' practice in mental health, identifying barriers, facilitators and regional needs. Evidence syntheses also provided strategic support for pedagogical, institutional and clinical decision-making. This approach shifted the discussion from isolated training initiatives towards a structured national agenda focused on capacity building and strategic intelligence.

Conclusion: Expanding pharmacists' role in mental health requires more than isolated training initiatives, demanding integrated approaches that combine professional development, evidence generation and understanding of national practice. In Brazil, this strategy represents an important step towards establishing mental health as a priority area within pharmacy practice and supporting more qualified, equitable and evidence-based services. The model has potential for replication in other contexts.

National coordination of continuing professional development for pharmacists in Brazil: an experience report

Walleri Christini Reis¹, Thais Teles De Souza², Vinícius Ribeiro¹, Wallace Bottacin³, Aline De Fátima Bonetti⁶, Cinthia Caldas Rios⁴, João Samuel De Moraes Meira⁵, Walter Jorge João⁵

¹Post Graduate Program in Health and Decision Models, João Pessoa, Paraíba, Brazil

²Universidade Federal da Paraíba, João Pessoa, Paraíba, Brazil

³Universidade Federal de Pernambuco, Recife, Pernambuco., Brazil

⁴Universidade Federal de Sergipe, Aracaju, Sergipe, Brazil

⁵Brazilian Federal Council of Pharmacy, Brasília, Distrito Federal, Brazil

⁶Complexo Hospital das Clínicas, Curitiba, Paraná, Brazil

Background: Continuing professional development is essential for strengthening health systems, particularly in contexts marked by regional inequalities and rapidly evolving healthcare demands. In pharmacy, the need for continuous training is intensified by the increasing complexity of clinical practice and the expansion of professional roles. Implementing structured, scalable and sustainable national training strategies therefore remains a significant challenge, especially in countries with large territorial dimensions such as Brazil. In this context, the development of institutional arrangements capable of integrating planning, implementation and evaluation of educational actions becomes a strategic priority.

Objective: To describe the strategic approach and organisational model of a national continuing professional development initiative for pharmacists in Brazil, coordinated by a technical group of the Federal Pharmacy Council, highlighting its large-scale implementation and impact.

Method: This is an experience report based on activities conducted in 2025 by the Continuing Professional Development Working Group of the Federal Pharmacy Council of Brazil. The analysis examined the governance model, planning processes, implementation of educational activities, and monitoring and evaluation mechanisms. Consolidated and anonymised institutional data were used, including information on geographical coverage, participant engagement, educational performance and faculty evaluation, as well as strategies for coordination with local and national stakeholders.

Results: The initiative enabled the implementation of a national coordination model integrating multiple stakeholders and territories within a structured professional development strategy. In 2025, a total of 3,208 hours of training activities were delivered, reaching 5,085 participants. Activities were implemented across 55 training sites in 47

cities and 14 Brazilian states, demonstrating extensive geographical coverage. This reach was supported by a collaborative network of 45 highly qualified faculty members operating across diverse regional contexts. The organisational model, based on central strategic coordination and decentralised delivery, enabled the simultaneous implementation of initiatives addressing priority areas of pharmacy practice, including clinical pharmacy, management of chronic conditions, minor ailments and mental health. In the latter, the initial implementation phase reached 1,155 participants, highlighting the capacity to respond rapidly to emerging professional demands. In addition to its scale, the initiative demonstrated consistent educational quality. Participant evaluations showed high levels of satisfaction, with 83.55% assigning the highest rating to the training. The systematic use of monitoring and evaluation mechanisms supported continuous improvement and strengthened pedagogical consistency across different regions.

Conclusion: The findings suggest that a centrally coordinated and strategically structured organisational model, combined with decentralised implementation and continuous monitoring, can support the large-scale delivery of continuing professional development with quality and consistency. This approach contributes to strengthening pharmacy practice, improving health services and reducing regional inequalities in professional training, particularly in clinical pharmacy and pharmaceutical care. Furthermore, it highlights the role of technical advisory structures in fostering innovation and integration between education, practice and regulation. The Brazilian experience may inform the development of similar strategies in other countries facing comparable structural and territorial challenges.

Antibiotic treatment for urinary tract infections during pregnancy and risk of infant birth defects

En Chi Chou¹, Sznajder Kristin¹, Hwang Wenke¹

¹Penn State College of Medicine, Hershey, Pennsylvania, United States

Background: Urinary tract infections (UTIs) are among the most common infections during pregnancy, affecting approximately 8% of pregnant individuals. UTIs, including asymptomatic bacteriuria and acute cystitis, are associated with adverse pregnancy outcomes such as preterm birth, low birth weight, stillbirth, and neonatal death. Although empiric antibiotic therapy is recommended by clinical guidelines, the antibiotic selection during pregnancy remains limited due to concerns about potential antibiotic-associated birth defects.

Objective: To assess the association between different classes of antibiotics used to treat urinary tract infections during pregnancy and the risk of birth defects. This study has been approved by the Institutional Review Board (IRB).

Method: A retrospective cohort study is conducted using electronic health record (EHR) data from a large medical center in Pennsylvania. In addition to structured EHR data, clinical information recorded by healthcare providers during routine care is used to facilitate mother–child linkage. Mother-child dyads are then used to link mothers' medical records to the child's birth records between 2020 and 2025. The study then examines a subset of mothers with documented urinary tract infection (UTI) during pregnancy. Antibiotic exposure is categorized into nitrofurantoin, trimethoprim–sulfamethoxazole, fluoroquinolones, and doxycycline, with β -lactams as the reference group for all comparisons. The primary outcome is major congenital malformations diagnosed within the first year of life. Sub-categories of primary outcomes are explored, including cardiac malformations, neural tube defects, orofacial clefts, musculoskeletal malformations, genitourinary defects, gastrointestinal malformations, other unspecified anomalies, and multiple system defects. The study examines secondary outcomes, including preterm birth, neonatal intensive care unit (NICU) admission, and low birth weight. Log-binomial regression models is used to estimate risk ratios (RRs) and 95% confidence intervals (CIs). In the presence of convergence issues, modified Poisson regression with robust error variance will be applied. Confounding is addressed using both multivariable regression and propensity score methods. Propensity scores is estimated using multinomial logistic regression, incorporating clinically relevant covariates including maternal age, race/ethnicity, UTI severity, comorbidities (e.g., diabetes, hypertension, chronic kidney or liver disease, autoimmune disease), smoking or alcohol use, body mass index (BMI), healthcare utilization, prior medication use, and relevant laboratory results (e.g., estimated glomerular filtration rate (eGFR), urine culture results). Inverse probability of treatment weighting (IPTW) is employed to balance baseline covariates across exposure groups.

Results: Statistical analyses are currently ongoing. Preliminary results identify 2,674 pregnant individuals with a documented diagnosis of urinary tract infection (UTI). The mean maternal age for the pregnancy-UTI cohort was 28.68 years (SD: 5.58), with racial distribution 57% White, 13% Black, 30% Others, 23.86% are reported with Hispanic ethnicity. Final analyses will estimate the association between antibiotic exposure during pregnancy and the risk of congenital malformations.

Conclusion: This study aims to provide real-world evidence on the safety of antibiotic treatment for UTIs during pregnancy and inform clinical decision-making and public health policy.

Access and adherence to smoking cessation services: How are people in BC using community pharmacies?

Jolanta Piszczek¹, Arwa Nemir¹, Yuki Meng¹, Ella Gray¹, Yashmeet Kaur¹, Andreas Pilarnos², Jamie Yuen¹, Karen Dahri¹, Femke Hoekstra³, Kate Johnson¹, Laura Struik⁴, Kevin Duan³, Phalgun Joshi⁵, Teri Charrois¹

¹University Of British Columbia Faculty of Pharmaceutical Sciences, Vancouver, Canada

²Indigenous Health Research Unit at Vancouver Coastal Health Research Institute, Vancouver, Canada

³University of British Columbia Faculty of Medicine, Vancouver, Canada

⁴University of British Columbia Okanagan School of Nursing, Vancouver, Canada

⁵Legacy for Airway Health, Vancouver Coastal Health Research Institute, Vancouver, Canada

Background: As one of the most accessible healthcare providers, pharmacists are uniquely positioned to provide nicotine cessation care to people in their communities. In British Columbia (BC), residents who use tobacco have access to a provincial programme through community pharmacies that provides smoking cessation pharmacotherapy such as nicotine replacement therapy (NRT) at no cost. Such programmes may be especially important for equity-deserving populations who face barriers to primary care for tobacco use disorder, including Indigenous Peoples, rural and remote residents, youth, and people experiencing homelessness. Unfortunately, pharmacist-delivered nicotine cessation care remains an underutilized resource among populations disproportionately impacted by nicotine use. This study aims to examine the barriers and facilitators to accessing and adhering to pharmacologic and non-pharmacologic smoking cessation support provided by community pharmacies in BC.

Method: We conducted a qualitative descriptive study using semi-structured virtual and in-person interviews and in-person sharing circles with individuals aged ≥16 years who smoke or vape and have considered or attempted quitting. Purposive sampling was used to achieve a diverse representation of individuals at risk of being underserved, with intentional inclusion of Indigenous Peoples, youth, and people experiencing homelessness. Participants were recruited through established community partnerships and the REACH BC platform. All sessions were audio-recorded and transcribed verbatim. Data was analysed by three study team members using multi-coder reflexive thematic analysis and supported by NVivo software.

Results: Thirty-one participants from diverse equity-deserving groups completed individual interviews, and 17 Indigenous youth participated in a sharing circle. Most participants had limited experience accessing pharmacist-

administered smoking cessation care but expressed a general acceptance of the programme. Barriers included limited awareness of programme availability, restrictions on NRT product choice, quantity, and duration of coverage, and insufficient integration of emotional and mental health supports. Youth identified the lack of anonymity and youth-specific messaging as major barriers. Participants described a variety of reasons for tobacco use, including cultural identity, peer and familial influences, and coping with mental health challenges, which they perceived as extending beyond the scope of pharmacist-administered smoking cessation programmes. Key facilitators included established relationships with pharmacists, easy access to NRT, and integration with other substance use or mental health care. Participants also valued timely follow-ups and ongoing support from pharmacists after initiating treatment.

Conclusion: Our findings identify the facilitators and barriers to accessing pharmacy-administered smoking cessation care, offering insights into improving programme awareness among equity-deserving groups, such as tailored messaging depending on the target audience, and highlighting opportunities for structural and policy-level changes to improve equitable engagement.

Depression among people living with HIV receiving antiretroviral therapy: A cross-sectional study at a military hospital in Accra, Ghana

Thelma Alalbila Aku¹, Michele Odame¹, Yaa Osei-ofei², Ebenezer Wiafe¹, Eugene Dordoye³, Kate Coleman², Peter Yamoah¹, Varsha Bangalee⁴

¹University Of Health And Allied Sciences, Ho, Ghana

²Military Hospital, Accra, Ghana

³Mental Health Authority, Accra, Ghana

⁴University of Kwazulu Natal, Durban, South Africa

Background: Depression is disproportionately prevalent among people living with HIV (PLHIV), with reported rates up to three times higher than in the general population. An HIV diagnosis introduces considerable psychosocial burdens, including social stigma, anxiety regarding long-term health outcomes, and the demands of lifelong medication adherence. These stressors are well-recognised contributors to the onset and progression of depressive symptoms. Evidence from sub-Saharan Africa underscores the magnitude of this challenge; a study conducted in the Kilimanjaro region of Tanzania reported an overall depression prevalence of 41% among PLHIV, with particularly elevated rates amongst newly diagnosed individuals. Despite this, mental health assessment remains inconsistently integrated into routine HIV care across many settings, representing a significant gap in holistic patient management. Consistent

access to antiretroviral therapy (ART) is fundamental to the effective management of HIV infection. ART suppresses viral replication, restores immune function, and significantly improves quality of life. However, the psychological dimensions of living with HIV — including stigma, disclosure concerns, and treatment burden — can undermine mental wellbeing and, consequently, treatment adherence. Unaddressed depression has been shown to negatively impact ART adherence, increase the risk of treatment interruption, and worsen clinical outcomes. Addressing depression within HIV care is therefore critical to optimising both clinical and patient-reported outcomes.

Method: A cross-sectional study was conducted at the antiretroviral clinic of the 37 Military Hospital, Accra, Ghana. Participants were recruited via random sampling from PLHIV attending the clinic for routine ART and care. Depression was assessed using the Patient Health Questionnaire-9 (PHQ-9), a validated and widely used nine-item self-report instrument that measures the severity of depressive symptoms over the preceding two weeks. Scores range from 0 to 27, with higher scores indicating greater symptom severity. Categories include: None/Minimal (0–4), Mild (5–9), Moderate (10–14), Moderately Severe (15–19), and Severe (20–27). Data were entered and analysed using Microsoft Excel and the Statistical Package for the Social Sciences (SPSS) version 27.

Results: A total of 164 participants were enrolled in the study. The mean PHQ-9 score was 3.61 (standard deviation = 4.08), indicating minimal depressive symptoms across the sample as a whole. Score distribution was positively skewed, with the majority of participants — 65.9% — falling within the None/Minimal depression category. Mild depressive symptoms were recorded in 24.4% of participants. The prevalence of clinically significant depression, defined as a PHQ-9 score of 10 or above, was 9.8%, affecting approximately one in ten participants.

Conclusion: The findings indicate that PLHIV receiving care within the structured and supportive clinical environment of the 37 Military Hospital's ART clinic experience a comparatively lower burden of depression than is frequently reported in similar settings across sub-Saharan Africa. Nevertheless, a meaningful proportion of patients demonstrated clinically significant depressive symptoms, underscoring the importance of routine, integrated mental health screening within standard HIV care. Embedding such screening into existing HIV care pathways has the potential to improve early identification, facilitate timely intervention, support adherence to ART, and ultimately optimise overall treatment outcomes for this vulnerable population.

Implementation science in pharmacy: Current evidence and future perspectives from a cross-sectional bibliometric analysis

Zaiwei Song^{1,2}, Yuan Wu^{1,2}, Ziqian Wang^{1,2}, Yi Ma^{1,2}, Linan Zeng³, Lingli Zhang³, Rongsheng Zhao^{1,2}

¹Peking University Third Hospital, Beijing, China

²Institute for Drug Evaluation of Peking University Health Science Center, Beijing, China

³West China Second University Hospital, Sichuan University, Chengdu, China

Background: Implementation science aims to bridge the gap between evidence and routine healthcare practice. In pharmacy, the growing complexity of pharmacotherapy and expansion of pharmacist-led services have increased the need for systematic approaches to implement evidence-based interventions. However, the global development of implementation science in pharmacy has not been comprehensively characterised. This study aimed to examine the evolution, theoretical foundations, and emerging research domains of implementation science in pharmacy through a cross-sectional bibliometric analysis.

Method: A cross-sectional bibliometric analysis was conducted using publications retrieved from major biomedical databases, including Web of Science Core Collection, PubMed, Embase, and the Cochrane Library. Studies addressing the implementation of pharmacy services, medication-related interventions, or pharmacist-led healthcare innovations were included. Bibliographic information such as publication year, country, institutional affiliation, keywords, and the use of implementation science theoretical models and frameworks (TMF) was extracted. Descriptive statistical analyses were performed to characterise publication trends. Bibliometric mapping and keyword co-occurrence analyses were used to identify major research domains, collaboration patterns, and emerging implementation topics.

Results: A total of 538 studies published between 2011–2025 were included in the analysis. The number of publications increased markedly after 2017, with over 76% of all studies published in the past five years, indicating rapid growth of implementation science research in pharmacy. Geographically, research output was dominated by high-income countries, with the United States accounting for approximately 49.6% of publications, followed by Australia and Canada. Institutional analysis showed that leading research centres were primarily located in North America, Europe, and Australia, although increasing contributions from Asia and other regions were observed. Regarding theoretical foundations, 35.2% of the included studies explicitly reported the use of implementation science theoretical models and frameworks. Among these, the Consolidated Framework for Implementation Research (CFIR) was the most frequently used framework, appearing in 62.2% of framework-informed

studies, followed by the Reach, Effectiveness, Adoption, Implementation and Maintenance (RE-AIM) framework and the Theoretical Domains Framework (TDF). Temporal analysis suggested a gradual increase in the adoption of these frameworks over time. Keyword clustering analysis identified several major research domains, including implementation of pharmacist-led clinical services, medication safety interventions, and medication management programmes. In addition, emerging domains were detected, such as digital health implementation, artificial intelligence-enabled decision support, pharmacogenomics implementation, and learning health systems, which have gained increasing attention in recent years.

Conclusion: Implementation science in pharmacy has expanded rapidly and is increasingly focused on implementation strategies and health system integration of pharmacy services. While established theoretical frameworks have played a key role in guiding research, broader methodological and theoretical innovation may be needed to address emerging implementation challenges. This study provides a global overview of the field and highlights priority areas for future implementation research in pharmacy.

A pharmacist-led “GUIDE” intervention strategy improves the safety of high-dose methotrexate therapy: A single-center ambispective cohort study

Zaiwei Song^{1,2}, Zhushu Ding^{1,2}, Yi Ma^{1,2}, Linan Zeng³, Fei Dong^{1,2}, Lingli Zhang³, Rongsheng Zhao^{1,2}

¹Peking University Third Hospital, Beijing, China

²Therapeutic Drug Monitoring and Clinical Toxicology Center, Peking University, Beijing, China

³West China Second University Hospital, Sichuan University, Chengdu, China

Background: High-dose methotrexate (HDMTX) is a key agent in the treatment of hematologic malignancies. However, its narrow therapeutic window and substantial inter-individual variability may lead to serious safety risks, including hepatotoxicity and delayed drug elimination. Although evidence-based clinical guidelines are available, their implementation in real-world practice remains inconsistent due to complex treatment procedures and variations in clinical practice. This study, guided by the RE-AIM implementation science framework, evaluated the effectiveness of a pharmacist-led “GUIDE” intervention strategy in improving the standardization and safety of HDMTX therapy.

Method: This study was a single-center ambispective cohort study conducted in the Department of Hematology at Peking University Third Hospital. A total of 600 HDMTX treatment

cycles between 2017 and 2023 were included. Using January 1, 2022—the implementation date of the GUIDE intervention—as the cutoff point, treatment cycles were divided into an empirical treatment group (n = 356) and a pharmacist intervention group (n = 244). The pharmacist-led GUIDE strategy included five components: Guideline simplification, Unified order sets, Interdisciplinary collaboration, Capacity development, and Evaluation and feedback. The intervention was evaluated using the RE-AIM framework, including the dimensions of Reach, Effectiveness, Adoption, Implementation, and Maintenance.

Results: At the reach level, among 305 HDMTX treatment cycles meeting the inclusion criteria, 244 cycles received guideline-based standardized management, corresponding to a coverage rate of 80.0%. At the effectiveness level, the pharmacist intervention group showed significantly lower rates of hepatic dysfunction (18.91% vs. 26.02%, $P = 0.046$) and delayed MTX elimination (5.74% vs. 13.48%, $P = 0.002$) compared with the empirical treatment group. At the adoption level, hematologists and nursing staff demonstrated high uptake of the order templates and medication checklists during the intervention period. The proportion of inappropriate proton pump inhibitor co-administration decreased significantly (37.70% vs. 52.25%, $P < 0.001$). At the implementation level, key process indicators improved substantially in the pharmacist intervention group. The proportion of cycles achieving sustained post-infusion urinary pH targets increased significantly (81.56% vs. 54.21%, $P < 0.001$), and adherence to therapeutic drug monitoring was also markedly improved. At the maintenance level, the intervention strategy remained integrated into routine clinical workflows and continued to be implemented consistently after the pilot implementation period.

Conclusion: Based on the RE-AIM evaluation, the pharmacist-led GUIDE intervention strategy demonstrated good performance across multiple implementation dimensions, particularly in adoption and implementation. The strategy significantly improved process adherence in HDMTX therapy and reduced several key adverse clinical outcomes. This model provides a replicable approach for pharmacist-centered safety management of high-risk medications and may contribute to improving the systematic management of complex chemotherapy regimens and medication safety in clinical practice.

Medical cannabis use and self-directed medication discontinuation in rheumatologic care: implications for pharmacist-led medication optimization

Heba A.t. Aref¹, Samuel Lowe⁵, Allyson Jones⁶, Tarek Turk², Susan Zhang¹, Joanne Olson⁴, Pauline Paul⁴, Shelby Yamamoto³, Elaine Yacyshyn², Cheryl Sadowski¹

¹Faculty of Pharmacy and Pharmaceutical Sciences_University of Alberta, Edmonton, Canada

²Faculty of Medicine & Dentistry_University of Alberta, Edmonton, Canada

³School of Public Health_University of Alberta, Edmonton, Canada

⁴Faculty of Nursing_University of Alberta, Edmonton, Canada

⁵School of Population and Global Health, McGill University, QC, Canada

⁶Faculty of Rehabilitation Medicine - Physical Therapy_University of Alberta, Edmonton, Canada

Background: Medical cannabis is increasingly utilized by individuals with rheumatologic conditions for its perceived therapeutic effects on chronic pain, inflammation, sleep disturbance, anxiety, and overall quality of life. In jurisdictions where cannabis has been legalized for medical and/or recreational use, including Canada, numerous U.S. states, the Netherlands, Germany, Australia, and parts of Latin America, patients have unprecedented access to cannabis products as adjunctive or alternative therapies. However, this expanded access presents a critical challenge: perceived benefits may lead patients to self-direct changes in their prescribed medication regimens, including dose reduction or complete discontinuation of conventional therapies, often without professional guidance. As cannabis legalization continues to expand globally, understanding these medication-taking behaviours becomes essential for ensuring the safety of medicines and highlights the urgent need for pharmacist engagement within integrated, patient-centred care models. Objectives 1) To examine patterns of medical cannabis use among individuals with rheumatologic conditions. 2) To describe self-reported changes in rheumatologic medication use among cannabis users for the purpose of informing opportunities for pharmacist-led medication intervention in legalized jurisdictions worldwide.

Method: A province-wide cross-sectional survey was conducted in Alberta, Canada. Individuals with rheumatologic disease diagnostic codes were identified through administrative health records and invited to participate. Respondents reported current medications, cannabis use status (current, past, never), reasons for use, and any dose modifications or discontinuations of prescribed medications following cannabis initiation. Data were analyzed descriptively using STATA version 17.

Results: Of 40,000 eligible individuals, 8% (n=3,302) completed the survey (mean age 66.4 ± 12.5 years; 51.5% female). Osteoarthritis was the most prevalent condition (54%, n=1,811). Among respondents answering cannabis-related questions (n=2,932), 25% (n=730) reported current use, 29% (n=851) past use, and 46% (n=1,351) never use. Notably, 25% (n=182) of current cannabis users reported reducing or discontinuing prescribed medications after cannabis initiation, compared to 3% (n=28) of past users. Most commonly affected medications included muscle relaxants (45%, n=95), systemic corticosteroids (18%, n=37), and disease-modifying antirheumatic drugs (DMARDs) (7%, n=14). Critically, 75% (n=158) of those who altered therapy did so independently, without consulting a healthcare provider, while only 20% (n=42) involved their prescriber.

Conclusion: Self-directed medication changes have been reported among medical cannabis users with rheumatologic conditions, with the majority of decisions occurring outside clinical oversight. The unsupervised dose reduction or discontinuation of DMARDs and corticosteroids poses substantial risks for disease progression, flares, and adverse outcomes. As cannabis legalization expands across jurisdictions worldwide, these findings are globally relevant for pharmacy practice. They highlight an urgent need for proactive pharmacist engagement through routine cannabis use screening, non-judgmental therapeutic conversations, and collaborative deprescribing when appropriate. Such actions will support informed decision-making, optimize therapeutic outcomes, and ensure patient safety. Findings underscore the importance of integrating insights into patient medication-use behaviours with pharmacy practice and evidence-informed care to address evolving therapeutic challenges in rheumatologic management. Further investigation of patients' reasons for medication changes and their clinical implications is needed to support informed dialogue and optimize treatment management.

Early findings from the RAK-PRIDE trial: A pharmacist-led educational intervention to deprescribe proton pump inhibitors - first experience from the United Arab Emirates

Syed Arman Rabbani¹, Mohamed El-tanani, Imran Rashid Rangraze, Arwa Monassar Ali Alnahdi, Sathvik Sridhar

¹Rak Medical And Health Sciences University, Ras Al Khaimah, United Arab Emirates

Background: Proton pump inhibitors (PPIs) are frequently continued beyond recommended durations despite limited indications for long-term therapy. Inappropriate PPI use is common globally and has also been documented in Ras Al Khaimah, United Arab Emirates (UAE). Multifaceted deprescribing interventions targeting both prescribers and patients may improve outcomes, but evidence from the Middle East is limited.

Objective: To evaluate the early effectiveness of a pharmacist-led educational intervention, delivered to both physicians and patients, on deprescribing potentially inappropriate PPIs.

Method: RAK-PRIDE is a 2-arm, parallel-group, pragmatic cluster randomized controlled trial (physician-level randomization) conducted in a secondary care hospital in Ras Al Khaimah. Adults (≥ 18 years) receiving potentially inappropriate PPI prescriptions (defined using American Gastroenterological Association guidance) were enrolled with their treating physicians. The intervention comprised pharmacist-delivered educational materials for physicians (educational brochure, evidence-based deprescribing guideline, deprescribing algorithm, whiteboard videos) and patients (educational brochure, decision aid, deprescribing pamphlet, action plan). The comparator was usual care over 6 months. The primary outcome was successful deprescribing, defined a priori as any reduction in cumulative monthly PPI dose from baseline to study completion (including dose/frequency reduction or cessation).

Results: Early findings include 144 patients (control $n=70$; intervention $n=74$). Baseline PPI type, dosing frequency, and cumulative monthly dose were comparable between groups (mean $\pm$ SD dose: 1134.6 $\pm$ 424.6 mg control vs 1152.4 $\pm$ 368.4 mg intervention). Successful deprescribing occurred in 60/74 (81.1%) intervention patients versus 1/70 (1.4%) controls (absolute risk difference 79.7 percentage points, 95% CI 70.3–89.0; relative risk 56.8, 95% CI 8.1–398.6; $p<0.001$). Complete cessation occurred in 54/74 (73.0%) intervention patients and 0/70 controls (absolute risk difference 73.0 percentage points, 95% CI 62.9–83.1; $p<0.001$). Mean change in cumulative monthly dose was -895.7 $\pm$ 569.4 mg in the intervention group versus -8.6 $\pm$ 71.7 mg in controls, with a between-group difference of -887.1 mg/month (95% CI -1017.9 to -756.3; $p<0.001$).

Conclusion: Early findings from this pragmatic cluster RCT suggest that a pharmacist-led, multifaceted educational intervention targeting both physicians and patients substantially improves deprescribing of potentially inappropriate PPIs in UAE practice settings. This model may support wider implementation of pharmacist-led deprescribing strategies to optimize PPI use and improve medication safety.

Health Sciences Trajectory: Leadership Disposition in Global Institutional Partnership Practices in Higher Education

Starr Miriam Ansong-ameyaw¹

¹Ahaint/depaul Univ, Chicago/il, United States

Background: In recent years, global institutional partnerships have become pivotal in many institutions of higher education including pharmacy programs worldwide. Universities have engaged with recognized institutions abroad to offer courses, student and faculty exchange programs, study abroad, service, and research opportunities. With the FIP theme of one health, one pharmacy, bridging science, practice, and education, it is critical to evaluate leadership roles with success in such practices. However, many health sciences institutions have embarked on such endeavors without a clear connection to their mission statement. To ensure sustainability of such programs, institutional goals must be mission-driven to guide global partnership practices. For the success and sustainability of programs, innovation, leadership, and community play significant roles, as a conceptual model rooted in a mission-driven foundation. The objective of this research is to identify how college leaders articulate the specifics of the mission statement as they relate to the implementation of successful and sustainable global institutional partnerships.

Method: This research used a qualitative design and was conducted through live and remote interviews with college leaders of pharmacy programs. The questions were open-ended to generate appropriate qualitative data. A 5- to 10-question set was developed for participant interviews. For brevity, the details of the questions will be presented at the conference. The department chair was interviewed first, followed by faculty, staff and students. The responses were compiled into qualitative data and analyzed. Since this study was grounded in a conceptual framework, the methodology employed a concept-centric qualitative research method. A literature search to identify scholarly papers relevant to the research question was conducted. Scholarly databases were identified through Library Research Guides. Keywords such as higher education partnerships, global collaborations, innovative leadership, and intercultural relationships were used. The conceptual framework was developed using Dugan's (2024) relational leadership theory which emphasizes the connectivity model. The principal investigator aligns with this trend of thought as connectivity plays a key role in collaboration and partnership. This conceptual framework was constructed by establishing the mission as the foundational block connecting to partnerships, with overlapping key elements of innovation, leadership, and community, which are known to provide supporting roles for successful partnerships. To accomplish this, responses to the interview questions were interpreted with the conceptual framework in mind.

Results: Data was collected and analyzed from responses to interview questions. Important excerpts were extracted from the answers and paraphrased regarding: leadership, innovation, and community. These themes were then analyzed through the lenses of the conceptual framework. Drawing from the conceptual framework, partnerships overlap with leadership effectiveness, innovations in strategic initiatives, and community engagement. The research question sought to determine how the college connects its global partnerships to its institutional mission. The research findings provide strong evidence of the college's leadership roles in global partnership practices, laying foundation for future partnerships.

Conclusion: Global partnership programs help institutions gain recognition, foster interprofessional collaboration, offer financial benefits, and strengthen bonds worldwide. Such a pursuit requires innovation, leadership, and communication for success and sustainability with leadership is critical role.

Large language models (LLMs) for navigating patient-centric collaborative model for effective patient-practitioner communication

Starr Miriam Ansong-ameyaw¹

¹Ahiant/depaul Univ, Chicago/il, United States

Background: The evolution of pharmaceutical care has transitioned clinical practice through various phases, with significant pivots occurring in 2014, 2018, and 2019. This progression has given rise to multiple patient-provider communication models, including patient-centered practice, the Pharmacists' Patient Care Process (PPCP), and, more recently, Core Entrustable Professional Activities (EPAs) aims to establish core competencies necessary for professional practice. Effective patient-practitioner communication plays a critical role in enhancing patients' quality of life in alignment with this year's International Pharmaceutical Federation (FIP) theme, patient-centered care.

A collaborative effort involving interprofessional disciplines spanning science, clinical practice, and education has led to the development of a Patient-Centric Collaborative Model to enhance practitioner-patient communication. However, the lack of integration of artificial intelligence (AI) into these models creates absence of modern innovations for forward-looking trajectory. The application of AI in the medical field remains an area of cautious exploration. Therefore, this study seeks to evaluate how AI LLM can enhance the effectiveness of such a model. Currently, there is limited literature distinguishing the terms "patient-centered" and "patient-centric," as they are often used interchangeably. Additionally, no existing research has explored the incorporation of AI into these communication models

Currently, there is limited literature distinguishing the terms "patient-centered" and "patient-centric," as they are often

used interchangeably. Additionally, no existing research has explored the incorporation of LLM into these communication models. Different disciplines may interpret and apply the terms "patient-centered" and "patient-centric" differently according to the literature (Amarstottir A, 2019; Juahri A, 2022).

Objective: This study aims to delineate the differences between patient-centered and patient-centric models in a holistic communication framework and to explore the role of AI in enhancing patient-practitioner communication.

Method: Methodology: This is a qualitative study of interviews with experts from diverse fields in science, practice and education. A standardized five-question survey was used to gather expert opinions on patient-centered versus patient-centric care. Key insights from qualitative responses were integrated into the newly designed model to clarify the distinction between the two terms.

To assess AI's capability in implementing this model, large language models (LLMs) such as ChatGPT, Gemini, Claude, and Copilot were evaluated. Each LLM was assigned a simple patient-case scenario and assessed based on a three-tiered performance scale:

- Yes: Performed the function well
- No: Did not perform the function well
- Somehow: Performed the function partially

Both script-based and audio-generated outputs from the AI models were reviewed by a four-member panel. The collected ordinal data was converted into nominal data for further analysis. A significance threshold of $p \leq 0.05$ was set for statistical analysis.

Results: The study presents findings in two key areas: 1.Qualitative analysis of expert perspectives on patient-centered vs. patient-centric models. 2.AI performance evaluation in facilitating patient communication using the Patient-Centric Collaborative Model.

Results demonstrated statistically significant differences in how healthcare professionals interact with AI-driven communication models. The comparative performance of the four LLMs—ChatGPT, Gemini, Claude, and Copilot — will be discussed at the conference, highlighting their effectiveness and potential to enhance patient-practitioner interactions. LLM enhances effective communication.

User-reported perceptions of usability and handling of a novel applicator for an over-the-counter topical gel: Findings from a non-interventional in-home use study

Giles Catcheside¹, Alessandra Croce¹, Mariane Ballerini Fernandes¹

¹Haleon CH SARL, Route de l'Etraz 2, 1260, Nyon, Switzerland

Background: Self-care using over-the-counter (OTC) topical gels is common in pharmacy practice, where pharmacists play a central role in guiding consumers on appropriate product selection and application techniques. Usability and handling characteristics are particularly important for individuals who may experience difficulty manipulating packaging or applying topical products, including those with reduced manual dexterity. As applicator-based formats emerge within OTC settings, empirical data describing real-world user perceptions of usability and handling remain limited. This study aimed to explore user reported perceptions of the usability and handling of a novel, non-marketed applicator used with a marketed gel during short-term, in-home use.

Method: This non interventional, in-home study assessed user perceptions of a novel applicator during five-days of self-directed topical gel use, following the written usage instructions. Adults aged 35-70 years with experience using topical gels, but not currently using applicators, were enrolled. A predefined subgroup self-reporting limited dexterity using a modified Cochin scale was included. Participants completed online surveys at first and final-use and maintained a daily diary documenting their experience. Endpoints included applicator adoption behaviour; self reported ease of use (including suitability for in-sight and out-of-sight application areas); perceived cleanliness; and intended future use. Data were summarised descriptively, consistent with the exploratory nature of user-experience research.

Results: A total of 175 participants used the novel applicator, including 24% who reported limited manual dexterity. Applicator adoption increased over the five-day period, with reported preference vs their usual pack rising from 73% at first use to 83% at final-use. By final-use, four in five participants (80%) reported that they would "rarely" or "sometimes" need to use their hands in addition to the applicator during application, and a similar proportion (80%) expressed an intention to use the applicator for future applications. Ease of use was described positively at first use and improved further by final-use, with trends suggesting differences in initial familiarity across age groups. Participants applying the gel to out-of-sight areas reported the applicator was suitable for these locations, with intention for out-of-sight use increasing over-time and perceptions converging with those reported for in-sight application. Cleanliness was frequently perceived as a key benefit by 54% participants and was attributed to reduced mess, less direct

hand contact, and fewer occasions requiring handwashing. Findings in the limited-dexterity subgroup were broadly consistent with those of the overall sample.

Conclusion: This study provides real-world insight into user-reported perceptions of a novel applicator for OTC topical gel use during routine self-care. The findings suggest that such applicators may support usability and handling across a range of users, including individuals with limited manual dexterity or those applying products to hard to reach or out-of-sight areas. These results help inform pharmacists' counselling by highlighting practical usability considerations that may influence user confidence during self-care using OTC topical gel. Study limitations include reliance on self-reported perceptions and the short evaluation period. Further research is warranted to assess how applicator usability and handling perceptions change with longer-term, real-world use, and how such insights may support pharmacist-led guidance on appropriate application in self-care.

Comparative study evaluating the thermal performance of non-medicated heat patches using a dual method integrating interface temperature analysis and infrared thermography

Dustin Clifford¹, Stephan Meyer², Mounika Nangineedi¹, Alessandra Croce², Mariane Ballerini Fernandes²

¹Haleon, 1211 Sherwood Ave, Richmond, VA 23220

²Haleon CH SARL, Route de l'Etraz 2, 1260, Nyon, Switzerland

Background: Continuous low-level heat therapy delivered by disposable patches is widely used in self-care for muscular aches and pains, and pharmacists play an important role in advising on safe and appropriate use. Heat patches are commonly described as providing warmth around 40 °C over several hours (commonly up to 8 hours), yet products may differ in time to reach target warmth, peak temperature and temperature consistency—factors that can shape user comfort, expectations and correct use in self-care. Systematic characterisation of heating behaviour may therefore support evidence-informed counselling. This study aimed to characterise and compare the heating profile of non-medicated heat patches using a dual temperature analytical approach.

Method: In a controlled 12-hour bench study, six anonymised non-medicated heat patches (Patches A-F) with different anatomical formats and single-cell designs were evaluated. Interface temperature was measured in triplicate with four thermocouples positioned at skin-contact regions on a pre-warmed glass substrate (35±2°C), and device surface temperature was monitored by infrared thermography. Measurements were recorded at scheduled intervals under

ambient lab conditions (22–25°C; 20–45% relative humidity). Patches were primarily assessed for the labelled 8-hour use period; later timepoints characterised extended heating behaviour only, and data were summarised descriptively. Separately, maximum-temperature variability was evaluated using 95% CI adjustment, ANOVA and tolerance intervals.

Results: Temperature–time profiles differed across Patches A–F. All patches reached 40 °C within the first hour, except patch F and patch C, which reached 40 °C at 1.5 h and 3 h, respectively. Peak temperatures ranged from 40.0 °C (patch C) to 41.9 °C (patch E); peaks for patches B, D and F were <41°C, whereas patch A exceeded 41°C. After warm-up, temperature consistency varied: patch A showed the greatest consistency (i.e., the smallest overall variation) around ~41 °C across the full 12-hour assessment, while patch C remained relatively consistent around ~40 °C but declined gradually later in the assessment; patch B showed the most pronounced decline, falling below ~40 °C after ~6 h. At the labelled 8-hour timepoint, patches C, D and F were ~40 °C, while patches A and E were ~41 °C. Infrared thermography corroborated the observed heating trajectories across patches but yielded lower absolute values than the interface-thermocouple, consistent with surface heat loss in open atmosphere, insulating top layers and patch-dependent emissivity.

Conclusion: Dual method integrating interface temperature measurement analysis and infrared thermography demonstrated between-patch differences in time to 40 °C, peak temperature and temperature consistency across non-medicated heat patches during the labelled wear period. These bench-derived profiles may support pharmacists in counselling on expected warming characteristics when heat patches are used for muscular aches and pains, including onset and consistency of warmth. Measurements were generated under controlled bench conditions to enable standardised, head-to-head comparison across patches, and the framework could be extended to additional use-relevant conditions and patch formats.

Assessment of views of healthcare providers about non-medical prescribing in secondary healthcare facilities in Lagos State, Nigeria

Arinola Joda¹, Olubusola Olugbake², Henry Olele²

¹University of Lagos/African Pharmaceutical Forum/Clinical Pharmacists Association of Nigeria (Lagos Branch), Nigeria

²Department of Clinical Pharmacy and Biopharmacy, Faculty of Pharmacy, University of Lagos, Idiaraba Campus, Idiaraba, Lagos, Nigeria

Background: Non-medical prescribing (NMP) is prescribing by healthcare professionals (HCP) other than medical doctors. Studies from countries where NMP is practiced provide

insights into the benefits of, and barriers militating against NMP. Though NMP is not yet considered a viable option for healthcare delivery in Nigeria, it is important to determine the views of HCPs about this potential service which could improve access to healthcare across the country. The aim of this study was to assess the views of selected healthcare providers (medical doctors, nurse and pharmacists) about NMP in Nigeria.

Method: A cross-sectional quantitative study was conducted among medical doctors, nurses and pharmacists in state-owned secondary healthcare facilities (General Hospitals) in Lagos State, Nigeria. A Likert-scale type questionnaire was developed, pre-tested and administered to the target population in the selected facilities. Collected data was checked for completion, entered into a Microsoft Excel database and transferred to SPSS version 23.0 for statistical analysis. Descriptive statistics were used to summarize the demographic and professional characteristics of the respondents and other categorical data. Inferential statistics (Pearson's Chi-square test) was used to ascertain differences between the socio-demographic and professional variables (such as age, gender, marital status, and location type) and respondents views about non-medical prescribing. Statistical significance was set at $-p\text{-value} \leq 0.05$. Ethical approval was obtained from LUTH Health Research Ethics Committee with assigned number as ADM/DCST/HREC/APP/3231 which was further used to gain approval from Lagos State Health Service Commission to conduct studies in the secondary-care facilities (approval number: HSC 378/Vol.V/61). Informed consent was obtained before questionnaire administration in the facilities.

Results: A 48% response rate was obtained. Almost half the respondents (45%) were nurses and about 82% were female. Mean ($\pm$ SD) number of years of experience of the respondents was 10.07 ± 7.019 overall. Median and modal years were 10 years each. Only about 26% of the respondents agreed that the Nigerian health care system is ready to accommodate non-medical prescribing though almost 60% agree that government should commit to it by providing legislative backing. About 43% of the respondents agree that NMP will help in addressing inefficiency in the Nigerian healthcare system, about 61% agree that it would offer an advantage over conventional medical prescribing practice and about 67% are willing to embrace it. About 68% agree that introducing NMP will likely face resistance from the medical community. There were several significant inter-professional differences in respondents' perceptions of the effect of non-medical prescribing on healthcare delivery. More pharmacists (77.8%) and nurses (88.2%) than medical doctors (22.8%) agreed on willingness to embrace new roles as independent or supplementary prescribers and more medical doctors (56.1%) than pharmacists (11.1%) and nurses (16.5%) disagreeing that the practice of NMP will save more time for the medical doctors to be more efficient.

Conclusion: Respondents held largely positive views about aspects of non-medical prescribing in Nigeria despite challenges for its adoption and establishment. More research

is needed to address these and work towards development and implementation of this potentially beneficial service.

Beyond the dispensary: A decade of evolving pharmacist roles in Singapore's public healthcare sector

Camilla Wong¹

¹MOH Singapore, Singapore, Singapore

Background: A review was initiated in 2024 to describe how pharmacy practice has evolved over the past decade in the public healthcare sector. This aimed to support an evaluation of pharmacists' job scope as part of their revised career development pathway framework.

Method: A comprehensive review of job descriptions across job grades for public sector pharmacists was conducted, examining changes in six key domains: Professional Practice, Communication and Collaboration, Leadership, Management, Education, and Research. Insights were drawn from PharmForce initiatives, with validation through a peer review process involving the Pharmacist Training and Development Committee and the Chief Pharmacist's Office at the Ministry of Health, Singapore.

Results: Findings were compiled and analysed from June 2024 to 2025, and key trends were highlighted. Pharmacists' roles in patient care have evolved to meet the challenges of a more complex healthcare environment, particularly due to an aging population. Their scope has expanded beyond traditional dispensing to include collaborative prescribing, precision medicine, deprescribing, digital health initiative, and providing vaccination service in the community while shifting towards preventive, proactive and personalised team-based care models. Pharmacists have expanded their roles as educators, focusing on interprofessional teaching, curriculum development, and mentoring. They leverage digital tools for public health education and have transformed pharmacy's training frameworks to incorporate competency-based approaches and entrustable professional activities to strengthen professional development. Pharmacists now hold broader leadership positions, contributing to healthcare transformation and workforce planning, with their management portfolio including building resilient supply chains in response to global disruptions and managing higher-value financial resources. Through national and cluster-level committees, pharmacists have increased influence in healthcare system improvements. In the domain of research and innovation, pharmacists lead national research, participate in grant review committees and advance work in pharmacogenomics and clinical informatics. They drive digital innovations such as AI and automation, integrate digital tools into education, and apply quality improvement methods to strengthen healthcare outcome.

Discussion: The pharmacy profession in Singapore has grown significantly across multiple domains, demonstrating its vital role in our healthcare system. However, the advancement of pharmacy practice varies across healthcare sectors. To effectively plan future developments at the national level, greater engagements with both public and private practitioners is needed to better track progress and guide the continued advancement of pharmacy practice. A comprehensive strategy to effectively guide the planning and advancement of pharmacy practice is essential and should be prioritised as the next roadmap for development.

Advancing kidney disease care through nephrology pharmacy: A Singapore multi-stakeholder perspective

Chuang Shen Hui, Rajalakshmi Rajaram, Leticia Peh¹

¹MOH Singapore, Singapore, Singapore

Background: Singapore faces unprecedented burden of kidney disease, with the crude incidence rate of Chronic Kidney Disease (CKD) Stage 5 surging by 38% from 408.9 per million population in 2013 to 563.7 in 2022. The number of patients requiring definitive dialysis has increased by 67% by December 2023. Recent therapeutic advances have transformed CKD management. The implementation of guideline-directed therapies (GDT) requires intensive patient education, close monitoring, and timely dose titration. Currently, nephrology pharmacy expertise is largely developed through informal, institution-specific training. There is a critical need for structured training pathways to enable the consistent delivery of standardized, high-quality, and value-based nephrology pharmacy care. The study objective was to define the value proposition, scope of practice, and workforce readiness for establishing specialized nephrology pharmacy practice in Singapore.

Method: A multi-stakeholder assessment was conducted. An online survey of 21 nephrology pharmacists from public healthcare institutions was conducted in August 2024, followed by structured engagements with 40 healthcare leaders, nephrologists, and multidisciplinary professionals between September and November 2025 using standardised survey questions. Data were analyzed descriptively to identify consensus, key themes, and workforce demands.

Results: The national survey of nephrology pharmacists demonstrated a highly experienced workforce, with 76% having more than five years and 29% more than ten years of dedicated nephrology pharmacy practice. Most held postgraduate clinical pharmacy qualifications (81%; PharmD/MClinPharm), with 57% Board of Pharmacy Specialties (BPS)-certified. There was strong support for specialised nephrology pharmaceutical services, with 95% of stakeholders surveyed, endorsing the need for advanced

nephrology pharmacy expertise. Key justifications identified included increased complexity and expanding formulary of renal pharmacotherapy; disease complexity and multimorbidity requiring stage-specific therapy management across CKD and dialysis modalities; subspecialty expertise requirements; patient safety considerations including drug interactions and medication reconciliation during care transitions; and the growing disease burden driven by an ageing population and rising diabetes prevalence in Singapore. Nephrology pharmacists were identified as uniquely positioned to manage advanced CKD (Stages G4–G5), dialysis, acute kidney injury, glomerulonephritis, and kidney transplant patients, with distinguishing expertise in dose adjustments, therapeutic drug monitoring (TDM), management of CKD complications, and immunosuppressive therapy. Discussion Nephrology pharmacists can practice across multiple care settings, enabling appropriate right-siting of advanced CKD and dialysis patients to pharmacist-led care. This allows nephrologists to focus on unstable or complex cases, enhancing the delivery of tailored yet standardized pharmaceutical care for the growing population with kidney disease. Nephrology pharmacy specialists can drive implementation of GDT to retard CKD, lead TDM protocols, and deliver evidence-based care. This translates to timely adoption of cost-effective treatments, whilst addressing unwarranted clinical practice variations.

Conclusion: There is strong national-level support for developing advanced nephrology pharmacy practice in Singapore to address the complex care needs of the kidney disease population. Future work should focus on formalizing structured training pathways to develop advanced nephrology pharmacy expertise, ensuring sustainable, evidence-based nephrology care delivery.

Therapeutic adherence across inhaled devices (pMDIs, DPIs, SMIs, and nebulizers): Insights From a Belgian real world study

Amélie Rosière¹, Sebastian Riemann^{2,3}, Stéphanie Pochet¹, Guy Brusselle^{2,3,4}, Carine De Vriese¹

¹Department of Pharmacotherapy and Pharmaceutics, Faculté de Pharmacie, Université libre de Bruxelles (ULB), Brussels, Belgium

²Department of Respiratory Medicine, Ghent University Hospital, Ghent, Belgium, Ghent, Belgium

³Department of Epidemiology, Erasmus Medical Center, Rotterdam, The Netherlands, Rotterdam, The Netherlands

⁴Department of Respiratory Medicine, Erasmus Medical Center, Rotterdam, The Netherlands, Rotterdam, The Netherlands

Background: Therapeutic adherence is a key determinant of asthma and COPD outcomes yet remains suboptimal worldwide. Inhaler device type has been identified as an important contributor to adherence, but most real world studies have focused on pressurized metered dose inhalers

(pMDIs) and dry powder inhalers (DPIs), mainly within inhaled corticosteroid (ICS) and long-acting beta-agonist (LABA) therapies. Evidence on soft mist inhalers (SMIs), nebulizers, and adherence across all inhaled pharmacological classes remains limited. Furthermore, most adherence studies assess patient-level adherence based on single device or drug, failing to capture the complexity of real-world multi-device and multi-class exposures. Objectives: To compare therapeutic adherence across all major inhaler device types – including DPI, pMDI, SMIs and nebulizers - and evaluate whether device type independently predicts adherence after adjusting for pharmacological class, demographics, and socio-economic characteristics.

Method: We conducted a retrospective cohort study using dispensing data from the Belgian Free Health Insurance Funds. Adults aged 19–80 who received at least two dispensations of mono-, dual-, or triple therapy based on ICS, LABA, or long-acting muscarinic antagonists (LAMA) between 2020 and 2023 were included. Adherence was quantified using Continuous Multiple interval Measures of Medication Availability (CMA), computed for each patient–device–pharmacological class combination and dichotomized at CMA ≥ 0.8 . Mixed-effects logistic regression models with patient-level random intercepts evaluated the association between device type and adherence, adjusting for pharmacological class, age, sex, area of residence and socio-economic status. Class-specific models were also performed.

Results: A total of 77,237 patients contributed 93,230 patient–device–class CMA3 exposures. DPIs were the most frequently used device and showed higher adherence (41.4%) than pMDIs (32.5%) and nebulizers (13.1%). SMIs exhibited the highest adherence (48.6%) but were available only for LAMA and LABA/LAMA therapies. In multivariable analysis, device type remained a strong independent predictor of adherence. Compared with pMDIs, DPIs were associated with significantly higher odds of adherence in the main model (OR 1.64; 95%CI 1.57–1.71, $p < 0.001$). In the restricted LABA and LABA/LAMA dataset, DPIs also showed substantially higher adherence than SMIs (OR 4.65; 95%CI 4.25–5.09, $p < 0.001$). Across all pharmacological classes, DPI use consistently yielded higher adherence than both pMDIs and SMIs.

Conclusion: Inhaler device type is a major determinant of therapeutic adherence. DPIs show consistently superior adherence compared with pMDIs and SMIs across all therapeutic classes, independent of patient demographics or socio-economic characteristics. These findings highlight the importance of integrating inhaler device choice into therapeutic decision-making. Favouring DPIs when clinically appropriate, and reinforcing inhalation-technique training across all patient groups represent key opportunities for pharmacists and prescribers to improve adherence and support sustainable respiratory care.

Functional abdominal cramping pain and irritable bowel syndrome: A clinical continuum with implications for pharmacy practice

Didem Sen¹, Mohamed Amessou¹, Robert Lange²

¹Opella, Neuilly sur Seine, France

²Opella, Frankfurt am Main, Germany

Background: Abdominal pain is among the most common complaints encountered in community pharmacy settings. Irritable bowel syndrome (IBS) and functional abdominal cramping pain (FACP) are two conditions frequently underlying this presentation, traditionally regarded as distinct entities, yet their relationship remains poorly defined in pharmacy practice. The IBS is diagnosed by physicians according to Rome IV criteria. This requires recurrent abdominal pain at least once weekly over six months, associated with changes in defecation, stool frequency, or stool form, alongside exclusion of organic disease. In contrast, FACP, characterised by recurring cramping pain without prominent bowel habit changes, can be assessed and managed by pharmacists through algorithms. A global epidemiological study demonstrated that 51.9% of adults reported abdominal pain, with 38.9% having no identifiable gastrointestinal disorder, representing a substantial patient population within the pharmacist's scope of practice.

Objective: This study synthesises evidence demonstrating that FACP and IBS represent a clinical continuum rather than discrete diagnostic categories, defines the pharmacist's role across this continuum, and provides an evidence-based framework for pharmacist-led patient assessment and management.

Method: A narrative synthesis was conducted based on pivotal publications examining epidemiology, pathophysiology, clinical presentation, diagnostic pathways, patient-reported outcomes, and treatment responses. Evidence was compared across the Rome Foundation Global Epidemiology Study, the FACP Expert Practical Guidance with dedicated pharmacist algorithm, and the Rome IV framework review. Analysis of the pharmacist-specific algorithm was undertaken to develop a continuum-based framework for pharmacy practice.

Results: Both conditions share similar underlying mechanisms, including visceral hypersensitivity, gut-brain axis dysregulation, low-grade mucosal inflammation, and dysbiosis, though differences in bowel habit expression may reflect pathophysiological nuances not yet fully elucidated. Demographically, both disproportionately affect women and younger age groups, with comparable impairment in quality of life, work productivity, and healthcare utilisation (effect sizes 0.5–0.8). The primary distinguishing feature, a strong association with defecation as defined by Rome IV, remains inherently subjective. IBS Unclassified (IBS-U), where bowel

habits cannot be categorised using the 25% threshold rule, represents a diagnostic overlap with FACP. The 38.9% of patients meeting neither IBS nor organic disease criteria further substantiates a genuine diagnostic grey zone. Antispasmodics including hyoscine butylbromide, mebeverine, and peppermint oil, are confirmed as efficacious first-line therapy across both presentations. The validated pharmacist algorithm provides a stepwise approach encompassing red flag screening, bowel habit assessment, trigger identification, and evidence-based over-the-counter recommendations.

Conclusion: FACP and IBS represent a clinical continuum rather than distinct entities. Rome IV recognition of this continuum, with IBS-U as a overlap zone, provides a robust scientific foundation for pharmacist-led management. Pharmacists are uniquely positioned to manage the majority of patients presenting with functional abdominal cramping pain, referring only those with alarm features or prominent bowel symptoms. Given that IBS diagnosis often follows a prolonged journey of multiple physician consultations, pharmacists can meaningfully initiate antispasmodic therapy during this period, providing timely relief while maintaining appropriate referral pathways. With abdominal pain affecting over half the global adult population, pharmacist-led management within this continuum model addresses a significant unmet need and optimises healthcare resource utilisation.

Drugs contributing to adapted Medication Appropriateness index in the oldest-old nursing home residents in Croatia

Maja Ortner Hadžiabdić¹, Lana Jurinić¹, Dora Belec¹, Ksenija Arbanas², Iva Bužančić¹

¹University of Zagreb Faculty of Pharmacy and Biochemistry, Zagreb, Croatia

²Health Center Zagreb, Zagreb, Croatia

³City Pharmacy Zagreb, Zagreb, Croatia

Background: Potentially inappropriate prescribing is a significant concern in the geriatric population, particularly among the oldest-old residents in long-term care facilities who often present with multiple comorbidities and extreme frailty. While polypharmacy is a known risk factor, the clinical quality of prescribing often requires more nuanced evaluation than simple medication counts. The aim of this work was to evaluate medication appropriateness using the adapted Medication Appropriateness Index (aMAI) and to identify specific therapeutic classes contributing to high aMAI scores in the oldest-old nursing home residents.

Method: This cross-sectional study included 31 residents. Clinical status was quantified using the Clinical Frailty Scale

(CFS), Geriatric Syndromes Database (GSD), and Mini-Cog test. In total 235 individual medications were evaluated to determine aMAI scores (Somers et al., 2012). Higher aMAI scores indicate greater levels of prescribing inappropriateness.

Results: Participants (median age 91, IQR 85–96) were predominantly female (77.4%). Polypharmacy (5–10 drugs) was observed in 61.29% and hyperpolypharmacy (>10 drugs) in 19.35% of the sample. High prevalence rates were noted for frailty (65.4%; mean CFS 5.85 ± 1.97), cognitive impairment (82.8%; mean Mini-Cog 1.21 ± 1.35), and depressive symptoms (61.3%; mean GSD 6.58 ± 4.37). The overall mean aMAI score was 27.24 ± 11.95 (range 6–52), with a mean score per drug of 3.59 ± 3.51 . While aMAI significantly correlated with the number of medications ($r = 0.662$, $p < 0.001$), high aMAI values were also recorded in patients with fewer medications (3–5). Nervous system drugs (ATC group N) showed the highest inappropriateness (6.80 ± 3.59), specifically psycholeptics (mean aMAI 8.28) and psychoanaleptics (6.00 ± 4.54). Benzodiazepines and related drugs contributed most significantly to high scores: zolpidem (8.9 ± 4.44), diazepam (8.19 ± 2.90), and oxazepam (7.95 ± 2.21). Inappropriateness in musculoskeletal system drug group (ATC group M) with aMAI score 5.70 ± 3.32 , primarily resulted from long-term NSAID use.

Conclusion: The aMAI index reveals that clinical inappropriateness is often driven by specific high-risk drugs rather than just the total number of medications. Given the high prevalence of frailty and cognitive decline in nursing home residents, these findings underscore the necessity of conscientious medication optimization with targeted deprescribing, particularly for benzodiazepines and NSAIDs, to improve safety and outcomes in the oldest-old.

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Real-world evidence of a community pharmacy-based intervention in COPD within the chronic diseases from A to Z programme

Elisabete Carvalho¹, Maria João Marques¹, Catarina Nunes^{2,3}, Marta Clemente^{2,3}, Joana Pinto^{2,3}, José Guerreiro^{2,3}, Sónia Romano^{2,3}, António Teixeira Rodrigues^{2,3,4,5}

¹AstraZeneca, Lisbon, Portugal

²Cientis, Lisbon, Portugal

³ANF - National Association of Pharmacies, Lisbon, Portugal

⁴Life and Health Sciences Research Institute [ICVS], School of Medicine, University of Minho, Braga, Portugal

⁵ICVS/3B's-PT Government Associate Laboratory, Braga/Guimarães, Portugal

Background: Chronic Obstructive Pulmonary Disease (COPD) is a global health threat and the third leading cause of death worldwide, according to the World Health Organization (WHO). Its high prevalence, frequent underdiagnosis, and substantial morbidity make early detection and effective management essential for improving patient outcomes. Community pharmacists are well positioned to support COPD patients through structured interventions that optimise treatment adherence, inhaler technique, and overall quality of life. This study presents preliminary demographic and clinical findings from a community pharmacy (CPh)-based intervention in Portugal, comprising (1) a Disease Awareness and Screening Campaign and (2) a Medication Management and Patient Education Programme for patients on fixed-dose triple therapy (FDTT).

Method: This real-world observational study was conducted in CPh as part of the national programme “Chronic Diseases from A to Z”. Adult patients with self-reported COPD were recruited during routine pharmacy visits. During the screening phase, structured interviews collected data on demographics, smoking status, comorbidities, dyspnoea severity (mMRC), and current COPD pharmacotherapy. Patients on FDTT were invited to participate in a three-month medication management programme with two visits (T0 and T3). Assessments included drug-related problems, inhaler technique, treatment adherence, mMRC score, and exacerbation history, with interventions consisting of patient education and inhaler training. Data were recorded electronically and analysed descriptively, with outcomes at T0 and T3 compared in the FDTT group.

Results: As of 15 September 2025, 270 patients had been enrolled: 158 (59%) on non-FDTT and 112 (41%) on FDTT. Overall, 51% were female, with a mean age of 67.4 years and the 65–79 age group most represented. At baseline (T0), an mMRC score ≥ 2 was reported by 46% of non-FDTT patients and 69% of FDTT patients, indicating a higher symptomatic burden in the latter group. Symptom burden, including cough, sputum production, and exacerbation history, was more frequent among FDTT patients. Preliminary outcomes

after three months of intervention showed improvements in the FDTT group: treatment adherence increased from 88% to 96%, correct inhaler technique from 85% to 96%, and the proportion of patients with mMRC < 2 rose from 31% to 44%.

Conclusion: These preliminary findings demonstrate the feasibility and potential impact of structured pharmaceutical interventions for COPD patients in community pharmacies. Improvements in treatment adherence, inhaler technique, and dyspnoea suggest that pharmacist-led interventions can support better disease management in real-world settings. The study remains ongoing, and final results will be presented at the congress, providing further insight into the role of community pharmacy in COPD care.

Teaching the One Health concept through immersive interprofessional simulation with medical and veterinary students

Aurore Gaspar¹, Catherine Delguste², Félix Scholtes³, Bénédicte Mousset¹, Dominique Théwissen⁴, Geneviève Philippe¹

¹Department of Pharmacy, Center for Interdisciplinary Research on Medicines, Faculty of Medicine, University of Liège, Belgium, Liège, Belgium

²Faculty of Veterinary Medicine, University of Liège, Belgium, Liège, Belgium

³Department of Preclinical Sciences, Faculty of Medicine, University of Liège, Belgium, Liège, Belgium

⁴University of Liège, Belgium, Liège, Belgium

Background: The “One Health” concept highlights the interdependence between human, animal and environmental health and is widely recognised as essential for addressing complex global health challenges. Responding effectively to such challenges requires strong interdisciplinary collaboration. Educational approaches that promote early interprofessional interaction are therefore increasingly encouraged in health professions training.

Objective: This study describes the design and preliminary evaluation of an interprofessional simulation developed to introduce the One Health concept to health professions students. The simulation was first piloted in July 2024 and subsequently implemented within a sustainable development course in May 2025 and April 2026. The objectives were to: (1) familiarise students with the One Health concept and its interconnected systems; (2) provide an interprofessional collaborative learning experience through a simulated health crisis; and (3) allow students to apply key principles of Crisis Resource Management in a complex scenario.

Method: An immersive simulation inspired by an escape-game format was developed, combining role-play and collaborative problem solving around the management of a fictional zoonotic outbreak. The activity involved mixed groups of medical and veterinary students (n = 20 per session). Feasibility and student satisfaction were assessed using post-activity questionnaires and focus groups. Students’ attitudes toward interprofessional collaboration were measured using the Readiness for Interprofessional Learning Scale (RIPLS), an inverted 5-point Likert scale where lower scores indicate a more positive attitude toward interprofessional learning (1 = strongly agree; 5 = strongly disagree).

Results: Pre-activity RIPLS scores showed a positive baseline attitude toward interprofessional collaboration (mean 1.72/5). Satisfaction questionnaires indicated that 90% of students were satisfied or very satisfied with the activity. Pre-activity RIPLS scores indicated a very positive baseline attitude toward interprofessional collaboration (mean score 1.72 on a 1-5 scale). The preliminary post-activity scores do not show any statistically significant change due to their currently low number. Satisfaction questionnaires that 90% of participants reported being satisfied or very satisfied with the learning experience. The focus groups highlighted the contribution of the immersive aspect and the positive group dynamic. These preliminary findings support the feasibility and perceived educational value of the activity.

Conclusion: These preliminary findings suggests that immersive interprofessional simulation may represent a promising educational approach to introduce the One Health concept and foster collaborative competencies among health professions students. Data from the 2026 cohort will further inform the educational impact of this approach.

Socioeconomic and clinical predictors of insulin-based therapy among U.S. adults with type 2 diabetes: A nationally representative analysis

Shalini Rana¹, Magaly Rodriguez De Bittner¹, Fadia Shaya¹

¹University Of Maryland, Baltimore, Baltimore, MD, United States

Background: Diabetes medication utilization varies widely across countries, with implications for pharmacy practice and health equity. In low- and middle-income countries, 51.9% of individuals with diabetes remain undiagnosed, and 18.6% of those diagnosed use no glucose-lowering medication. Even in high-income settings, treatment rates differ substantially; for example, 66.0% of U.S. adults with type 2 diabetes use glucose-lowering medications compared with 88.1% in Israel. Beyond treatment access, glucose-lowering medication type and intensity, particularly insulin vs. oral agents, vary based on clinical need, healthcare system factors, and patient characteristics. Understanding drivers of diabetes medication

selection in the United States may help pharmacists identify treatment barriers and promote equitable, patient-centered care.

Objective: To identify demographic, socioeconomic, and clinical predictors of insulin-based therapy among U.S. adults with type 2 diabetes, stratified by comorbidity burden.

Method: This cross-sectional study used data from the National Health and Nutrition Examination Survey (NHANES) 2021-2023 cycle. Adults ≥ 18 years with type 2 diabetes (HbA1c $\geq 6.5\%$ or self-reported diagnosis) were included; pregnant individuals were excluded ($n=1,225$). The primary outcome was diabetes medication category: oral medications only, insulin only, or intensive therapy (oral medications plus insulin). A secondary binary outcome (any insulin use vs. oral medications only) was also modeled. Analyses were stratified by comorbidity burden: diabetes only ($n=505$), diabetes plus chronic kidney disease ($n=379$), diabetes plus heart failure ($n=38$), and diabetes plus both conditions ($n=81$). Covariates included age, sex, race/ethnicity, poverty-income ratio, insurance status, and HbA1c category. Weighted multivariable logistic regression was conducted using PROC SURVEYLOGISTIC in SAS. Analyses incorporated NHANES complex survey design elements. Odds ratios and 95% confidence intervals were reported.

Results: Individuals with the highest comorbidity burden (diabetes plus heart failure plus chronic kidney disease) had more than twice the odds of insulin use compared with those with diabetes alone (OR 2.29, 95% CI 1.11-4.74). Higher poverty-income ratio was inversely associated with insulin use (OR 0.79 per unit, 95% CI 0.68-0.93). A dose-response relationship was observed for HbA1c: poorly controlled HbA1c ($\geq 9\%$) was associated with over five times the odds of intensive medication use compared with controlled levels (OR 5.12, 95% CI 2.53-10.38). Age, sex, race/ethnicity, and insurance status were not statistically significant, although non-Hispanic Black participants trended toward higher odds of intensive therapy.

Conclusion: Insulin use was strongly associated with comorbidity burden and poor glycemic control, reflecting appropriate treatment intensification. The inverse relationship between income and insulin use suggests cost-related access barriers relevant across diverse healthcare contexts globally. Future research pooling multiple NHANES cycles and incorporating multinational data will better characterize unmet needs in diabetes medication access. Pharmacists across practice settings are well-positioned to screen for social determinants of health, support medication access, and advocate for equitable therapy intensification worldwide.

Enhancing regional synergy for effective CPD: Inter professional collaboration

Philip Harrison¹

¹The Square Foundation, Verdun, Canada

Background: The goal of health care professionals is enhancement of public health. The essential components are

- Knowledge
- Skills i.e. The ability to use the knowledge effectively and to work collaboratively with members of the health care team

Objective: Anecdotally, most physicians and pharmacists report more efficient work practices when working together and there is substantive research teamwork leads to better health care outcomes and this is borne out by evidence

Method: Continuing Professional Development is an essential part of maintaining professional competence. Each of these words is critical; •Continuing; life-long learning •Professional: The requisite professional standards •Development: improvement of skills and not just the status quo Much CPD focuses on knowledge at the expense of skills and most takes place in the context of one profession i.e. CPD for pharmacists does not involve physicians. The Square Foundation held a workshop with the West African Post Graduate College of Pharmacists with five countries and including a physician, to develop CPD Guidelines which will encompass skills as well as knowledge. Similar workshops are planned for east Africa (April 2026 in conjunction with the Ethiopian Ministry of health and Ethiopian Pharmaceutical Association and including Kenya, Tanzania, Rwanda and Uganda) and in southern Africa (May 2026 with Malawi, Zimbabwe, Zambia, Botswana, Namibia and Lesotho)

Results: In some countries, joint training takes place at the undergraduate level but has yet to find its way into CPD. This can be rectified cooperation of other health care professions, initially, physicians

Conclusion: A more formal process is planned with an Institute for optimization of public health in which physicians and pharmacists train academically and practically leading to a recognized qualification?)

Navigating the Generosity of Medicines (Gen-MED): Characterizing the complex relationships of medication donations through stakeholder analysis - Japan's case study

Carol Namata¹, Eiko Kobayashi², Kayoko Takeda Mamiya³, Tetsumi Irie⁴, Takashi Egawa⁵, Naoko Arakawa⁶, Kaitlyn Watson¹

¹Faculty of Pharmacy and Pharmaceutical Sciences, University of Alberta, Edmonton, Canada

²Japanese Red Cross Medical Centre, Tokyo, Japan

³Department of Pharmaceutical Education, Faculty of Pharmaceutical Sciences, Hokkaido University of Science, Hokkaido, Japan

⁴Department of Pharmaceutical Packaging Technology, Faculty of Life Sciences, Kumamoto University, Kumamoto, Japan

⁵Department of Pharmaceutical Sciences for Health Crisis Management, Faculty of Pharmaceutical Sciences, Fukuoka University, Fukuoka, Japan

⁶Division of Pharmacy Practice and Policy, School of Pharmacy, University of Nottingham, Nottingham, United Kingdom

Background: Anthropogenic and natural hazards frequently disrupt health systems, increasing reliance on medicine donations. However, inappropriate donations (e.g., expired, unlabelled, or poorly matched to local needs) remain common and create environmental, economic, social, and health burdens on disaster-affected communities. Although World Health Organization (WHO) guidelines exist for medicine donations, compliance remains inconsistent. Addressing these challenges requires improved coordination and engagement among the diverse stakeholders involved in medicine donation systems. In Japan, awareness of inappropriate medicine donations has increased since the Great East Japan Earthquake, and efforts have been made to improve donation practices; however, the coordination mechanisms and roles among stakeholders remain insufficiently characterized. As part of a larger program of research, this study aimed to identify and characterize stakeholders involved in the donated medicine cycle in Japan and to examine their relationships. In addition, this study also obtained stakeholder opinions on our proposed collaborative initiative, to build transparency within the medicine donation systems and increase the proportion of donated medicines that meet the health needs of disaster affected populations while complying with WHO guidelines.

Method: This study applied stakeholder analysis combined with Social Network Analysis (SNA) to examine the existing collaboration network within the Japanese medicine donation system. The analysis followed three phases: stakeholder identification, stakeholder categorization, and analysis of stakeholder relationships. Between June and August 2025, an online questionnaire was distributed to 18 stakeholders asking for: (1) their influence, interest and

attitude toward the initiative; (2) interests; (3) desire for involvement; (4) concerns; (5) whom they considered a key stakeholder; and (6) the level of collaboration they had with other stakeholders. Data analysis combined descriptive quantitative analysis and SNA.

Results: The analysis identified 18 stakeholders across nine groups. Eight stakeholders were considered critical to the proposed initiative. These belonged to seven groups including pharmacy professional bodies, national and regional government, humanitarian organizations, pharmaceutical companies, regional hospitals, and the national pharmaceutical manufacturers association. Half of the critical stakeholders reported a positive attitude toward the initiative and the majority were willing to collaborate in its development. Public health and science were the main driving interests. A collaboration network existed between 17 stakeholders. National-level stakeholders emerged as the most strategically positioned for controlling the flow of information and resources within the Japanese medicine donation system.

Conclusion: This stakeholder analysis provided a comprehensive understanding of collaboration patterns within the Japanese medicine donation system and highlighted contextual insights required for the successful implementation of the proposed initiative. These insights provide practical guidance for designing collaborative approaches that enhance transparency and better align medicine donations with local health needs while supporting compliance with the WHO guidelines for medicine donations. While Japan served as the pilot site, the structural insights provide a transferable methodological approach that can be applied in other countries and humanitarian settings to identify and engage critical stakeholders when developing strategies to mitigate the negative consequences of inappropriate medicine donations.

Feasibility of community pharmacy-delivered HIV PrEP in South Africa: A mixed methods study applying the RE-AIM framework

Tsitsi Nyamuzihwa¹, Angela Tembo¹, Siphamandla Gumede¹, Sheree Schwartz², Cherryl Hendrickson³, Jacqui Miot³, Paballo Mataboge³, Francois Venter¹, John De Wit⁴, Samanta Lalla Edward¹

¹Ezintsha, Faculty of Health Sciences University of Witwatersrand, Johannesburg, South Africa

²John Hopkins School of Public Health, Department of Epidemiology, Baltimore, United States of America

³Health Economics and Epidemiology Research Office (HE2RO), Johannesburg, South Africa

⁴Department of Social Science, Utrecht University, Utrecht, Netherlands

Background: Delivery of oral pre-exposure prophylaxis (PrEP) in community pharmacies has the potential to overcome barriers related to low PrEP uptake, including stigma, confidentiality, and long waiting times. We aimed to assess the feasibility, acceptability, and implementation outcomes of community pharmacy-delivered PrEP in South Africa by applying the Reach, Effectiveness, Adoption, Implementation, and Maintenance (RE-AIM) framework.

Method: This convergent mixed-method study evaluated PrEP delivery to men and women ≥ 18 years between June 2023 and March 2025 across 10 community pharmacies in South Africa. Study-trained nurses assessed eligibility in pharmacies, with physicians supporting PrEP initiation and management via telemedicine. Quantitative data included demographics, appointment adherence, HIV risk assessment, clinical data, direct and indirect participant costs. Qualitative data, analysed thematically, included verbatim transcribed in-depth interviews (with clients and providers) to explore PrEP uptake motivators and opinions about the community pharmacy-delivered PrEP model.

Results: We recruited 2100 participants at baseline, 1703 of whom initiated PrEP; 70.2% (1195/1703) were female, and the median age was 30 years (IQR 24–36). Among the 1897 participants who completed the self-sexual risk assessment, 76% reported condomless sex. PrEP persistence was 33.5%, (570/1703) 17.1% (292/1703), and 12.7% (217/1703) at 1, 3, and 7 months respectively. Over half returned at unscheduled dates, indicating challenges in adherence (51.4%, 876/1703), and 6.2% (105/1703) intended to discontinue PrEP. PrEP was offered per national guidelines with an average of 170 initiations per pharmacy. Clients reported an average total cost of \$7.44 per PrEP initiation visit; \$2.51 direct cost (transport + childcare + food) and \$4.97 indirect cost (time of travel + waiting + consultation). Participants found pharmacy-delivered PrEP to be acceptable citing convenience, privacy and reduced stigma as key motivators. Baseline qualitative findings led to expanding female eligibility from 18-35 years to 18 years and above. Recommendations for sustainability

included subsidizing the cost of PrEP post-study and expanding services to rural areas.

Conclusion: Community pharmacy-delivered PrEP in South Africa is feasible and reaches at-risk key populations effectively. While uptake was strong, persistence was suboptimal, underscoring the need for tailored support strategies. Policy changes to expand pharmacy roles and reduce cost barriers could enhance access and sustainability, supporting national HIV prevention goals.

From local needs to integrated care: A regional development of a regional collaborative model

David Pires^{1,2}, Filipa Sousa^{1,2}, Humberto Alexandre Martins^{1,2}, Mónica Condinho^{1,2,3,4}

¹Portuguese Pharmaceutical Society, Lisbon, Portugal

²PPS Centre of Studies for the Pharmacy Profession, Lisbon, Portugal

³Faculdade de Ciências e Tecnologia da Universidade do Algarve, Faro, Portugal

⁴ABC-RI, Algarve Biomedical Center Research Institute, Faro, Portugal

Background: Regional disparities in access to healthcare in Portugal remain significant, particularly in areas affected by shortages of healthcare professionals and limited service availability. These challenges hinder care coordination and call for locally tailored, collaborative responses involving pharmacists and other healthcare professionals. In this context, the South and Autonomous Regions Branch (SARB) of the Portuguese Pharmaceutical Society (PPS) launched a regional initiative to identify locally perceived health needs and foster integrated pharmaceutical care solutions.

Objective: To identify regional health priorities through the active engagement of healthcare professionals and to develop a regional collaborative model for integrated care.

Method: The initiative began with a regional collaborative event held in Alto Alentejo, Portugal, involving pharmacists from different professional sectors, other healthcare professionals, representatives from the Local Health Unit of Alto Alentejo, which comprises the local hospital and primary healthcare facilities, and the National Association of Pharmacies (ANF), ensuring the involvement of key institutional stakeholders. The project follows a three phase structure. Phase 1 consisted of a structured participatory process during the event, in which participants identified regional health needs and system level challenges through moderated discussions. Phase 2 involves interdisciplinary working groups that further explore the identified priorities and develop intervention proposals. Phase 3 will focus on implementing pilot projects across the region.

Results: Twenty local healthcare professionals participated in the initial event, which led to the establishment of three thematic working groups: (1) Clinical Pharmaceutical Services and Patient Follow up in the Community; (2) Access to and Sharing of Health Data; and (3) Environmental Sustainability and Medicines. These groups are currently developing region-specific proposals aimed at improving care continuity, strengthening health data exchange, and promoting sustainable pharmaceutical practices.

Conclusion: This initiative provides a structured regional model for identifying health priorities and co-developing collaborative solutions to reinforce integrated pharmaceutical care. By engaging healthcare professionals and institutional stakeholders in a participatory process, it ensures that proposed interventions are aligned with locally identified needs and offers a potentially replicable framework for other regions.

Trends in the diagnostic tools and medicines for the management of asthma in Ghana

Serwah Opoku-mensah¹, Afia Frimpomaa Asare Marfo¹

¹Kwame Nkrumah University of Science and Technology, KUMASI, Ghana

Background: Asthma remains the most prevalent chronic respiratory disease that affects more than 300 million people globally. Many low and middle-income countries still struggle to diagnose accurately and properly manage their asthma patients. Although the national guidelines for asthma management in Ghana have recently been launched, there is still critical need to evaluate the availability and use of essential diagnostic tools together with medicines for the management of asthma to support the effective implementation of the national guideline. Therefore, the objective of the study set out to find the trends in terms of asthma diagnostic tools and the medicines used in its management in Ghana.

Method: A cross-sectional study was conducted on 449 hospital and community pharmacies with Pharmacists as the participants of the study. These included 45 private hospitals, 151 public hospitals and 252 community pharmacies across Ghana. Pharmacies in 14 out of 16 regions in Ghana participated in the study. A self-structured questionnaire was distributed online and in person to ascertain the methods used to diagnose asthma in the hospitals and determine the availability of diagnostic tools and medications used in the management of asthma. SPSS version 27 was employed for data analysis and the study was ethically approved by the Committee on Human Research, Publication and Ethics of the Kwame Nkrumah University of Science and Technology (CHRPE-KNUST).

Results: The majority of hospitals (95.7%) diagnosed based on asthma symptoms, while additional methods included; the use of spirometers (28%), peak flow meters (23%), broncho-provocative tests (7.7%) and fractional exhaled tests (1%). Notably, the asthma devices were readily available in the public hospitals than in the private hospitals ($p = 0.001$). Asthma medications frequently stocked in hospitals and community pharmacies were salbutamol inhalers, budesonide formoterol turbuhalers and salbutamol nebulers.

Conclusion: Trends in the diagnosis of asthma in Ghana is still reliant on asthma symptoms; therefore, more hospitals should come on board with the use of advanced technology to confirm asthma diagnosis in their facilities. The hospitals and community pharmacies in Ghana have essential medicines for managing asthma in the country.

Early-career health professionals' interaction with different health disciplines: A cross-sectional study in Saudi Arabia's eastern region

Suhaib Muflih¹, Dana Alsugeir, Barry Bleidt

¹Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia

Background: The value of interprofessional education (IPE) in enhancing interdisciplinary collaboration, effective communication, and health outcomes are becoming more widely recognized. IPE promotes collaborative practices across profession programs through emphasizing mutual respect, effective communication, roles and responsibilities, leadership and teamwork competencies to better gain real-world problem-solving skills and achieve desired health outcomes. Previous research suggested that IPE led to positive attitudes toward team-based care. The literature lacks research on how IPE affects the core values of interprofessional collaborative activities. Therefore, the current proposed study aims to assess an entry-level health professional's interaction with members of other health professions and investigating the role of IPE in changing interprofessional collaborative practice.

Method: A cross-sectional study design with a validated survey tool will be used to collect data from an estimated sample size of 377 healthcare providers with less than 5 years of experience. Ethical approval was obtained by the ethics research committee of the Imam Abdulrahman bin Faisal University. Eligible participants will receive the interprofessional professionalism assessment (IPA) questionnaire online, along with items that inquire about sociodemographic and prior experience with IPE, perceived barriers and facilitators of IPE and collaborative practice. The online survey link will be sent out to healthcare practitioners (e.g., physicians, pharmacists, nursing, and nutritionist) working at tertiary hospitals in the Saudi Arabia's Eastern

Region. IPA consists of 26 questions assessing 6 domains of interprofessional collaborative competencies. Both descriptive and inferential (Chi-square, ANOVA, Regressions) statistics will be performed using IBM® SPSS® Version. 28.

Results: Data Collection is currently in progress. Statistical analysis will be performed about the completion of data collection process. The preliminary findings from the pilot testing phase showed a potential value of IPE initiatives and collaborative practice in enhancing interprofessional competencies.

Conclusion: The findings may inform decision makers to integrating IPE in profession program curricula and assessment methods to improve student learning outcomes and develop a sense of collaborative practice early on. Further, the findings are expected to highlight barriers and facilitators for effective IPE initiatives and meaningful collaborative practices.

Construct validity of a single question on current persistence; comparisons with a visual analogue scale for medication adherence.

Hadia Kazkaz¹, Jeff Taylor, Holly Mansell, David Blackburn

¹University Of Saskatchewan, Saskatoon, Canada

Background: Non-persistence is the act of discontinuing a medication temporarily or permanently; it is one of the most common manifestations of non-adherence. We have used a single question about current persistence (SQCP) in research studies (i.e., "Are you still taking your medication?"). Although face validity of a SQCP is high, little information is available to understand its relationship to other self-reported adherence measures. However, validation analyses can be challenging given the lack of a "gold standard" adherence measure. The visual analog scale (VAS) is a commonly used measure that has been validated in several settings. Although VAS does not identify non-persistence, it is expected to agree with a SQCP under certain conditions.

Objective: To evaluate construct validity of a SQCP compared to VAS in a sample of individuals recently starting a chronic medication.

Method: The MDNAS survey was mailed to Saskatchewan residents who recently started a new chronic medication. Surveys were completed approximately 3 to 6 months after receiving their initial prescription. The survey contained a VAS question, and an SQCP "Are you still taking your medication?". We calculated sensitivity and specificity within strata based on time since discontinuation.

Results: The MDNAS survey was completed by 3,973 respondents. The median VAS was 100 (IQR 100 to 95) and 94.5% (n=2675) reported adherence at least 80%. Non-persistence based on the SQCP was reported by 5.5% (n=157). Among those reporting non-persistence, only 45% (n=71) also reported VAS<80%. However, when the sample was stratified by time since discontinuation, a clear relationship emerged. For respondents who discontinued their drug within 1 week of starting it, the vast majority indicated a VAS<80% (i.e., 100% and 80% for those discontinuing on day 1 or day 2 to 6 respectively). In contrast, people who discontinued more recently were less likely to indicate a VAS<80%.

Conclusion: Non-persistence indicated by the SQCP was highly aligned with a VAS < 80% for people who discontinued their medication months ago. Disagreement between the SQCP and VAS<80% was commonly observed when drug discontinuation was more recent. These findings align with the conceptual understanding of overall adherence measured by the VAS versus the specific outcome of non-persistence measured by the SQCP. Study results suggest high levels of construct validity for the SQCP.

Point of care services in pharmacy: impact on healthcare costs and economic outcomes

Doris Drmač^{1,2}, Robert Vučina^{1,3}, Valentina Rezić^{1,4}, Martin Kondža^{1,5,6}

¹Faculty of Pharmacy University of Mostar, Mostar, Bosnia and Herzegovina

²Pharmaceutical Health Institution LUPRIV PHARM, Mostar, Bosnia and Herzegovina

³AgroHerc Organic d.o.o., Mostar, Bosnia and Herzegovina

⁴FARMAVITA d.o.o. Sarajevo, Sarajevo, Bosnia i Hercegovina

⁵Pharmaceutical Chamber of the Federation of Bosnia and Herzegovina, Sarajevo, Bosnia i Hercegovina

⁶Faculty of Food Technology Josip Juraj Strossmayer University of Osijek, Osijek, Croatia

Background: Point of care services delivered by pharmacists are expanding across community and hospital settings, supporting early diagnosis, antimicrobial stewardship, and chronic disease management. These services are increasingly recognised as a strategy to optimise healthcare resource utilisation and reduce system burden. However, while clinical benefits are well documented, evidence on their economic impact remains fragmented. There is a need for a clear synthesis of how point of care pharmacy services influence costs, healthcare utilisation, and broader economic outcomes.

Objective: This review aims to evaluate the economic impact of pharmacist led point of care services and to identify their potential contribution to healthcare system efficiency. It also explores whether these services provide cost savings through improved patient outcomes and reduced unnecessary healthcare utilisation.

Method: A rapid review of the literature was conducted using selected peer reviewed articles focusing on point of care testing and pharmacy based clinical services. Studies were analysed descriptively, with emphasis on economic outcomes, including cost effectiveness, cost savings, and resource utilisation. Data were synthesised to identify common trends and key economic indicators across different healthcare settings.

Results: The reviewed studies demonstrate that pharmacist led point of care services improve early diagnosis and enable timely initiation of treatment, particularly in infectious diseases. These services increase accessibility and reduce delays in care, leading to decreased physician visits and lower pressure on emergency departments. Evidence consistently shows improved antimicrobial stewardship, with reductions in unnecessary antibiotic prescribing of approximately 25–50%. Additionally, point of care testing supports more efficient healthcare resource utilisation and redistribution of workload across the system. Economic analyses indicate favourable cost effectiveness and potential cost savings through reduced complications, optimised therapy, and improved patient outcomes, although variability in study designs and economic measures remains a limitation.

Conclusion: Pharmacist led point of care services represent an effective approach to improving both clinical and economic outcomes within healthcare systems. The evidence demonstrates that these services enhance early diagnosis, support appropriate medicine use, and reduce unnecessary healthcare utilisation, resulting in improved system efficiency and potential cost savings. Despite consistent positive findings, variability in study design and economic evaluation methods highlights the need for more standardised and large scale research. Future efforts should focus on integrating point of care services into routine pharmacy practice through structured implementation models, professional training, and sustainable reimbursement frameworks. This approach aligns with broader healthcare strategies aimed at optimising resource use while strengthening the role of pharmacists in patient centred care.

A qualitative evaluation of the role of the pharmacy technician in increasing vaccination access, equity, and addressing vaccine-related health disparities in the US and Canada.

Mathew Demarco¹, Kimberly McKeirnan¹, Taylor Bertsch¹, Dana Bowers¹

¹University of Waterloo, Waterloo, Canada

Background: To enhance vaccination accessibility for Canadians, integrating injection-certified regulated pharmacy technicians into community pharmacy vaccination workflows is critically important. Quantitative and qualitative research has shown numerous workflow benefits of increasing injector availability with an injection-trained regulated pharmacy technicians (RPhT), including reducing pharmacists' workload, increasing pharmacist capacity for clinical services, improving patient access to an injector, and reducing wait times, all without negatively affecting patient outcomes. Less explored, however, are patient access impacts beyond simply increasing the number of injectors in the workflow. Immunizing pharmacy technicians are more likely to be culturally, ethnically, linguistically, and religiously representative of the patients they serve, which helps them identify and mitigate vaccine-related health disparities in their communities. Engaging underserved populations strengthens community mobilization, improves vaccine confidence, and supports vaccine acceptance. Therefore, this research works to describe how immunizing pharmacy technicians perceive their role in improving vaccine access, addressing vaccine-related health disparities, and promoting vaccine equity within the communities they serve.

Method: This work will use one-on-one semistructured interviews to qualitatively evaluate Canadian and American immunizing pharmacy technicians' perceptions of how their role influences vaccine access, reduces vaccine-related health disparities, and promotes vaccine equity within their communities. Forty immunizing technicians will participate in total, consisting of approximately twenty from the United States and twenty from Canada. U.S. technicians will be recruited from prior survey participants, and Canadian technicians will be contacted through their provincial regulatory colleges via email. Interview questions will be informed by the five domains of the Access Framework: affordability, availability, accessibility, accommodation, and acceptability. Because healthcare disparities affect vaccine access and equity, this project uses the Access Framework, which defines access as the "fit" between patients and the healthcare system. Its five components guide our inquiry: acceptability (patients' comfort with technician vaccinators), accessibility (time, distance, and wait-time impacts), accommodation (appointment systems and hours), affordability (whether technician vaccinators reduce costs), and availability (whether more immunizers expand access). This framework helps identify which disparities

technician-delivered vaccination may address or leave unresolved. After interviews are completed and transcribed, researchers will conduct thematic coding to identify key patterns. The Access Framework will guide theme development, and quotations will illustrate theoretical constructs. The research team will jointly review coding to ensure accurate categorization. Quotations will then be grouped to compare similarities and differences in technicians' experiences administering vaccines. Deductive coding will be applied to content aligned with the Access Framework, while inductive coding will identify new concepts emerging outside the framework.

Results: Data analysis are ongoing. Results will be available at the time of presentation.

Conclusion: This research will substantially contribute to limited existing pharmacy technician literature in Canada and the United States by demonstrating the value of pharmacy technicians as immunizers in increasing vaccine access and equity and addressing vaccination-related health disparities. Findings may help provincial and state health systems and decision-makers recognize the importance of expanding technician immunization roles. Results from two countries that were the among the first to authorized RPhTs to inject medications may support generalizability to jurisdictions considering technician-administered vaccinations.

The impact of integrating injection-certified regulated pharmacy technicians into community pharmacy vaccination workflow: A time and motion study

Mathew Demarco¹, Sherilyn Houle¹, Nancy Waite¹

¹University of Waterloo, Waterloo, Canada

Background: To enhance the accessibility of vaccinations for Canadians, utilizing injection-certified regulated pharmacy technicians within the vaccination workflow of community pharmacies is of critical importance. Research to date has revealed numerous benefits of this practice, including reducing workload burden on the pharmacist, increasing pharmacist time for providing clinical services, and pharmacy professionals' job satisfaction, without adverse impacts on patient outcomes. Less well known are the quantitative impacts of this approach including overall injector availability, patient appointment durations and wait times, workflow efficiency, and differences in the frequency of interruptions that may impact vaccination service efficiency and safety. Determining how much time pharmacists and injection-certified pharmacy technicians require to provide vaccinations during high and low volume periods can help optimize health care human resource allocation and workflow, ensuring the public can conveniently and effectively access vaccination services at Canada's 11,500

community pharmacies. The objective of this research is to describe average appointment duration and time spent on individual workflow activities across models that utilize and do not utilize injection-certified pharmacy technicians in pharmacies during high volume and low volume periods.

Method: This observational time and motion study evaluated average vaccination appointment time and time spent on individual workflow activity when injections were administered by an RPh or an RPhT during days with either high or low respiratory vaccination volumes. Each recruited RPhT-RPh pair were observed for at least 26 appointments per injector. Appointment and workflow activity time was observed and documented using a digital stopwatch, including interruptions and patient waiting time. Data was analyzed using descriptive statistics to compare times across injector types during high and low volume periods.

Results: Seventy booked vaccination appointments (n=36 RPhT appointments, n=34 RPh appointments) were observed during low volume days (n=6) at one community pharmacy from an urban region of Niagara, Ontario. One hundred six booked vaccination appointments (n=52 RPhT injector, n=53 RPh injector) were observed during high volume days (n=4) at a community pharmacy in an urban regional of Sudbury, Ontario. Statistics analysis comparing RPhT and RPh injectors revealed that there were no significant differences in the average time it took to provide vaccination appointments. There was no difference in the average time that pharmacists took to provide clinical vaccination roles such as answering patient questions, providing therapeutic approval, and treating adverse events among vaccination appointments provided by RPhT injectors versus those provided by RPh injectors. The average waiting time was shorter for RPhT injectors on low volume days.

Conclusion: This research will significantly contribute to limited existing pharmacy technician research in Canada by quantifying workflow benefits through optimizing the skill sets of pharmacy professionals and supporting the implementation of RPhT injectors in community pharmacies in Ontario. By identifying strategies to enhance the delivery of community pharmacy vaccination programs that reduce patient waiting time while maintaining the quality of patient care, safe and convenient access to vaccinations for Canadians can be ensured, and in a way that results in a positive experience that encourages future vaccination and improves vaccination uptake at the population level.

Antimicrobial access, use practices, and stewardship capacity at the community level in Sub-Saharan Africa: A scoping review protocol

Josephine Osarfo¹, Archibald Okotah^{1,2}, Sandra Duoduwa Lartey⁴, Nii Obodai Mensah³, Leslie Vanderpuije¹

¹*Britts Pharma Ltd, Accra, Ghana*

²*AJ Health & Research Consult, Accra, Ghana*

³*Eastern Regional Health Directorate, Ghana Health Service, Eastern Region, Eastern Region, Ghana*

⁴*School of Nursing and Midwifery, KNUST, Kumasi, Ghana*

Background: Antimicrobial resistance (AMR) is a critical global health issue, with approximately 700,000 deaths annually and projections of 10 million by 2050. The rise of AMR stems from genetic changes in microorganisms that allow them to evade antibiotics, contributing to longer hospital stays and increased healthcare costs. Sub-Saharan Africa (SSA) reports significant mortality rates linked to AMR, impacted by complex systemic factors such as ineffective regulation, health system and socio-economic challenges. Informal access to antimicrobials and cultural beliefs complicate responsible usage, exacerbating the issue. Effectively addressing antimicrobial misuse in SSA requires a comprehensive approach that considers economic, cultural, and healthcare system factors.

Method: Guided by Arksey & O'Malley's framework (2005), enhanced by Levac et al. (2010), the review will systematically search, map, and synthesize peer-reviewed studies identified across selected electronic databases, including PubMed, Scopus, Web of Science, Ovid Embase, MEDLINE, and Google Scholar. Websites of organizations involved in antimicrobial access, usage practices and stewardship capacity at the community level across SSA will also be explored for grey literature. The authors will extract data from peer-reviewed articles published from 2000 to 2025 in the English language. The primary investigator and a second author will independently review the retrieved articles, guided by the inclusion criteria. A third independent reviewer will be consulted to resolve any conflicts that may arise in article selection. The search strategy will employ predefined inclusion criteria for studies assessing the antimicrobial access, usage practices and antimicrobial stewardship capacity of populations at the community level. An Excel data extraction sheet will be used to chart the evidence in accordance with predefined Antimicrobial access and usage practice indicators of antimicrobial access points, antibiotic access and distribution pathways, regulatory structures governing antimicrobial sales, common antimicrobial use practices, commonly used antimicrobial classes, antimicrobial misuse behavior, socio-economic provider-related and health system drivers, and community antimicrobial stewardship implementation. Expected findings The scoping review is expected to identify key antimicrobial access points and

usage practices in communities, document stewardship programs, public awareness campaigns, and assess training initiatives. It will highlight socioeconomic and systemic factors influencing antibiotic access, reveal evidence gaps, and provide policy-relevant insights and recommendations to enhance antimicrobial stewardship and combat resistance in Sub-Saharan Africa.

Expected Results: The scoping review is expected to identify key antimicrobial access points and usage practices in communities, document stewardship programs, public awareness campaigns, and assess training initiatives. It will highlight socioeconomic and systemic factors influencing antibiotic access, reveal evidence gaps, and provide policy-relevant insights and recommendations to enhance antimicrobial stewardship and combat resistance in Sub-Saharan Africa.

Conclusion: The review will map evidence to illuminate antimicrobial access and misuse in Sub-Saharan Africa, assessing community stewardship capacity within SSA to inform policies and public health strategies aimed at combating antimicrobial resistance. The findings will be synthesized narratively and descriptively and presented in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses- Extension for Scoping Review Guidelines

Handling practices of therapeutic protein products among pharmacists in Saudi Arabia

Amani Elsayed¹, Manar Alsaadi¹, Raghad Alqarni¹, Sahar Alsulaymi¹, Raghad Alhumaidi¹

¹*Taif University- College of Pharmacy-Department of Pharmaceutics and Industrial Pharmacy, Taif/ Makkah, Saudi Arabia*

Background: Therapeutic Protein Products (TPPs), including monoclonal antibodies (mAbs), recombinant hormones and enzymes, are increasingly employed in the management of cancer, autoimmune diseases, diabetes, and metabolic disorders. Owing to their structural and chemical complexity, TPPs are vulnerable to degradation, aggregation, denaturation, and loss of activity when exposed to temperature fluctuations, agitation, or improper reconstitution.

Objective: This study aimed to evaluate the current handling practices of pharmacists in Saudi Arabia regarding TPPs, identify gaps, and highlight risk factors that may impact product safety, quality, and efficacy.

Method: A cross sectional study was conducted between December 2025 and February 2026 using an electronic questionnaire targeting pharmacists involved in handling

TPPs. The survey comprised two parts: one for respondents with experience in mAbs (Part A) and another for those with experience in other protein based products (Part B). The questionnaire covered storage practices, reconstitution and preparation techniques, transportation methods, administration practices, staff training, and patient education. Ethical approval was obtained from the Scientific Research Ethics Committee at Taif University (Application No: 47 133).

Results: A total of 155 responses were received. Of these, 41.30% of respondents reported having experience working with mAbs and therefore completed Part A. A further 51.60% indicated that they had experience working with TPPs other than mAbs and completed Part B. Regarding storage temperature, most respondents store TPPs at 2–8 °C and use a temperature logger. They also protect ready to administer products from light. TPPs are reconstituted mainly in the IV admixture room (61.05%) or in the chemotherapy room (32.63%). With respect to the devices used for reconstitution, the frequencies were 38.90%, 31.62% and 29.41% for a needle, a closed system transfer device (CSTD) and a spike, respectively. Approximately 70.30% reconstitute TPPs manually. In addition, 90% of respondents use normal saline for IV administration, and 92.10% remove residual headspace (air) from the infusion bag before administration. Most respondents use an in line filter during administration (88.90%) and refer to the SmPC to determine the shelf life of prepared mAbs (54.50%). Trolleys are the most widely used method for transporting TPPs within hospitals (58.10%). The most frequently encountered problems during the transportation of TPPs were vibration and shaking (17.90%), container drops or impacts (17.03%), and the use of pneumatic tube systems (10.04%). Whilst the most reported issues in the reconstitution or dilution of TPPs were vials being shaken vigorously (18.75%), followed by air being introduced during dilution (17.86%). Regarding administration, the most frequently reported problems was Y site administration without checking compatibility (22.09%). In relation to patient counselling, respondents recommended the following: observing turbidity (46%), protecting products from light (30.2%) and avoiding shaking (15.9%).

Conclusion: The pharmacists demonstrated good practice overall. However, issues such as the use of CSTDs and the use of pneumatic tube systems—both reported by around 30% of respondents—may have a detrimental effect on the stability of TPPs. Proper patient counselling is also needed to improve handling practices. In addition, further training in this area is required.

Embedding research in practice: enhancing clarity and standardisation of pharmacy team job descriptions through development of exemplar research descriptors

Scott Cunningham¹, Diane Ashiru-oredope^{2,3}, Mandy Wan⁴, Philip Jones⁵, Aoife Mcdermott⁶, Sarah Hiom⁷, Lisa Smith⁸, Christine Bond⁹, Uk Pharmacy Research Advisory Group

¹School of Health Sciences, University of New South Wales (UNSW), Sydney, Australia

²UK Health Security Agency, London, England, United Kingdom (UK)

³School of Pharmacy, University of Nottingham, Nottingham, England, UK

⁴Guys and St Thomas' NHS Foundation Trust, London, England, UK

⁵Association of Pharmacy Technicians, UK, London, United Kingdom

⁶Aston Business School, Aston University, Birmingham, England, UK

⁷Cardiff and Vale University Health Board, Cardiff, Wales, UK

⁸Northern Ireland Centre for Pharmacy Learning and Development, Queen's University, Belfast, Northern Ireland, UK

⁹University of Aberdeen, Aberdeen, Scotland, UK

Background: Research is recognised in UK health policy as a key driver of improved health outcomes, with the National Health Service (NHS) aiming to embed research and innovation into routine clinical practice. However, evidence from a UK-wide survey suggested that only a minority of pharmacists and pharmacy technicians are research active. Aligning policy ambitions with workforce practice requires clear expectations within job descriptions (JDs). The aim of this cross-sectional study was to analyse NHS pharmacy JDs, identify and characterise research-related responsibilities and develop exemplar research descriptors to support clear, consistent, equitable articulation of research expectations across roles.

Method: The work was undertaken by Workforce subgroup members of the UK Pharmacy Research Advisory Group. A purposive stratified sample of JDs for pharmacists and pharmacy technicians, in all four UK nations and NHS job grade bands (4(low) to 9(high)) was selected from adverts live on NHS Jobs websites during one week in January 2025. For each nation and banding group, up to 20 JDs were reviewed. Research related content was extracted in a subsample and subjected to qualitative documentary analysis through coding to the eight Multi professional Practice based Research Capabilities Framework domains. Research elements within the Royal Pharmaceutical Society's credentialling frameworks were also extracted and coded. Coding was conducted by two team members independently with discrepancies resolved through discussion or referral to a third. Then through a multistage consensus process involving eight team members, working in pairs with cross checks, collated information was

synthesised to draft and refine a set of generic, structured exemplar descriptors.

Results: Across the sample, inclusion of an explicit research section varied markedly. For pharmacists, 20 of 28 (71%) Band 6–7 roles and 23 of 40 (58%) Band 8a roles included research descriptors, compared with only 7 of 22 (32%) at Bands 8b–8c. None of the band 8d or 9 JDs included research descriptors. For pharmacy technicians, 14 of 32 (44%) Band 4–5 roles and 4 of 19 (21%) Band 6–7 roles included research descriptors. Overall, 164 distinct research descriptors were identified across the 22 downloaded JDs. The final structured set of generic research descriptors aligned with capability domains included planning and design, delivery, knowledge mobilisation, collaboration, developing others, leadership, strategic influence, career progression, and funding acquisition. Example generic descriptors for delivering research domain are shown below: Band 4-5: Participate in research that may include audits, clinical trials, quality improvement and service evaluation activities. Band 8b-c: Actively lead the delivery of pharmacy related research to generate new knowledge to inform service design and delivery that positively impacts outcomes and experiences of service users and wider communities at local, regional and national levels

Conclusion: Assessment of pharmacy job descriptions suggest that research expectations are not systematically embedded across NHS pharmacy roles, particularly at senior leadership levels. Lack of research focus at senior levels will impact on research strategy and culture. The UK-PRAG exemplar descriptors offer a standardised, evidence informed approach for articulating research responsibilities and have the potential to support job planning, workforce development and wider culture change.

Potential overtreatment of blood pressure in frail older adults: findings from home monitoring in Brazilian primary care

Marcio Galvão Oliveira¹, Maria Clara Costa¹, Pablo Maciel Moreira¹, Helena Salomão¹, Ana Maria Coqueiro¹, Ethiene Lima Santos¹, Welma Wildes Amorim², Antônio Luiz Ribeiro³, Kelle Oliveira Silva¹, Larissa Morgan⁵, Kenneth Boockvar⁴

¹Federal University Of Bahia, Vitória da Conquista, Bahia, Brazil

²Southwest Bahia State University, Vitória da Conquista, Brazil

³Federal University of Minas Gerais, Belo Horizonte, Brazil

⁴University of Alabama at Birmingham, Birmingham, USA

⁵Health Department of Vitória da Conquista, Vitória da Conquista, Brazil

Background: Optimal blood pressure (BP) targets in older adults remain controversial, particularly among individuals

with frailty and increased clinical vulnerability. Although more intensive BP reduction may prevent major cardiovascular events, excessively low targets may increase the risk of hypotension, syncope, and falls. This risk–benefit balance is especially uncertain in frail populations, in whom evidence remains limited. Home blood pressure monitoring has emerged as a promising tool to support treatment adjustment and deprescribing in this context. This study aimed to determine the prevalence of intensive BP control among older adults recruited to participate in a study of home blood pressure monitoring to assist in deprescribing antihypertensive drugs in community-dwelling older people (the Pressure Study) and to examine its association with frailty, age, and antihypertensive treatment intensity in community-dwelling older adults.

Method: A cross-sectional analysis was conducted of baseline data obtained from 121 community-dwelling adults older than 60 years treated for hypertension with at least one antihypertensive medication in primary care in Brazil. BP was assessed using home blood pressure monitoring. Intensive control was defined as systolic BP <120 mmHg and diastolic BP <70 mmHg. Frailty was classified as non-frail, pre-frail, or frail according to clinical-functional criteria. Age was categorised as 60–79 years and ≥80 years. The number of prescribed antihypertensive agents was used as a measure of treatment intensity. Descriptive analyses, Fisher's exact test for bivariate comparisons, and the Cochran–Armitage test were used to assess trends across ordered medication categories.

Results: The sample comprised predominantly women (64.5%), with a mean age of 71.4 ± 9.3 years. Frailty distribution was 26.4% non-frail, 53.7% pre-frail, and 19.8% frail. Intensive BP control was observed in 9.4% of non-frail, 13.8% of pre-frail, and 25.0% of frail participants ($p=0.298$). A similar non-significant pattern was observed by age, with 12.2% among those aged 60–79 years and 26.1% among those aged ≥80 years ($p=0.108$). The prevalence of intensive BP control increased with the number of antihypertensive medications: 9.3% among those using 1–2 agents, 29.0% among those using 3–4, and 33.3% among those using ≥5 (Fisher's exact $p=0.028$), with a significant linear trend (Cochran–Armitage $p=0.006$). Stratified analyses by frailty showed a consistent upward pattern across medication categories, although these trends did not reach statistical significance within strata.

Conclusion: Intensive BP control was more frequent among individuals receiving a higher number of antihypertensive medications and showed non-significant trends towards higher prevalence among older and frailer participants. These findings raise concerns about potential overtreatment in vulnerable subgroups and highlight the importance of individualising BP targets according to frailty status, goals of care, and balance of benefit and burden of treatment.

a risk-based approach to pharmacy inspection in South Africa: the influence of inspection officers on the inspection outcome (grading scores)

Vincent Tlala^{1,2}, Martha Lubbe², Susan Burton³

¹South African Pharmacy Council, Pretoria, South Africa

²Medicine Usage in South Africa (MUSA), Faculty of Health Sciences, North-West University,, Potchefstroom campus, South Africa

³Faculty of Pharmacy, Makhanda, South Africa

Background: The South African Pharmacy Council (SAPC) uses a risk-based inspection (RBI) approach and officially appointed inspectors to monitor pharmacies' compliance with Good Pharmacy Practice (GPP) standards. Based on the RBI approach, pharmacies are classified as high, medium or low risk and inspection findings are classified as Grade A (minor), Grade B (major), or Grade C (critical). The non-operational pharmacy is graded D.

Objective: The study aims to investigate the influence of the inspection officer on the inspection outcomes (grading scores) obtained by pharmacies inspected during 2020 to 2024 using a RBI approach.

Method: A cross-sectional research design was used to analyse inspection and grading results of inspected pharmacies between 2020 and 2024. Independent variables include the inspector's age group, gender, and years of experience. The dependent variable was the grading obtained after the inspection. Ethics approval was obtained (NWU-00504-19-A1).

Results: A total of 45 pharmacists, mostly male (n=25; 59,5%), aged 58,6 years (SD 12,5; 95% CI 54,7-62,5), with 7,6 years (SD 6,6; 95% CI 5,5-9,6) of experience as inspectors, conducted 11,053 inspections in 5,800 pharmacies between 2020 and 2024. Most inspections led to an A grade (n=7160; 64,8%), followed by a C grade (n=2928; 26,5%). Only a small percentage received a B or D. Independent of the pharmacy sector, province, or inspection type, the results indicated that more pharmacies inspected by inspectors <50 years (n=764; 29,4%) received a C grade than those inspected by inspectors >72 years (n=610; 21,6%) (P<0.0001). In contrast, fewer pharmacies inspected by inspectors <50 years old received an A grade (n=1612; 62,1%) than those inspected by inspectors >72 years old, who received an A grade in 71,3% (n=2018). Although still statistically significant (P<0.0001), the influence of years of experience and the inspector's gender was less on the grading differences. Fewer pharmacies (N=4407) (n=2851; 64,7%) inspected by inspectors with <5 years of experience obtained an A grade compared to those pharmacies (N=3172) inspected by inspectors with >10 years (n=2094; 66,0%). The opposite was observed: less experienced inspectors awarded more C grades (n=1152; 26,1%) than the more experienced inspectors (n=774; 24,4%). More inspections (N=4111) done by female inspectors led to

a C grade (n=1195; 29,1%) and fewer to an A grade (n=2521; 61,3%); compared to those of male inspectors (N=6925), with fewer C (n=1732; 25,0%) and more A grade (n=4624; 66,8%).

Conclusion: The findings of this study demonstrate that an inspector's competency significantly influences the outcome of an inspection. Specifically, the greater the inspector's professional experience and age, the more favourable the inspection results. It is therefore recommended that SAPC establish a structured mentorship programme in which senior inspectors train junior inspectors, and that pharmacists appointed as inspectors have at least 15 years of professional experience to qualify.

Impact of a one-day practical training on pharmacists' self-reported competency in cardiovascular physical examination: A pre-post study

Patrick Jean Francesco Deschênes¹, John Nam Kha Nguyen¹, Louis-etienne Marchand², Amélie St-arnaud²

¹Centre universitaire de santé McGill, Montreal, Canada

²Quebec Heart And Lung Institute (IUCPQ), Quebec, Canada

Background: As the scope of pharmacy practice continues to expand, physical examination (PE) has become an important clinical skill for pharmacists caring for patients with cardiovascular conditions. PE training however has not yet been widely adopted in pharmacy program curricula, and pharmacists may have limited competency in cardiovascular examination. This study aimed to assess pharmacists' self-reported competency in cardiovascular physical examination following a one day practical and theoretical training session using surveys.

Method: Pharmacists completed pre-readings, participated in a lecture and practiced physical exam skills on their peers and patient partners under preceptor supervision. Participants were invited to complete a survey prior to the training session (T1), 1 month after completion (T2), and 6 months after completion (T3). The survey evaluated participant demographic data and participant perceptions regarding physical exam and self-perceived physical examination proficiency. Differences across time points were compared using the Wilcoxon signed-rank test.

Results: A total of 17 pharmacists participated in the physical exam training, while 14 pharmacists completed all 3 surveys. Participants practised in both the inpatient and outpatient settings and 82% had independent prescribing rights. Most participants had more than 10 years of experience (57%) and only 2 participants had prior physical exam training. Pharmacists were uncomfortable in general with physical examination at T1 (93%), while 88% of participants were

comfortable with physical examination at T2. We saw a marked improvement in perceived skills for pulmonary auscultation, jugular venous pressure measurement and assessment of peripheral edema between T1 and T2, with a more modest improvement for assessment of hemodynamic status, triaging for red flags and completing anamnesis for this same period. After completing the training session, most pharmacists employed physical exam in their practice with 69% of participants using it weekly or multiple times per month. Only 4 participants sought further mentorship while introducing physical exam into their practice. During this period (T2 to T3), there was a regression to the mean for all questionnaire items. Overall, pharmacists were slightly more confident to adjust medications based on clinical exam findings (63% at T1 vs. 69% at T3); however, pharmacists' belief that physical exam knowledge translated to clinical benefit remained mostly unchanged (79% T1 vs. 74% T3).

Conclusion: The current study shows that a combination of lecture and practice-based learning improved pharmacists' self-perceived cardiovascular physical exam skills. Pharmacists strongly believe that physical exam skills are important and can benefit patients. Further research on physical exam education in pharmacy practice should focus on physical exam training for other organ systems, consolidation of physical exam proficiency through mentorship programs and translation of physical exam skills to patient clinical outcomes.

Women's health study: A patient review of menopause service provision by pharmacists in Scotland – What matters to you?

Laura Wilson¹, Kellie King¹, Fiona B. McIntyre¹, Iwan Hughes¹

¹Royal College Of Pharmacy (previously RPS), London, United Kingdom

Background: By 2030, the global population of menopausal and postmenopausal women is projected to reach 1.2 billion. In Scotland's population of 5.5 million, women represent 51%, with the average age of menopause being 51 years. Cardiovascular disease remains a major public health concern, with 1 in 10 deaths attributed to ischaemic heart disease. The decline in protective oestrogen contributes to adverse changes in blood pressure, lipid profiles and vascular function, increasing cardiovascular risk. Limited evidence exists regarding women's lived experiences of seeking menopause advice and information from pharmacists. This study aimed to explore these experiences to inform and shape the future role of pharmacists in delivering high-quality patient centred menopause services.

Method: A mixed-method, convergent online Patient-Reported Experience Measure (PREM) study was conducted over a 10-week period, focusing on women aged 35–65 years.

To ensure equitable access, online and face-to-face completion options were offered. The survey assessed experience, attitudes, knowledge of menopausal symptoms, health-seeking behaviours, and opinions to establish "What matters to you?" in relation to menopause support. Primary outcomes included overall preparedness for menopause and confidence in seeking advice from a pharmacist. Subdomains examined knowledge of menopausal symptoms, sources of information, perceived accessibility of pharmacists and confidence in existing menopause services. Secondary outcomes explored how findings could be translated into existing pharmacy workstreams, including cardiovascular risk reduction and structured consultation services. Quantitative data were analysed descriptively, while qualitative free-text responses were analysed thematically. Findings were integrated at the interpretation stage in line with a convergent mixed-method design.

Results: A total of 168 women completed the survey (154 online; 14 face-to-face). Overall preparedness for menopause was low, with 77% reporting they did not feel prepared. Only 3% sought initial menopause advice from a pharmacist. However, 84% indicated they would welcome education and advice from a pharmacist to help them make informed decisions about managing menopausal symptoms. Furthermore, 75% believed pharmacists could support improved awareness of postmenopausal symptoms and associated risk factors. While 89% of participants rated their overall knowledge of menopausal symptoms as good, recognition of specific health risks was variable. Only 45% identified urinary tract infections as a potential menopausal symptom and 56% recognised the increased risk of cardiovascular disease. Social media, peers, and general practitioners were the most common initial information sources and the top descriptors used to characterise currently available menopause information were "inconsistent," "conflicting," and "confusing."

Conclusion: Women's self-perceived knowledge of menopausal symptoms does not align with awareness of associated long-term health risks and they report confidence in receiving this information from pharmacists. Despite high self-rated understanding, significant gaps remain in recognising increased cardiovascular disease (CVD) risk following menopause, suggesting many women feel informed yet lack awareness of future health implications. These findings support embedding menopause-related cardiovascular discussions within existing pharmacy services. Pharmacists are well positioned to provide targeted counselling, including education on sex-specific heart attack symptoms, blood pressure monitoring, weight management, and lifestyle modification. Integrating menopause education into routine pharmacy services may improve informed decision-making, reduce misinformation, and enhance long-term health outcomes for women.

Exploring the landscape of evidence based pharmacy practice in Pakistan: Insights into knowledge, attitudes and implementation barriers – A cross sectional study

Shama Abidi¹

¹Liaquat National Hospital, Karachi, Pakistan

Background: Evidence-Based Practice (EBP) can be defined as the integration of clinical expertise, patient values and the most reliable research evidence to enhance clinical outcomes in the patients. In developing countries, like Pakistan the extent of adoption of EBP is not sufficiently explored despite of its great significance in healthcare globally.

Objective: This study aimed to explore the knowledge, attitudes and barriers regarding EBP related to pharmaceutical care among pharmacists in Karachi, Pakistan. **Methodology:** This cross-sectional survey included 125 registered pharmacists, who filled out an online validated google survey form, which assess the level of understanding the core concepts of EBP, attitude regarding the implementation of EBP in pharmacy practice and various structural and individual barriers that limit the incorporation of EBP. The collected data was analyzed using SPSS by applying various descriptive and inferential statistical tests.

Method: This cross-sectional survey included 125 registered pharmacists, who filled out an online validated google survey form, which assess the level of understanding the core concepts of EBP, attitude regarding the implementation of EBP in pharmacy practice and various structural and individual barriers that limit the incorporation of EBP. The collected data was analyzed using SPSS by applying various descriptive and inferential statistical tests.

Results: Professional Practicing Pharmacists reported a significant knowledge gap while the attitude towards combining EBP into pharmaceutical care is highly positive. Lastly, the limited reliance on primary literature and limited inclusion of patient values appear as major barriers in implementing EBP.

Conclusion: All things considered, there is a need to set standard guidelines and strict compliance related to EBP, strengthening continuing medical education (CME) programs, developing a culture of research and learning and incorporating advanced clinical decision-making tools are a need of the time to ensure evidence-based pharmaceutical care.

Gaps in guideline-based sepsis management among healthcare professionals in Bahrain: a cross-sectional study

Khadija Aziz Oameer Ebrahim², Ammar Ali Saleh Jaber¹, Mirza Baig³

¹Dubai Pharmacy College for Girls, Dubai, United Arab Emirates

²Higher Colleges of Technology, Dubai, United Arab Emirates

³Dubai Pharmacy College for Girls, Dubai, United Arab Emirates

Background: Sepsis and septic shock remain major causes of morbidity and mortality and require rapid recognition and timely evidence-based intervention. In Bahrain, limited data are available on how closely healthcare professionals' knowledge and practice align with current sepsis management recommendations. Identifying these gaps is important for improving adherence to protocols and patient outcomes.

Objective: To assess the knowledge, attitudes and practices of healthcare professionals in Bahrain regarding sepsis and septic shock management according to recent guidelines, and to identify gaps that may inform targeted educational and clinical improvement strategies.

Method: A cross-sectional survey was conducted among healthcare professionals involved in sepsis management in Bahrain. Of 310 approached, 260 consented to participate. Data were collected using a structured, self-administered questionnaire developed in line with recent Surviving Sepsis Campaign recommendations. The questionnaire included 18 knowledge items, 5 attitude items and 22 practice items. Data were analysed using descriptive and inferential statistics.

Results: Participants demonstrated generally good baseline knowledge of sepsis management. Most correctly identified broad-spectrum antibiotics as the first-line treatment (90.7%). However, important knowledge gaps were observed for the quick Sequential Organ Failure Assessment score (44.6%) and the use of capillary refill time as an adjunct resuscitation measure (60.0%). Positive attitudes towards early recognition and treatment were reported by 82.2% of participants. In practice, 72.7% routinely assessed for organ dysfunction, 66.7% regularly monitored vital signs, lactate and organ function, and 51.9% initiated antibiotic therapy within the first hour of diagnosis. Practice was less consistent for fluid resuscitation within 1 hour (41.6%), ultrasound-guided fluid responsiveness assessment (33.3%), corticosteroid use in septic shock (33.7%) and blood product administration to maintain target haemoglobin (34.7%).

Conclusion: Although healthcare professionals in Bahrain showed good general awareness of sepsis and positive attitudes towards its management, important gaps remain in familiarity with selected diagnostic tools and in consistent

implementation of time-critical and advanced management practices. These findings support the need for targeted interprofessional education, reinforcement of sepsis protocols and ongoing audit of adherence to guideline-based care.

Leveraging pharmacists' scope of practice to improve access to gender affirming care in Nova Scotia

Zachariah Crawford¹

¹Dalhousie University, Halifax, Canada

Background: It is well documented that transgender and gender diverse (TGD) people are medically underserved throughout Canada and the world. Pharmacists have the potential to assist TGD people through leveraging their scope of practice to improve access to Gender Affirming Care (GAC). The perspectives of the TGD populations are vital to understanding what is needed and wanted in terms of accessing GAC through leveraging pharmacists' scope of practice.

Objective: To explore the perspectives and experiences of TGD populations on what would allow better access to GAC in order to inform pharmacy and government policies.

Method: The study was qualitative and utilized online interviews with TGD people to examine their perspectives on gender affirming care through pharmacies. The interviews were transcribed and the transcripts were inductively coded using thematic analysis with eight constructs from the Theoretical Framework of Acceptability (TFA). The eight constructs are Affective Attitude, Burden, Ethicality, Intervention Coherence, Opportunity Costs, Perceived Effectiveness, Self-efficacy, and Risks and Harms. From the questions under each construct, themes were created to categorize concepts that emerged from the data.

Results: Twelve interviews with TGD people were completed. These interviews revealed that TGD people had positive perceptions towards pharmacists taking on a larger role in the provision of GAC in most TFA categories. Some of the positive perceptions involved being able to change pharmacies if care was not adequate, the convenience of having less travel or stops for GAC, possible easier access to supplies such as syringes and binding tape, and feeling more comfortable with pharmacists due to the perception of pharmacists being approachable and community oriented. The main concerns voiced throughout the interviews involved perceived barriers. These barriers were topics such as how much training pharmacists would receive, fear of prejudice from pharmacists (especially in rural areas), privacy within the pharmacies, the cost of GAC therapies through pharmacies, loss of interactions with other healthcare professionals, the

need for healthcare to be a connected network, as well as issues with what pharmacists are able to modify when facing drug shortages such as specific testosterone or estrogen products.

Conclusion: The TGD participants were overall receptive to leveraging pharmacists' scope of practice to improve access to GAC. Main concerns about pharmacy led GAC involved potential barriers that could be mitigated through appropriate training for pharmacists specific to understanding and respecting gender diverse people, knowing how to do bloodwork, and ensuring safety and privacy for patients. The knowledge gained from this study has the potential to inform and impact both pharmacy practice policy as well as larger overarching governmental policies that could improve the healthcare system as well as the lives of gender diverse people.

Is patients' experience of switching biological medicines associated with their perceptions of switching?

Johanna Kytöluoto¹, Marika Pohjanoksa-mäntylä¹, Raisa Laaksonen¹, Kari Linden^{1,2}

¹Social and Clinical Pharmacy, Division of Pharmacology and Pharmacotherapy, Faculty of Pharmacy, University of Helsinki, Helsinki, Finland

²Research Unit, Yliopiston Apteekki (University Pharmacy), Helsinki, Finland

Background: The use of biological medicines, as well as the switch from original medicines to biosimilars, is increasing in the treatment of several chronic inflammatory diseases. Patients' experiences and perceptions of switching are important, as they may influence acceptance of biosimilars and biological medicine switching, treatment adherence, clinical outcomes, and healthcare costs. However, little is known about patients' real-world experiences of switching. In Finland, physician-led switching of biological medicines has been supplemented by pharmacy-level automatic substitution, which was introduced between 2024 and 2026.

Objective: The purpose of this study was to examine: 1) patients' experiences of physician-led switching of biological medicines, and 2) whether the switching experience was associated with their perceptions of switching.

Method: A cross-sectional survey was conducted in 2021–2022 among Finnish patients with rheumatoid arthritis, inflammatory bowel disease, or psoriasis. Of the 1,554 respondents, 202 (13%) who reported current use of adalimumab or etanercept products were included in the analysis. These biological medicines had biosimilar alternatives and were commonly used in outpatient care at

the time of the survey. The primary outcome variable—patients' perceptions of biological medicine switching—was assessed using seven items rated on a five-point Likert scale (1–5, with 5 indicating the most positive perception), and a related sum variable (mean score). Descriptive statistics and multivariable analyses (generalized linear model) were performed.

Results: Of the 202 responding users of biological medicines, 79 (39%) used a biosimilar: 22 had been switched from the originator product; 57 had only used a biosimilar; and the remaining 123 (61%) had used an originator. Multivariate analysis showed that patients' perceptions of switching to a biosimilar did not differ between those who had switched and those who had not. A more positive perception of switching was associated with a favourable view of biosimilars' therapeutic properties (OR 2.23, 95% CI 1.84–2.69, $p < 0.001$), willingness to collaborate with a physician on treatment decisions (OR 1.35, 95% CI 1.02–1.80, $p = 0.039$), and having a healthcare education (OR 1.21, 95% CI 1.01–1.47, $p = 0.045$). Sociodemographic and disease-related factors were not significantly associated. Among the 22 patients with switching experience, 16 were overall satisfied, 19 reported equal treatment effectiveness, and 18 found the biosimilar easy to use. Three Two patients reported reduced effectiveness, and two reported new adverse effects.

Conclusion: Switching from an original biological medicine to a biosimilar did not affect patients' overall perceptions of switching. Most patients reported positive experiences with biosimilars, although a small proportion noted problems or dissatisfaction. These preliminary findings highlight the importance of patient education, clear communication, and adequate support during the switching process to promote treatment continuity and positive therapeutic outcomes. The limited number of patients with actual switching experience in this study restricts the generalizability of the findings and underscores the need for further real-world research on physician-led and pharmacy-level substitution of biologicals.

Pharmacists' perceptions of their counselling competence regarding biological medicines and pharmacy substitution: a survey in Yliopiston Apteekki (University Pharmacy) chain, Finland

Kari Linden^{1,2}, Maarit Dimitrow², Mari Havia³, Tatu Hämäläinen⁴, Raisa Laaksonen², Marika Pohjanoksa-mäntylä²

¹Research Unit, Yliopiston Apteekki (University Pharmacy), Helsinki, Finland

²Social and Clinical Pharmacy, Division of Pharmacology and Pharmacotherapy, Faculty of Pharmacy, University of Helsinki, Helsinki, Finland

³Customer Service Management, Chain Medication Safety, Yliopiston Apteekki (University Pharmacy), Helsinki, Finland

⁴Information and Communication Technology, Yliopiston Apteekki (University Pharmacy), Helsinki, Finland

Background: Biological medicines are increasingly used in outpatient care. Pharmacy substitution of biological medicines has been gradually implemented in Finland during 2024–2026 to increase biosimilar uptake and reduce medication costs. Pharmacists play a central role in counselling patients on the safe use and substitution of these medicines. However, little is known about pharmacists' counselling competence, and the existing literature indicates knowledge gaps. Understanding pharmacists' competence is essential for developing educational strategies to ensure high-quality counselling and appropriate use of biologicals. Yliopiston Apteekki (University Pharmacy), owned by the University of Helsinki, dispenses approximately 10% of Finnish outpatient prescriptions and has statutory responsibilities in pharmaceutical manufacturing, education and research.

Objective: The study aimed to investigate pharmacists' overall counselling competence regarding biological medicines, biosimilars and related pharmacy substitution. The counselling competences across specific domains, including biological medicine groups, use of original medicines/biosimilars, administration devices, and therapeutic role of biologicals, as well as pricing and economic aspects, are also explored.

Method: A cross-sectional electronic survey was conducted among B.Sc./M.Sc. pharmacists working in customer service at YA's 17 branch pharmacies or online pharmacy in March 2023. The questionnaire covered three medicine groups (enoxaparin; adalimumab/etanercept; insulin) and four related counselling domains (originator biological medicines; biosimilars; administration devices; therapeutic role of biological medicines). Items were rated on a five-point Likert scale (1–5; 5 = highest competence). The primary outcome was overall counselling competence, evaluated as the mean score of a 12-item sum variable. Descriptive statistics, non-parametric tests (Friedman, Wilcoxon, Kruskal–Wallis),

and generalized linear models were used ($p < 0.05$ considered significant).

Results: Of the 530 pharmacists invited, 236 responded (response rate 45%); 83% were B.Sc. and 17% M.Sc. pharmacists. The mean overall counselling competence score was 3.13/5.00 (95% CI 3.02–3.24). Competence differed significantly across medicine groups ($p < 0.001$), being lowest for adalimumab/etanercept products (2.66/5.00). Significant differences were also found across counselling domains ($p < 0.001$); competence was lowest for devices (2.55/5.00) and highest for the therapeutic role of biologicals (3.38/5.00). Competence regarding biosimilars (3.12/5.00) was lower than that for original biologicals (3.48/5.00). Higher competence was associated with positive perceptions of biosimilars' therapeutic properties (OR 1.41, 95%CI 1.05–1.89; $p = 0.022$), recognition of economic benefits of biosimilars (OR 1.47, 95% CI 1.02–2.11; $p = 0.037$), and participation in training on biologicals (OR 1.30, 95%CI 1.03–1.64; $p = 0.027$). No differences across pharmacists' personal or professional background factors were identified. Between 74–80% of respondents rated their competence as good regarding concepts of biological medicines, original biologicals, and biosimilars; 68% did so for physician-led switching, and 80% for pricing, reimbursement, and economic aspects of biosimilar use.

Conclusion: Consistent with the literature, pharmacists' self-reported counselling competence regarding biological medicines was moderate prior to the pharmacy substitution. Competence was lowest for biosimilars and administration devices, while strongest in pricing and economic aspects. The findings underscore the importance of education and practical training of pharmacists to support safe and rational use of biological medicines. The results inform the development of internal training and counselling at Yliopiston Apteekki (University Pharmacy) and support other pharmacies and health systems preparing for pharmacy substitution.

Are safety concerns a barrier to online pharmacy use? A survey among Yliopiston Apteekki (University Pharmacy) customers with no prior experience of Finnish online pharmacies

Kari Linden¹, Lauri Kokki¹, Jenni Tyrni¹

¹Yliopiston Apteekki (University Pharmacy), Helsinki, Finland

Background: For community pharmacy customers, online pharmacies have become an increasingly important channel for purchasing prescription and non-prescription medicines, wellness products, and pharmaceutical services. Online pharmacies improve convenience and access to pharmaceutical services, and constitute an important component of pharmacies' multi-channel services. In Finland,

Yliopiston Apteekki (YA, the University Pharmacy), a community pharmacy chain owned by the University of Helsinki, has 17 pharmacies and an online pharmacy (ya.fi), which accounted for 9% of YA's consumer sales in 2024. Although online pharmacies offer clear advantages, and digital health services are widely used in Finland, only one-third of adults are aware that prescription medicines can be purchased online. International studies report varying estimates of safety concerns related to online pharmacy use, indicating a need for a better understanding of their role in community pharmacies' online services.

Objective: To study the prevalence of safety concerns about online purchasing as a barrier to the use of online pharmacies among customers with no prior experience of online pharmacy services. In addition, we examine whether these concerns are associated with customers' overall online shopping activity and key sociodemographic characteristics.

Method: A cross-sectional online survey was conducted between December 2025 and January 2026 among consented Yliopiston Apteekki (University Pharmacy) customers, including both users and non-users of Finnish online pharmacies. The outcome variable was based on whether the respondent selected the option "I am concerned about the safety of online shopping" in the question: "Why have you not made purchases from Finnish online pharmacies?" The question included 13 response options, of which 1–5 could be chosen (including options "Other" and "I don't know"). Independent variables included gender, age group, living area (metropolitan area, major cities, other regions), and overall online shopping activity (frequent, occasional, never). Data were analysed using descriptive statistics, and associations were examined using logistic regression adjusted for all independent variables. The level of statistical significance was set at $p < 0.05$.

Results: This study was based on responses from customers with no experience using any Finnish online pharmacies (35%; $n = 989/2920$); among them, 8% reported safety concerns related to online shopping as a reason for not using online pharmacies. Among customers with no prior general online shopping experience (of any online shop), 13% reported concerns, compared with lower proportions among those with occasional (7.0%; OR = 0.51, 95% CI 0.31–0.82) or frequent other online shopping (2.9%; OR = 0.23, 95% CI 0.05–1.01). No differences were observed across genders, age groups and living areas.

Conclusion: Only a small proportion of Yliopiston Apteekki (University Pharmacy) customers without prior experience with Finnish online pharmacies reported safety concerns as a barrier to using online pharmacies. These concerns did not differ by gender, age group, or living area, but were more common among customers with no general online shopping experience. This suggests that the concerns may be driven less by pharmacy-specific factors and more by general digital trust and confidence in online transactions, potentially shaped by education, socio-economic status, and digital or

health literacy. These underlying mechanisms warrant further research.

Impact of pharmacist led guideline-directed medical therapy titration in heart failure

Gaith Hajeh¹, Kayla Woicehovich, Bethany Anderson, Julianne Fallon, Emily Mcelhaney

¹Cleveland Clinic, Cleveland, Ohio, United States

Background: Heart failure (HF) is a common cardiovascular condition affecting a substantial proportion of adults and prevalence is projected to continue to increase. Current HF guidelines recommend use of guideline-directed medical therapy (GDMT) shown to reduce morbidity and mortality in patients with HF, with titration recommended every 1-2 weeks as tolerated. Studies demonstrate that early achievement of target GDMT doses after acute heart failure (AHF) events improves clinical outcomes, and pharmacist-led titration increases GDMT utilisation.

Objective: The purpose of this study is to assess whether pharmacist-led GDMT titration in an ambulatory HF pharmacy clinic improves GDMT scores.

Method: This retrospective analysis included adult patients with a HF diagnosis referred to the ambulatory HF pharmacy clinic at Cleveland Clinic Main Campus for GDMT optimisation from September 2024 through November 2025. Exclusion criteria included more than 1 consecutive missed pharmacist appointment, left ventricular assist device placement, organ transplantation, or death during follow-up. A GDMT score was calculated based on prescribed GDMT and dosing (0–9; ≥8 optimal, ≥6 acceptable). The primary outcome was to assess GDMT score at time of referral and at discharge from the HF pharmacy clinic. Key secondary outcomes included number of pharmacists versus referring team GDMT interventions, number of visits per patient, and number of AHF hospitalisations during follow-up and up to 30 days after discharge from the clinic. The primary outcome was analysed using the Wilcoxon signed-rank test, with $p < 0.05$ considered statistically significant. Descriptive statistics summarised secondary outcomes

Results: A total of 176 subjects were included. Median time from referral placement to completion of the initial pharmacist visit was 5 weeks. After a median follow-up of 17 weeks (interquartile range=16.3), median GDMT score increased from 4 at referral to 6 at pharmacy clinic discharge (absolute median difference 2; $p < 0.01$, 95% confidence interval: 1.0 - 3.0), with a median of 5 visits per patient. During follow-up, pharmacists performed 419 interventions compared with 85 by the referring team. Eleven AHF hospitalisations occurred during follow-up, with two additional events within 30 days after clinic discharge.

Conclusion: Pharmacist interventions were associated with a significant improvement in GDMT score highlighting their essential role in multidisciplinary HF care. Expanded pharmacist availability is needed to align with literature recommendations for GDMT titration frequency.

Medication counselling in the age of artificial intelligence (AI): Opportunities and innovations

Yasi Mojab¹, Steven Chen

¹USC Alfred E. Mann School of Pharmacy & Pharmaceutical Sciences, Los Angeles/california, United States

Background: As generative artificial intelligence (AI) tools, particularly large language models (LLMs), become increasingly integrated into healthcare, their reliability and safety in delivering medication counselling should clinically be evaluated. AI-driven chatbots can generate rapid, patient-friendly responses and are already being used by patients and healthcare professionals to obtain medication information. This study evaluated the reliability, safety, and communication quality of AI-generated medication counselling and explored implications for pharmacy education and innovation.

Method: Twenty frequently prescribed medications in the U.S. were randomly selected from widely used drug lists to represent diverse therapeutic classes and risk profiles. Eleven standardised counselling prompts were developed to reflect common patient questions, including indication, administration, missed doses, adverse effects, drug–drug and food interactions, pharmacogenomic considerations, affordability concerns, and high-risk challenge scenarios. Four generative AI chatbot models were evaluated. A total of 880 AI-generated responses were produced and archived. Two independent licensed pharmacists scored each response using a structured rubric assessing ten performance domains: accuracy of drug information, completeness, safety considerations, Black Box Warning identification, side-effect management, missed-dose guidance, referral recommendations, affordability interventions, empathy, and overall effectiveness. Reviewers were blinded to each other's evaluations. Inter-rater reliability was assessed using Cronbach's alpha.

Results: Performance varied across platforms and counselling domains. ChatGPT 4o Omni achieved the highest safety and accuracy scores across most counselling domains. ChatGPT 4o Mini and Copilot also demonstrated high inter-rater reliability (Cronbach's alpha > 0.86), whereas Gemini demonstrated moderate agreement ($\alpha = 0.56$). Reviewer 1 assigned a perfect score to ChatGPT Omni in "Missing Dose of Medication Intervention" and $\geq 90\%$ in "Accuracy of Drug Information," "Referral to Healthcare Provider", and

“Empathy & Communication”. Reviewer 2 similarly assigned high scores to Omni across most categories, with scores of 89% for “Referral to Healthcare Provider” and 79% for “Empathy & Communication”. Other models showed variable and often lower performance, particularly in safety-critical areas. Across platforms, strengths included clear explanations of drug indications and mechanisms, patient-friendly language, and encouragement of professional follow-up when serious symptoms were presented. Clinically significant safety gaps were identified. Critical omissions included failure to appropriately flag severe dermatological reactions associated with lamotrigine, incomplete recognition of suicidality risk with selective serotonin reuptake inhibitors, insufficient emphasis on statin-associated myopathy, and inadequate clarification of methotrexate weekly dosing. Instances of misinformation, unsafe redosing advice, and unsupported herbal recommendations were observed. These findings underscore that, while communication quality was often strong, safety performance was inconsistent.

Conclusion: Generative AI chatbots demonstrate promising capabilities in accessible, empathetic medication counselling and may serve as adjunct tools to support patient engagement and pharmacy training. Opportunities include integration into educational simulations, multilingual support to enhance equity, and incorporation into decision-support ecosystems. Nevertheless, variability in safety performance highlights the necessity of pharmacist oversight, rigorous validation frameworks, and ethical safeguards prior to deployment in patient-facing contexts. AI should complement professional clinical judgement. Responsible integration, aligned with evolving regulatory standards and patient safety priorities, is essential to ensure that innovation advances safe, person-centred pharmaceutical care.

Neonatal exposure to ibuprofen disrupts rat testicular transcriptome and functions at doses equivalent to those used in babies, suggesting caution when treating children with ibuprofen.

Martine Culty¹, Nicole Mohajer¹, Amina Khan¹, Amy Tran-guzman¹

¹University of Southern California, Los Angeles, United States

Besides its therapeutic use as analgesic, antipyretic and anti-inflammatory drug, the non-specific cyclooxygenase (Cox) inhibitor ibuprofen is known to be nephrotoxic and induce hypersensitivity reactions in a subset of patients. As other NSAIDs, ibuprofen is not recommended in pregnant women after 20 weeks gestation due to risk of renal and cardiac defects and in infants younger than six months without medical supervision. Yet this over-the-counter drug is commonly used by pregnant women and routinely given to babies by parents (1). Studies have reported an association between maternal use of NSAIDs such as ibuprofen and

acetaminophen, and increased risk of reproductive syndromes in male infants (2). We previously reported the role of Cox enzymes in neonatal and juvenile male germ cells, and how ibuprofen and acetaminophen disrupted these cells (3). Our goal was to identify the molecular mechanisms disrupted in juvenile and adult rat testis following ibuprofen neonatal treatment, to shed light on the physiological roles of Cox enzymes and the risk of preventing these processes in the developing testis.

We examined the transcriptome, protein levels and morphology of testes after oral administration of vehicle or ibuprofen (0.4, 0.7 mg/day), to rat pups from postnatal day (PND) 1 to 7. Single cell RNA-seq analysis of PND8 testes revealed that ibuprofen induced the up- and down-regulation of genes and changes in functional pathways in several testicular cell types, including spermatogonia, Leydig, peritubular and Sertoli cells and macrophages, while testes morphological alterations and changes in key proteins were observed up to adulthood, indicating long-term effects. Moreover, circulating testosterone and LH levels were increased following neonatal exposure to ibuprofen.

These data suggest that neonatal exposure to ibuprofen can reprogram testicular genes and proteins that involve Cox enzymes in their regulation, even at doses corresponding to what babies are given. Thus, parents should exert caution when treating babies with ibuprofen and pharmacists could advise them on safe ways to give ibuprofen to young children.

Implementing follow-up consultations for asthma and COPD in community pharmacies

Sara Bremer¹, Maja Kokorina², Karine Wabø Ruud¹, Ingunn Björnsdottir²

¹Apokus, National Centre for Development of Pharmacy Practice, Oslo, Norway

²School of Pharmacy, University of Oslo, Oslo, Norway

Background: Asthma and chronic obstructive pulmonary disease (COPD) are common chronic diseases often complicated by poor adherence and incorrect inhaler use. In Norway, pharmacists currently provide an inhalation technique assessment service, while no structured follow-up services such as the New Medicine Service (NMS) exist for this patient group. Introducing broader follow-up requires understanding barriers and facilitators for implementation. This pilot therefore explored pharmacists' experiences with delivering follow-up consultations for asthma and COPD patients in community pharmacies.

Objective: To explore pharmacists' experiences with training, implementation, practical delivery and perceived value of follow-up consultations for asthma and COPD, and to identify factors influencing feasibility and sustainability in routine pharmacy practice.

Method: A qualitative descriptive study was conducted using two semi-structured focus groups with a total of six pharmacists from two pilot pharmacies. All were certified for NMS (for cardiovascular medicines) and inhalation technique assessment service. Interviews were audio-recorded, transcribed verbatim, and analysed using reflexive thematic analysis. Key topics included training needs, communication, integration with existing services, patient identification, use of support tools and perceptions of service utility.

Results: Pharmacists considered prior NMS and inhalation technique training helpful, and pilot materials supportive, but reported a need for deeper disease-specific competence. Implementation was influenced by workload, time pressure and the need for predictable routines. New users were easier to recruit than experienced patients. Consultations typically lasted approximately 15 minutes and often overlapped with inhalation technique assessment service. Commonly identified medication-related problems included poor inhalation technique, confusion between maintenance and reliever therapy, suboptimal regimens and high use of short-acting beta-agonists. The service was perceived as valuable for improving adherence and patient understanding, and it enhanced pharmacists' confidence and motivation.

Conclusion: Pharmacists viewed follow up consultations for asthma and COPD as feasible and clinically useful, but successful implementation requires dedicated time, strengthened disease-specific training and integration into existing pharmacy workflows. The service supports identification and resolution of medication-related problems, optimises inhaler use, and strengthens pharmacists' clinical role. Further research should examine scalable implementation strategies and long-term effects on patient outcomes.

Identifying and managing drug related problems in pharmacist-led follow-up services

Sara Bremer¹, Karine Wabø Ruud¹, Nadia Jensen², Therese Høydahl Bakke², Ane Gedde-dahl²

¹Apokus, National Centre for Development of Pharmacy Practice, Oslo, Norway

²Faculty of Health Sciences, Oslo Metropolitan University, Oslo, Norway

Background: Drug-related problems (DRPs) such as poor adherence, incorrect use, side effects and unmet information needs can reduce the therapeutic benefit of medicines. Pharmacist-led follow-up consultations can help address these challenges. In Norway, such consultations are offered through the New Medicine Service (Medisinstart) for first-time users of cardiovascular medicines. In addition, a pilot has been established to offer NMS for type 2 diabetes (T2D) medicines. A separate pilot has tested similar follow-up

consultations for users of asthma and chronic obstructive pulmonary disease (COPD) medicines. Qualitative evidence on how pharmacists identify and manage DRPs across these services remains limited.

Objective: To synthesize findings from two descriptive studies of pharmacist-led follow-up services for users of medicines for cardiovascular disease, T2D, asthma and COPD. The analysis focuses on DRP identification, management and factors influencing consultation quality.

Method: Both studies used a qualitative descriptive design with non-participant observations of real consultations and semi-structured interviews with pharmacists. The two studies included observations of a total of 54 consultations, and interviews with a total of 20 pharmacists. Observational data were analyzed using descriptive statistics and cross-case analysis, and interviews were analyzed using reflexive thematic analysis.

Results: DRPs were identified in 44 and 52 percent of the consultations for cardiovascular and T2D medicines and obstructive pulmonary medicines, respectively. Frequent DRPs included side effects, poor adherence, misunderstanding of dosing, unmet information needs and, for asthma and COPD, incorrect inhalation technique. Pharmacists managed DRPs through tailored counselling, practical guidance and recommendations for medical follow up. DRP identification increased when pharmacists used open questions, explored patient experiences and had adequate time. Consultations involving DRPs were longer. Telephone consultations offered flexibility but made it harder to identify technique-related or nuanced DRPs and often involved less patient engagement. Barriers to DRP identification included time pressure, reliance on telephone consultations, variation in communication skills, limited exploration of patient perspectives and inconsistent use of support tools. Pharmacists highlighted a need for more disease-specific training.

Conclusion: Pharmacist-led follow-up consultations for users of medicines for cardiovascular disease, T2D, asthma and COPD support early detection and management of DRPs and promote safer medication use. Enhanced disease-specific training, stronger communication skills, sufficient consultation time and more in-person follow-up may further improve service quality and long-term outcomes.

Establishing a clinical trial pharmacy liaison role to optimise integration of research and clinical care in a major Australian tertiary hospital

Alison Khor¹

¹Austin Health, Melbourne/Victoria, Australia

Background: The increasing use of clinical trials and investigational therapies in oncology and haematology has expanded the complexity of medication management across inpatient, outpatient and ambulatory settings. Fragmentation between clinical trial teams and routine pharmacy services can lead to inefficiencies, delays in treatment initiation, and increased risk of medication-related errors. Innovative pharmacy workforce models are needed to better integrate research activities into standard patient care.

Objective: To describe the development and implementation of a clinical trial pharmacy liaison role within an Australian specialist cancer centre and evaluate its impact on workflow efficiency, patient safety, and multidisciplinary collaboration.

Method: A dedicated clinical trial pharmacy liaison position was introduced within a major Australian tertiary hospital network. The role functioned as a central interface between clinical trial teams, pharmacy services, and treating clinicians. Key responsibilities included coordinating workflows, reconciling trial and standard-of-care therapies, facilitating timely access to medications, and providing education to staff across multiple departments and teams. A retrospective service evaluation was conducted over a 6-month period. Outcomes assessed included time to treatment initiation, number of medication-related queries resolved, incidence of protocol deviations related to medication management, and qualitative feedback from stakeholders.

Results: Implementation of the liaison role improved coordination between clinical and research teams and streamlined medication workflows. Time to treatment initiation was reduced, and medication-related queries were managed more efficiently. The role contributed to a reduction in protocol deviations related to medication processes and enhanced communication within the multidisciplinary team. Qualitative feedback highlighted improved workflows and clearer accountability across teams.

Conclusion: The clinical trial pharmacy liaison role represents a novel and effective model to integrate research and routine clinical care in oncology outpatient settings. This approach enhances medication safety, operational efficiency, and multidisciplinary collaboration. Further evaluation is warranted to quantify long-term impacts and explore scalability across other clinical areas.

A helping or hindering hand: Health professionals' views of expanding scope for pharmacist-delivered perinatal depression and anxiety screening

Lily Pham¹, Jack Collins¹, Claire O'reilly¹, Rebekah Moles¹, Sarira El-den¹

¹The University Of Sydney, Sydney/ New South Wales, Australia

Background: Pharmacists' scope of practice continues to evolve in response to changing community needs, with notable expansion to support primary care workforce shortages and access inequities. For perinatal depression and anxiety (PNDA), which affects expectant and new parents within the first year postpartum, early identification through screening is critical to ensure timely and appropriate supports, as well as to mitigate long-term developmental impacts on children. Although international data on PNDA screening rates are limited, existing evidence suggests that PNDA is under-reported and under-detected. Leveraging the accessibility of the community pharmacist may address this gap by enabling pharmacists to screen and refer parents to appropriate healthcare services, thereby promoting early detection and intervention. Studies have already explored acceptability of pharmacist-delivered PNDA screening and referral among perinatal women and pharmacists in Australia, demonstrating support for pharmacists' roles in this area provided concerns, such as those relating to appropriate training and health system integration, were resolved.

Objective: The current study aims to explore other (non-pharmacists) Australian health professionals' perspectives of pharmacists' potential roles in PNDA screening and care.

Method: A semi-structured interview guide was informed by a systematic review exploring perinatal depression (PND) screening acceptability, questionnaire measuring pharmacist acceptability of PND screening and research exploring perinatal women's views of pharmacist-delivered PND screening. Questions explored health professionals' experiences with PNDA screening and working with pharmacists, as well as their views of a hypothetical pharmacist-delivered PNDA screening and referral service. Advertisements were distributed through professional member organisations, local health networks, perinatal mental health organisations, Facebook and LinkedIn, targeting health professionals. Participants were eligible if they were health professionals registered in Australia and were not pharmacists. Audio-recordings of interviews were transcribed verbatim. Data underwent a six-phase reflexive, inductive thematic analysis to produce semantic and latent codes.

Results: Twenty participants were interviewed; (nurses (n=5), psychologists (n=4), GPs (n=4), dual-qualified midwives and nurses (n=4) and physiotherapists (n=3)). Most participants

(n=15) reported a specialty/interest in mental health, women's health and/or child/adolescence or family health. Most (n=13) had experience screening for PNDA. Through inductive thematic analysis, four themes were generated, 'stick to the status quo', 'out of sight, out of mind', 'into the unknown' and 'look at the bigger picture'. Although health professionals recognised PNDA as a significant public health priority, views on pharmacists' involvement in PNDA screening were mixed. Concerns centred on perceived limitations in pharmacists' knowledge and skills to provide sensitive, trauma-informed care, with many noting the potential for harm if screening were conducted without appropriate training, safeguards and support. Interviews revealed some resistance towards pharmacists' expanding scope in this area, particularly since pharmacists' training and clinical experience were viewed as less comprehensive than that of other health professionals.

Conclusion: Findings underscore the importance of thoughtful, well-designed screening models that are well-integrated into existing services to support acceptability and feasibility. Understanding stakeholders' perspectives enables exploration into perceived challenges with service implementation and highlights opportunities to work collaboratively to overcome these challenges, so that more parents have improved access to perinatal mental healthcare in primary care.

Pharmacist-delivered perinatal depression screening in Canada: Exploring Canadian pharmacist perspectives through an inductive content analysis

Lily Pham¹, Andrea Murphy², Jack Collins¹, Claire O'reilly¹, Rebekah Moles¹, David Gardner², Stephen Carter¹, Sarira Elden¹

¹The University Of Sydney, Sydney, New South Wales, Australia

²Dalhousie University, Halifax, Nova Scotia, Canada

Background: Early detection of perinatal depression (PND), affecting expectant parents and those up a year postpartum, is critical to mitigating long-term risks. Although most guidelines recommend routine PND screening for this reason, Canada is the only Organization for Economic Co-operation and Development country to recommend against routine screening. Yet in Alberta, Canada, women identified as high-risk through screening were more likely to receive support and formal PND diagnosis when compared to those unscreened. Furthermore, approximately two-thirds of PND cases in Canada remain undetected. Leveraging pharmacists' expanded scope to include PND screening could improve access to screening and referral, thereby facilitating early intervention and support. Research from Australia indicates that pharmacists generally find pharmacist-delivered PND

screening acceptable; however, perceived knowledge, confidence and ability to conduct screening is low.

Objective: Building on this work, this study explores Canadian pharmacists' perspectives of their roles in PND screening, and the training and resources needed for implementation.

Method: Canadian pharmacists were invited to complete a questionnaire comprised of 16 demographic questions, 33 items focusing on acceptability and willingness regarding PND screening by community pharmacists, and five open-ended questions on perceived benefits and concerns regarding PND screening, and training and resource needs. Questionnaire development was guided by a published questionnaire developed based on literature, researchers' expertise and the theoretical framework of acceptability. Invitations to participate were distributed via professional member organisations, Facebook, LinkedIn and publicly available pharmacy emails. The focus of this study was the inductive content analysis of the responses to the five open-ended questions.

Results: Ninety-three pharmacists across Alberta (n=72), the Atlantic provinces (n=15), New Brunswick (n=3), Ontario (n=2), British Columbia (n=2), Saskatchewan (n=1) and Quebec (n=1) completed the open-ended questions. Respondents identified as female (n=68), male (n=24) and non-binary (n=1). Most (n=76, 80%) worked in community pharmacy settings. Pharmacists identified the need for comprehensive training, with suggestions ranging from online modules and interactive in-person workshops to blended learning combining both delivery modes. Recommendations for training content included outlining the screening protocol, including when and how to administer screening tools, how to interpret results, and appropriate escalation pathways for individuals with high scores or child safety-related concerns. Respondents also emphasised the need for culturally sensitive and trauma-informed practice, as well as opportunities to practice screening interactions. In addition to training, pharmacists reported requiring access to validated screening tools, private consultation spaces, staffing, time, remuneration, access to mental health service directories or local support networks and guidance from regulatory bodies to conduct screening. Referral pathways to the multidisciplinary care team, medication information for pregnancy and lactation, clear explanation of assessment benefit and outcomes, patient education materials, self-care strategies and ability to provide brief in-person counselling for parental stress were seen as desirable service elements.

Conclusion: Canadian pharmacists' views mirror those of their Australian colleagues, suggesting that pharmacists' perspectives of pharmacist-delivered PND screening may be generalisable across similar international pharmacy practice settings. While pharmacists have a potential role to play in PND screening, meaningful guideline changes in Canada may be needed to potentially justify pharmacist-delivered screening.

Advancing pharmacy practice in chemotherapy-induced peripheral neuropathy: Aligning pharmacists' roles with FIP Development Goals and the Sustainable Development Goals

Aline Hajj^{1,2,3}, Omid Gholami^{1,2}

¹Université Laval, QC, Canada

²Centre de recherche du CHU de Québec – Université Laval, Axe Oncologie, QC, Canada

³INSPECT-LB (Institut National de Santé Publique, d'Épidémiologie Clinique et de Toxicologie-Liban), Beirut, Lebanon

Background: Chemotherapy-induced peripheral neuropathy (CIPN) is a common and dose-limiting toxicity of anticancer therapy that significantly affects patients' functional status and quality of life (QOL), potentially compromising treatment outcomes. Pharmacists are well positioned to support the prevention, early detection and management of CIPN through medicines optimisation, therapeutic monitoring and patient-centred education. Aligning these roles with the International Pharmaceutical Federation (FIP) Development Goals (DG) and the United Nations (UN) Sustainable Development Goals (SDGs) provides a structured framework to strengthen pharmacy practice in oncology supportive care. This study explores how pharmacists' contributions to CIPN management align with these global frameworks and proposes a conceptual model to guide future pharmacy practice research.

Method: A narrative literature review and conceptual policy analysis were conducted using peer-reviewed articles, clinical guidelines and professional reports addressing CIPN and oncology pharmacy practice. Relevant policy documents from the FIP and the UN were also examined. Pharmacists' clinical and system-level contributions were mapped to FIP DGs and relevant SDG targets. Findings were synthesised thematically to develop a framework linking pharmacy practice in CIPN management with global professional and sustainability priorities.

Results: The review highlights pharmacists' key contributions to optimising neurotoxic chemotherapy regimens, identifying patient-specific risk factors, monitoring neuropathic symptoms and implementing evidence-based interventions. These activities reinforce medicines expertise in line with FIP DG 14 and support holistic, person-centred care consistent with FIP DG 15. By integrating clinical expertise with individual patient needs, pharmacists contribute to safer and more effective oncology treatment pathways. Moreover, pharmacist-led counselling improves early symptom recognition, appropriate reporting and safe analgesic use, thereby strengthening medication safety and shared decision-making within multidisciplinary teams, in alignment with FIP DG 8 (Working with Others). Expanding access to supportive therapies and reinforcing medication safety systems further align with FIP DG 18 (Access to Pharmaceutical Services) and DG 19 (Patient Safety), while

responsible medication use and optimisation contribute to DG 21 (Sustainability in Pharmacy). These contributions also support several UN SDGs. Pharmacists contribute to SDG 3 (Good Health and Well-being) by improving treatment safety, symptom management and patient's QOL. Through patient education and professional training initiatives, they also contribute to SDG 4 (Quality Education). By helping patients better manage treatment-related toxicities and maintain functional capacity, pharmacists may indirectly support SDG 8 (Decent Work and Economic Growth) by facilitating patients' ability to remain engaged in or return to daily and professional activities. Innovation in oncology pharmacy services aligns with SDG 9 (Industry, Innovation and Infrastructure), while the rational and sustainable use of medicines supports SDG 12 (Responsible Consumption and Production). Finally, collaborative care models further reflect the spirit of SDG 17 (Partnerships for the Goals).

Conclusion: Pharmacists play a critical role in the prevention and management of CIPN in advancing patient-centred oncology care. Aligning pharmacy practice with the FIP DGs and the SDGs provides a coherent framework to guide innovation in practice, education and research. Expanding pharmacists' involvement in CIPN care can enhance treatment safety, improve QOL while contributing to broader global health priorities.

Categorizing global pharmacy competency frameworks: Aligning Workforce Development with FIP Development Goals and global health priorities

Aline Hajj^{1,2,3,4}, Asmaa Al-haqan^{1,5}, Rhonda Clifford^{1,6}, Arijana Mestrovic^{1,7}, Shaun E. Gleason^{1,8}

¹International Pharmaceutical Federation, The Hague, The Netherlands

²Université Laval, Faculty of Pharmacy, QC, Canada

³CHU de Québec-Université Laval Research Center, Oncology Axis, QC, Canada

⁴Institut National de Santé Publique, d'Épidémiologie Clinique et de Toxicologie-Liban (INSPECT-LB), Beirut, Lebanon

⁵Department of Pharmacy Practice, College of Pharmacy, Kuwait University, Kuwait City, Kuwait

⁶School of Health and Clinical Sciences, The University of Western Australia, WA, Australia

⁷Pharma Expert consultancy and education, Zagreb, Croatia

⁸Department of Clinical Pharmacy, University of Colorado Skaggs School of Pharmacy and Pharmaceutical Sciences, Aurora, Colorado, USA

Background: Competency frameworks play a critical role in standardizing and advancing pharmacy workforce development worldwide. The International Pharmaceutical

Federation (FIP) has led global efforts through the development and dissemination of frameworks such as the Global Competency Framework (GbCF), which guide professional practice and education. This evaluation aimed to identify, categorize, and analyze global pharmacy competency frameworks, and to assess their alignment with international standards, including the FIP Development Goals (DGs) and the GbCF, while considering regional priorities. This initiative also supports global health objectives by promoting competencies that enhance medication safety and public health outcomes.

Method: A one-year search (February 15, 2025–February 15, 2026) was conducted using PubMed, internet search engines, and FIP network resources. Identified frameworks were systematically categorized by geographical region, level of practice, and specialty areas. Additional analyses included language accessibility, references to FIP-developed frameworks, and areas of specialization to evaluate their applicability across diverse pharmacy practice settings.

Results: Of the 92 total global competency frameworks identified, six were considered primary, including FIP's Global Competency Framework (GbCF v1 and v2), which serve as key references for national and regional adaptations. A clear trend toward region-specific frameworks was observed, with the highest representation in Europe (n=29) and the Americas (n=25), followed by the Western Pacific (n=12) and the Eastern Mediterranean Region (n=11). Fewer frameworks were identified in South-East Asia (n=7) and Africa (n=3), highlighting geographical disparities. Frameworks addressed multiple levels of practice, including entry-level (n=14), early career (n=4), advanced practice (n=36), and those spanning all career stages (n=36), reflecting diverse professional development needs. In terms of scope, general pharmacy practice was the most represented domain (n=44), followed by clinical pharmacy (n=5). Several specialized areas—including hospital, community, primary care, and humanitarian pharmacy—were moderately represented (each n=4), while emerging and niche fields such as digital health, industry, cardiology (each n=2), and managerial roles, public health, mental health, oncology, critical care, and pharmacogenomics (each n=1) were less frequently addressed. Most frameworks were published in English, facilitating cross-regional comparison and adaptation. A significant proportion of non-North American frameworks referenced or were adapted from FIP-developed models, underscoring the global influence of FIP in shaping competency-based pharmacy education and practice.

Conclusion: Centralizing and analyzing global competency frameworks supports FIP's mission to advance pharmacy practice and workforce development while addressing regional inequities. However, challenges remain, including limited access to frameworks, variability in terminology, and contextual differences across regions. Addressing these gaps requires strategic actions such as strengthening regional collaborations, developing a centralized global repository of frameworks, and expanding FIP competency development initiatives. Enhancing and scaling framework development,

particularly in underrepresented regions and in emerging and niche fields will contribute to more equitable workforce development and ultimately advance the profession, improving healthcare delivery and patient outcomes worldwide. Future work will include comparing existing frameworks for commonalities and alignment with FIP primary frameworks, aiming to assist further framework development.

Bridging science, policy, and practice through a one health—one pharmacy framework: Advancing integrated solutions for resilient health systems in Africa

Ukamaka Okafor¹

¹Euclid University, Bangui - Remote Function, Lagos, Nigeria

Background: The interconnected challenges of human, animal, and environmental health underscore the urgent need for collaborative, evidence-driven approaches that unify science, practice, and education. The Global Center for One-Health Research, Advocacy, and Innovation (G-COHRAI) was recently established to strengthen these linkages through research translation, advocacy, cross-sector partnerships, and collaboration with government to monitor and implement public policies, ensuring fidelity to public policies.

Objective: This presentation will share the Center's experience in operationalizing a cross-sectoral approach that empowers pharmacists as catalysts for health system resilience. Through collaborative initiatives G-COHRAI integrates evidence generation, advocacy, and innovation to address emerging health challenges at the human–animal–environment interface.

Results: Case examples from Nigeria and sub-Saharan Africa will illustrate how research evidence and stakeholder engagement have informed policy frameworks, optimized the use of medicines, and strengthened local capacity for public health preparedness. The presentation will further highlight strategies for embedding One Health principles into pharmacy curricula and professional practice to foster a future-ready pharmaceutical workforce.

Conclusion: By bridging science, practice, and education, the One Health–One Pharmacy framework provides a transformative pathway to advance global health security and sustainable development, while positioning pharmacists as essential drivers of collaborative, people-centred care and reinforcing pharmacy's central role in achieving the One Health vision.

Human factors evaluation of an intravenous compounding verification and workflow system in a simulated hospital pharmacy environment

Haley Winsor¹, Mihir Patel², Amy Lo², Barbora Hrapkova², Augustine Joshua Devasahayam¹, Liam Kelly¹

¹Newfoundland and Labrador Health Services (NLHS), St. John's, Canada

²Becton, Dickinson and Company (BD), Toronto, Canada

Background: Human Factors principles are increasingly applied in healthcare to improve safety, efficiency, and usability of clinical technologies. Hospital pharmacies are particularly high-risk environments for medication errors, with contributing factors including workload, communication challenges, and usability flaws in compounding systems. Technology-assisted workflow systems have demonstrated benefits in accuracy and error reduction; however, gaps remain regarding real-world usability and workflow integration, particularly for systems supporting both gravimetric and volumetric compounding. This evaluation addresses a gap by examining how pharmacy staff interact with a novel intravenous compounding verification and workflow system, within a simulated environment, identifying potential use errors, workflow barriers, and opportunities for design improvement.

Objective: The objectives of this evaluation were: (1) to assess the usability of a novel software and hardware integrated workflow system during a series of simulated intravenous compounding tasks performed by pharmacy technicians and pharmacists; and (2) to gather user feedback to inform workflow optimization and system design enhancements. We expected that users would find the system generally usable but identify specific steps vulnerable to confusion, inefficiency, or error.

Method: A mixed-methods human factors usability evaluation was conducted in July 2025 at the Health Sciences Centre in St. John's, Newfoundland and Labrador. Six participants (four pharmacy technicians, two pharmacists) with 2 to 27 years of experience completed structured simulated workflows after a training session and 30-minute washout period. Technicians were tasked with preparing five different simulated compounded medications, and pharmacists verified the completed products. Moderators recorded performance outcomes using predefined usability evaluation criteria: Success, Use Error, Use Difficulty, Test Artifact, or Not Accessed. A total of 36 tasks were evaluated. Participants completed the System Usability Scale and semi-structured interviews. Quantitative and qualitative information were analyzed to identify patterns of use, error frequency, and emergent themes related to workflow and interface design.

Results: Across 36 tasks, participants demonstrated 19 successes, 10 use errors, 6 use difficulties, and one test

artifact. Process improvement opportunities were identified by both pharmacy technicians and pharmacists during the preparation and verification stages including improved user instructions and error handling. The mean System Usability Scale score was 68.3, indicating acceptable usability above the standard threshold of 68.0. Scores varied widely, ranging from 55 to 85. Interview themes highlighted system clarity, hardware challenges, sterility considerations, workflow disruption, and the value of stepwise guidance.

Conclusion: The intravenous compounding verification and workflow system was generally well-received and considered usable; however, a number of themes emerged as opportunities for targeted improvements. Key recommendations include clearer user prompts, enhanced barcode scanning responsiveness, and improved workflow guidance for user error resolution. These findings will inform iterative design improvements and support future real-world implementation. Continued evaluation integrating human factors principles is essential to optimize compounding safety, efficiency, and user experience in hospital pharmacy environments.

Pharmacists advanced practice and independent prescribing in Family Medicine Groups: perceptions of professionals and patients' experience

Marie-claude Vanier^{1,2}, Audrey Janoly-dumenil³, Anne Maheu^{4,5}, Ghislaine Rouly⁶, Marie-thérèse Lussier⁷, Fanny Mulder⁸, André Myre⁹, Nicolas Dugré^{1,5,10}, Line Guénette¹¹

¹Faculty of pharmacy, Université De Montréal, Montréal, Canada

²GMF-U Laval CISSS de Laval, Laval, Canada

³Faculty of pharmacy, Université de Lyon, Lyon, France

⁴GMF-U Bordeaux-Cartierville, Montréal, Canada

⁵CIUSSS du Nord-de-l'île-de-Montréal, Montréal, Canada

⁶Chaire de Recherche du Canada sur le Partenariat avec les Patients et les Communautés, Centre de recherche du Centre hospitalier de l'Université de Montréal (CRCHUM), Montréal, Canada

⁷Faculty of Medicine, Université de Montréal, Montréal, Canada

⁸Faculty of pharmacy, Universität Bern, Bern, Switzerland

⁹Bureau du Patient Partenaire, Faculty of Medicine, Université de Montréal, Montréal, Canada

¹⁰GMF-U Sacré-Coeur, Montréal, Canada

¹¹Faculty of pharmacy Université Laval and Centre de recherche du CHU de Québec, Québec, Canada

Background: Interprofessional Family Medicine Groups (FMGs) provide primary care in Quebec (Canada) where pharmacists can adjust and initiate medications in some conditions. Pharmacists' independent prescribing privileges can be further expanded in FMGs through collective practice

agreements (CPA). Patients' appreciation of FMG Pharmacists' (FMGPs) independent prescribing is not well documented; some data exist for physicians' appreciation, but none for community pharmacists (CPs). This study aimed to 1) describe FMGP's advanced clinical practice and explore its appreciation by patients, FMGs' health care providers (HCPs), and CPs; 2) evaluate patients' experience with FMGPs' independent prescribing.

Method: A mixed-methods sequential explanatory model was used to explore FMGPs' role, trustworthiness, accessibility and perceived benefits of pharmacists' interventions. We conducted a patient and HCP survey (04-06/2023) followed by semi-structured interviews and focus groups co-facilitated by a patient partner and a pharmacist (06/2023-06/2024). In each of the six participating FMGs, a local physician-pharmacist tandem ensured project coordination and recruitment of 20 patients and two nearby CPs. Patients recently receiving a FMGP's prescription were invited to complete the survey, while CPs having recently dispensed such prescriptions were invited to a focus group. Local tandems invited their eligible physicians (MD), registered nurses (RN), and nurse practitioners (NP) to complete the survey (n=185). All survey respondents could indicate their interest in participating in an interview (patients) or a focus group (HCPs) via a link embedded in the survey. These were audio-recorded, transcribed, imported into QDA Miner® software, and then coded. Donabedian's quality of healthcare systems model was used to structure inductive thematic analysis in three interconnected levels: structure (FMGPs' activities and competencies), process (interactions and teamwork), and outcomes (overall effects).

Results: Surveys were completed by 80 patients and 70 HCPs (73% MDs, 20% RNs, and 7% NPs). FMGPs' prescriptions were highly trusted by patients, with 77% trusting them as much as their physician's and 19% even more. Most patients (80%) considered that independent prescribing contributed to faster access to care. Among HCPs, 94% were either comfortable or very comfortable with FMGPs' prescribing. A significant portion of MDs (53%) considered CPA freed up time for them to devote to tasks requiring medical expertise. Sixteen patients were interviewed, 16 MDs, 7 RNs, 3 NPs, and 10 CPs participated in 9 focus groups (1 per participating FMG and 3 for CPs). Occurrences of elements most frequently discussed by all participants groups were FMGPs' interventions impact (n=119) and role/responsibilities (n=70). Patients and HCPs praised FMGPs' professionalism (n=93) while patients and CPs pointed out good relationship between FMGPs and them (n=58). Globally, FMGPs were deemed to provide essential expertise to optimize medication and continuity of care. Patients were reassured by collaboration among their care team members and by FMGPs' access to their medical files. They valued their clear explanations and shared decision-making approach.

Conclusion: Patients and HCPs perceived that FMGPs' advanced practice improves care access and physicians considered it reduced their medication-related physicians' workload. Independent prescribing is a powerful tool to

support FMGPs' advanced clinical practice and was considered beneficial by all stakeholders.

Caregiver knowledge, attitudes, and practices as determinants of viral load suppression among children and adolescents on antiretroviral therapy in Nigeria: A multisite, mixed-methods study protocol

Afusat Adesina¹, Arinola Joda¹, Olubusola Olugbake¹, Kowam Raji³, Modupe Okeneye²

¹Dept. of Clinical Pharmacy & Biopharmacy School of Postgraduate Studies, University of Lagos, Lagos, Nigeria

²Howard University Global Initiative in Nigeria, Lagos, Nigeria

³Howard University Global Initiative in Nigeria (HUGIN), Osun State, Nigeria

Background: Despite significant advances in antiretroviral therapy (ART), viral load suppression among children and adolescents living with HIV (CALHIV) remains suboptimal in sub-Saharan Africa, with Nigeria bearing one of the world's largest burdens of paediatric HIV. Unlike adult populations, children and adolescents are uniquely dependent on caregivers for medication administration, clinic attendance, and adherence monitoring. Caregiver-related barriers, including limited knowledge of treatment goals, stigma, psychosocial strain, health literacy deficits, and socioeconomic vulnerability, have been consistently associated with virological failure in this population.

Purpose: 1. characterise the viral load status of CALHIV across Nigeria's six geopolitical zones; 2. identify caregiver-related factors including KAP, psychosocial dynamics, socioeconomic status, health literacy, and stigma that are independently associated with viral load suppression; 3. assess the impact of these factors over a 9–12-month follow-up; and 4. evaluate the effectiveness of a structured, pharmacist-led caregiver education and Differentiated Service Delivery (DSD) intervention in improving ART adherence and viral suppression rates among CALHIV.

Method: A quasi-experimental, mixed-methods study design will be employed across six geopolitical zone of the country with one state selected per geopolitical zone as follows; Kaduna (North West), Taraba (North East), Benue (North Central), Anambra (South East), Akwa Ibom (South South), and Lagos (South West), selected based on highest zonal HIV prevalence per the 2018 Nigeria AIDS Indicator and Impact Survey (NAIIS). A minimum of 120 caregiver-CALHIV dyads per site (n=720 total) will be enrolled. Two intervention states (Lagos and Kaduna) will receive a 12-month pharmacist-led intervention targeting caregiver education and drug therapy problem (DTP) management; four states serve as controls. Quantitative data will be collected via structured caregiver questionnaires, healthcare provider questionnaires, and

clinical data abstraction forms. Qualitative data will be collected via focus group discussions (FGDs) with caregivers and healthcare providers. Viral load suppression ($\leq 1,000$ copies/mL) serves as the primary outcome.

Results: A pilot study conducted at the State Specialist Hospital, Asubiaro, Osogbo (n=39 dyads) confirmed study feasibility. Preliminary findings revealed a viral suppression rate of 69.2% among CALHIV, with 23.1% unsuppressed (viral load $>1,000$ copies/mL). Caregivers were predominantly female (79.5%), with mothers constituting 74.4%; most (64.1%) had caregiving durations exceeding 10 years and a mean age of 43.7 years. Index patients had a mean age of 12.4 years; 59.0% were receiving tenofovir/lamivudine/dolutegravir. Critically, baseline viral load collection was not programme-supported, and 28.2% of patients had missing baseline CD4 count, highlighting systemic data gaps with direct implications for clinical decision-making. Caregivers' socioeconomic vulnerability was prevalent: the majority reported trading as their primary occupation (66.7%), and a significant proportion likely experienced income insufficiency.

Conclusion: It addresses a critical gap in the paediatric HIV literature by delivering the first comprehensive, nationally representative assessment of caregiver KAP and its relationship to viral load outcomes among CALHIV in Nigeria. Its mixed-methods, interventional design uniquely positions it to generate both explanatory evidence and actionable solutions. Findings will directly inform the design of structured caregiver training programmes, pharmacist-led DTP management protocols, and DSD model refinements for CALHIV — with significant implications for national and sub-Saharan HIV programming.

Innovative telehealth integration to overcome prescribing barriers in community pharmacist-directed group A streptococcus testing: A pilot study in Toronto

John Papastergiou^{1,2,3}, Abdeen Salim Hamid⁴

¹Professor, Faculty of Medicine, University of Ottawa, Ottawa, Canada

²Assistant Professor, Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, Canada

³Assistant Professor, School of Pharmacy, University of Waterloo, Waterloo, Canada

⁴Pharmacist, Shoppers Drug Mart, Toronto, Canada

Background: Community pharmacists can effectively perform point-of-care Group A Streptococcus (GAS) testing and improve timely access to care. A prior Canadian program demonstrated that same-day antibiotic initiation was significantly higher in provinces with advanced pharmacist

prescribing authority (e.g., Alberta) compared to those without. In jurisdictions lacking full prescribing rights, referring positive patients to primary care, urgent care, or emergency departments creates delays and inefficiencies. Telehealth platforms offer a potential solution to bridge this gap.

Objective: This pilot study evaluated the feasibility and efficiency of integrating a real-time telehealth platform (Stealth Health) with community pharmacist-directed GAS testing to enable rapid antibiotic prescribing for positive cases in a province without independent pharmacist prescribing authority.

Method: Trained pharmacists in a busy urban community pharmacy in Toronto, Ontario, used the Centor criteria and clinical judgement to identify eligible patients with sore throat symptoms. All pharmacists completed training on GAS testing using the Abbott ID NOW platform. Throat swabs were collected and tested on-site. For GAS-positive patients, test results and clinical information were securely uploaded to the Stealth Health telehealth platform. A licensed physician reviewed the case and issued an electronic prescription when appropriate. Time from positive result to prescription generation was recorded. Patient and pharmacist feedback was collected anecdotally.

Results: To date, 50 patients were tested, of whom 28 (56%) were GAS-positive. All 28 positive patients received an antibiotic prescription via the Stealth Health platform within 15 minutes of the positive test result. This represents a dramatic improvement over traditional referral pathways. Both patients and pharmacists reported high satisfaction with the service, describing it as convenient, efficient, and patient-centred.

Conclusion: Integration of a telehealth platform with pharmacist-led point-of-care GAS testing enables same-day antibiotic initiation even in the absence of independent prescribing authority. This innovative model can serve as an effective bridge in provinces awaiting expanded pharmacist scope of practice and has the potential to reduce burden on primary care and emergency services while improving patient outcomes. Larger-scale implementation and formal patient satisfaction studies are warranted.

Time-and-motion study of pharmacists working in a Montreal psychiatric hospital

Philippe Vincent^{1,2}, Vincent Dagenais-beaulé^{3,4}

¹*Institut universitaire en santé mentale de Montréal, Montreal, Canada*

²*Faculté de pharmacie de l'Université de Montréal, Montreal, Canada*

³*Hôpital Général Juif, Montreal, Canada*

⁴*School of Pharmaceutical Sciences, Faculty of Medicine, University of Ottawa, Ottawa, Canada*

Background: Clinical pharmacy activities occupy a substantial proportion of hospital pharmacists' workload and can have important clinical, economic and public health impacts. Although pharmacist staffing ratios have been suggested for some clinical areas, there is limited published evidence describing the workload of clinical pharmacists in inpatient psychiatry. Existing recommendations suggest approximately 1 full-time equivalent pharmacist per 20 acute psychiatric beds, but real-world staffing often differs markedly.

Objective: To estimate an appropriate pharmacist-to-patient ratio for an inpatient psychiatry setting using a prospective time-and-motion study.

Method: A prospective time-and-motion study was conducted in May 2019 at Institut universitaire en santé mentale de Montréal, where a dozen pharmacists provide direct pharmaceutical care in services like general psychiatry, geriatric psychiatry, intensive care, mood disorders, emergency psychiatry, and psychotic disorders. Activities were recorded in real time using a spreadsheet and a stopwatch application. Tasks were categorised as: direct clinical care, indirect clinical care, and non-clinical activities. Medians and interquartile ranges were calculated. Time required for a standard episode of care was estimated as the sum of admission, follow-up and discharge activities adjusted to length of inpatient stay. The weekly time available for direct patient care was then used to calculate pharmacist-to-patient ratios.

Results: Seven pharmacists participated. Over 64 hours and 10 minutes of observation for 352 activities were recorded for 111 patients. Clinical activities accounted for 50 hours and 18 minutes, representing 78% of total observed time. Median time per patient activity was 74 minutes for admission, 29 minutes for follow-up and 17 minutes for discharge. Indirect clinical care included interdisciplinary meetings and professional communications, while non-clinical activities accounted for 519 minutes per week, mainly teaching, walking to and from wards, administrative tasks and professional development. After subtracting indirect clinical and non-clinical activities from a 40-hour working week, 1232 minutes remained available for direct patient care. Based on the observed distribution of length of stay of 42 days, the

calculated mean ratio was 22 patients per pharmacist. In a scenario with shorter admissions only (mean length of stay of 16 days), the ratio decreased to 14 patients per pharmacist.

Conclusion: This first time-and-motion study of pharmacists working in inpatient psychiatry suggests that approximately 1 pharmacist per 22 patients is required to provide the full range of direct and indirect clinical activities in a university hospital setting. These findings are broadly consistent with suggested professional guidance but starkly contrast with commonly observed staffing levels in Quebec. Larger studies are needed to confirm external validity and support workforce planning in psychiatric pharmacy services.

Wearables and mobile applications: Pharmacist-led patient monitoring

Ylenia Grech, Lilian M. Azzopardi¹

¹*Department of Pharmacy, Faculty of Medicine and Surgery, University of Malta, Msida, Malta*

Background: The healthcare industry is rapidly transforming with the emergence of digital health, particularly through mobile applications and wearable devices to offer easier patient monitoring. Despite their potential, barriers such as limited awareness and education restrict widespread adoption of digital technologies for patient monitoring. Community pharmacists, given their accessibility and trusted position as healthcare providers, are well positioned to contribute to bridge the digital gap between patients and digital health platforms. This study aimed to assess the use of mobile applications and wearable devices by patients to monitor their health, to identify challenges encountered by both patients and community pharmacists when using digital tools and to explore how pharmacists may empower patients to use these tools effectively.

Method: A literature review of existing articles on digital technologies in healthcare was conducted to capture latest terminology and concepts. Two questionnaires were developed; one targeting patients and the other community pharmacists. The questionnaires were validated for content by a multidisciplinary panel comprising two physicians and two pharmacists for both questionnaires, with additional feedback from two laypersons for the patient version. The panel provided feedback on layout, clarity, and relevance contributing to the final version of concise and user-friendly questionnaires. The pharmacist questionnaires were distributed electronically via Google Forms through the registration body and respondents were allowed eight weeks for submission. For patients, hundred paper questionnaires in English and Maltese were distributed in ten geographically spread pharmacies across Malta and Gozo, selected by convenience sampling from the six districts in Malta. To ensure confidentiality, completed questionnaires were

placed in a sealed box. Data collection was subsequently analysed for quantitative analysis.

Results: From the patient questionnaires, 616 responses were collected. Only 30% of patients use mobile applications or wearable devices to monitor their health, with 74% of them having tertiary education, 70% being female and the majority residing in the Northern Harbour. The most monitored parameters were pulse (52%), sleep and calories (45%). Amongst non-users, 45% stated that lack of awareness and education regarding digital health was the main barrier that prevented them from using digital health monitoring tools. From the pharmacist questionnaires, 73 responses were collected. Of these, 56% had never recommended a mobile application or wearable device to patients. A large majority (85%) of community pharmacists reported not feeling adequately trained in digital health, while 99% stated more patient education about digital health is required. The main challenges pharmacists face when recommending digital health tools are difficulties in communicating with patients who lack understanding and insufficient knowledge about the latest technologies, which affects their confidence in recommending these tools.

Conclusion: The findings demonstrate limited use of digital health among patients and highlight the pharmacists' training needs. While patients primarily face barriers of awareness and education, pharmacists identify confidence and knowledge gaps as obstacles when promoting these tools. Addressing these issues could enhance the role of pharmacists as facilitators of digital health adoption.

Closing the adult immunization gap: An innovative centralized pharmacist-led outreach initiative in community pharmacy

Molly Yang¹, Negeen Foroughian¹, Jessica Hoxha

¹Wholehealth Pharmacy Partners, Markham, Canada

Background: Despite pharmacists across Canada having the scope to inject many different vaccines, immunization rates are still below national targets, with only about 10% of Canadian adults having up-to-date immunizations. Pharmacists face many barriers to addressing this care gap, including a lack of tools to identify unvaccinated individuals and time constraints that hinder them from providing extended clinical services. Our pilot program is the first of its kind by a pharmacy banner to address these barriers; it involves a central pharmacist conducting proactive outreach on behalf of pharmacists to perform a comprehensive vaccine assessment for eligible individuals.

Method: The central pharmacist uses custom internal software to screen the patient populations of participating, Ontario-based Wholehealth pharmacies. Patients are

screened based on age, medical history, and drug coverage, then contacted by the central pharmacist, who performs a virtual, personalized vaccine review (using VaxCheck software) and generates relevant prescriptions through a medical directive. These prescriptions are transmitted to the patient's home pharmacy, and the vaccines are administered by their regular pharmacist. The number of patients contacted by the central pharmacist and the number of patients that accepted vaccine recommendations are tracked by the internal software. The final number of vaccines administered is also monitored monthly by collecting dispensing data from participating pharmacies. Qualitative data is also collected to gather immunization-related insights from both pharmacists and patients. During intake and exit interviews with pharmacists at participating pharmacies, feedback around barriers to conducting vaccine outreach, and their experience with this program are collected. Patient feedback is also collected during the service, as the central pharmacist conducts an informal interview to understand the patient's pre-existing knowledge around their vaccine eligibility.

Results: This project is still underway; currently, after performing 6 weeks of outreach, 291 patients across 6 pharmacies have been contacted, of which 178 patients have accepted the vaccine recommendations made, and 377 vaccines have been prescribed. We anticipate recruiting up to 30 pharmacies for this program to sufficiently evaluate its impact. Every pharmacy contacted thus far about this program has expressed interest in participating. All 11 recruited pharmacists thus far cite significant time constraints due to staffing limitations and workflows as barriers to conducting vaccine outreach themselves, thus serving as their primary reason for joining this program. 7 out of 11 of participating pharmacists also shared that they lack sufficient knowledge around which vaccines to recommend to patients, further motivating them to participate in this initiative. Over 75% of patients that accepted vaccine recommendations were unaware of their vaccine eligibility, attributing this to lacking a primary care provider (30%), not having conversations about vaccine eligibility previously with a care provider (45%), or being unclear around vaccine age requirements (60%).

Conclusion: In conclusion, we have developed an innovative program that effectively overcomes time and knowledge barriers faced by pharmacists addressing the adult immunization gap, having successfully provided hundreds of patients with personalized vaccine recommendations. This project illustrates the value that pharmacists bring to primary care when they are provided with sufficient support to offer clinical services.

Comparative analysis of medication safety reporting data across small, medium, and large pharmacy organizations in Canada, the United States, Europe, and Australia/New Zealand

Aleksa Stankić¹, Rhonda Kollenborn¹, Jessica Amiana¹, Jason Percy¹

¹Think Research, Toronto, Canada

Background: Medication incident reporting systems support continuous quality improvement (CQI) in community pharmacy. However, reporting engagement varies across pharmacy organizations and geographical regions. Understanding organizational factors associated with reporting engagement may help inform strategies to strengthen medication safety reporting.

Objective: This study evaluated user engagement within the Pharmapod medication incident reporting and management platform across organizations of varying sizes, geographic regions, and operational structures. We also examined qualitative factors contributing to differences in reporting activity. We hypothesized that normalized reporting and organization size would have a positive correlation due to scaling factors.

Method: Data were collected from January 2023 through February 2026 across four regions (Canada, the United States, Europe, and Australia/New Zealand) using the Pharmapod platform. Organizations were categorized by the number of pharmacy locations: small (<10), medium (10-99), and large (≥100). Engagement was assessed through quantitative analysis of user logins and reported events. Metrics were normalized to account for different onboarding times and to facilitate comparisons across regions and organization sizes. Qualitative insights were derived from focus groups, one-on-one discussions, and user feedback from current and potential customers.

Results: Across 14,415 pharmacy sites, 293,075 events and 501,267 logins were recorded. Reporting engagement varied substantially by organization size and region when normalized to report per location per month (report/location/month). Despite their low share of total locations (1,400 locations, 9.71%), medium-sized organizations demonstrated the highest reporting activity in multiple regions (4.24 reports/location/month average). While large organizations accounted for the greatest absolute number of reported events (148,918 reports, 50.81%) and 49% of all locations, their normalized reporting activity was not consistently higher than that of other organization sizes (0.64 reports/location/month average). Interestingly, small organizations generally demonstrated higher reporting engagement than large organizations, representing a similar proportion (41.29%) of all locations (2.01 reports/location/month average). These findings indicate that normalized medication safety incident reporting activity

is not proportional to organization size. Qualitative data identified differences in the frequency, tools, and incentives used by organizations of different sizes to mitigate reporting barriers. These include, but are not limited to, organization-wide mandates relative to the timing and types of events reported, reporting data tracking and analysis, and the overall safety culture within the organization.

Conclusion: Organizations consisting of 10-99 locations appear to be ideally suited for change management and medication safety reporting adoption. This may be due to their ability to balance corporate policies, procedures, and expectations with the direct feedback from their locations. Moreover, their ability to respond to early signals in reporting data can enable timely guidance and policy or procedure changes. Small organizations may lack the resources to analyze operational data or implement meaningful change, while large organizations may face challenges in enacting change and monitoring compliance across large networks of locations. Although reporting mandates establish expectations for incident reporting, operational accommodations and change management for frontline staff are required to support meaningful improvements in reporting engagement.

Needs and challenges in pediatric pharmaceutical care: a mixed-methods survey of hospital pharmacists in Quebec, Canada

Catherine Sicard¹, Anne-isabelle Dubé¹, Geneviève Laflamme¹

¹APES - Regroupement de pharmaciens experts (RPE) en pédiatrie, Montréal, Canada

Background: The Association des pharmaciens des établissements de santé du Québec (APES) is a professional organization representing hospital pharmacists in Quebec, Canada, dedicated to advancing clinical pharmacy practice. Within APES, expert pharmacist groups (EPGs) bring together clinicians with specialized expertise to develop practice standards, clinical tools, and provide advisory input. Recently established in 2023, the pediatric EPG needed to define the direction of its initial activities. Pediatrics is a unique population where pharmacists' exposure varies widely, and the nature, frequency, and impact of challenges remain poorly characterized. While previous surveys have identified gaps in confidence and competencies in pediatric pharmaceutical care and other studies have evaluated interventions targeting perceived barriers, none have surveyed frontline clinicians to identify challenges encountered in practice. As a result, key barriers and priority needs remain unclear. Therefore, the pediatric EPG aimed to identify and quantify challenges encountered in hospital-based pharmaceutical care to guide its initiatives.

Method: Convergent mixed-methods analysis of a 22-question online survey distributed to all APES members in November 2024.

Results: Responses from 135 participants, primarily experienced clinical pharmacists (mean 13 years of practice) with postgraduate (Master's-level) training in advanced pharmacotherapy, were analyzed. Most reported frequent but low-volume exposure to pediatric care. Perceived competence was high for dose calculations (90%), order verification (75%), and antimicrobial therapy (70%), but lower for comprehensive pharmaceutical care (56%), pharmacokinetics (62%), and off-label medication use (70%). Key challenges included limited knowledge (89%) and limited exposure (85%), uncertainty in treatment selection (86%) and dosing (78%), and off-label medication use (81%). Issues perceived to have the greatest negative impact on patients were off-label use (97%) and limited access to appropriate formulations or compounding (90–91%). Open-ended responses highlighted parenteral drug preparation, emergency and critical care situations, and off-label use as key concerns. Neonatology was the most frequently identified complex population, and antibiotics were the most cited complex drug class. Respondents emphasized the need for foundational resources ("Pediatrics 101"), practical tools (e.g., IV preparation guides), and access to centralized best practices. Highlighted clinical priorities included emergencies, neonatology, pharmacokinetics, and off-label use, with antibiotics being the most frequently cited drug class for future work.

Conclusion: Respondents are representative of hospital clinical pharmacists in Quebec, supporting the relevance of these findings. Consistent with prior surveys, limited exposure to pediatric care appears to contribute to lower confidence and perceived competence. Convergent findings identify priority areas including neonatology, emergency care, parenteral medication preparation, and off-label use, alongside cross-cutting needs related to treatment selection, dosing, and pharmacokinetics. Despite high confidence in antimicrobial therapy, antibiotics were the most frequently cited complex drug class and priority topic. This likely reflects frequent exposure to common infectious conditions alongside variability and complexity in less common scenarios, supporting the need for structured, accessible antimicrobial guidance tailored to generalist clinicians. These findings may apply to generalist pharmacists in low-volume pediatric settings and highlight concrete opportunities for the pediatric EPG to develop targeted, accessible, and standardized resources addressing key challenges in clinical practice.

Primary Care Pharmacy – Addressing the elephant in the room: Workplace stress and duress experienced by pharmacists

Yazid Al Hamarneh¹, Shania Liu¹, Sandra Winkelbauer², Michelle Wyand³, Jennifer Lapierre³, Ross Tsuyuki¹

¹University Of Alberta, Edmonton, Canada

²Ontario College of Pharmacists, Toronto, Canada

³Prince Edward Island College of Pharmacy, Charlottetown, Canada

Background: Practicing to their full scope solidifies the pharmacist's role as a vital primary care provider and offers an additional avenue for Canadians to access such services. This avenue is needed now more than ever since nearly 50% of Canadians are unable to access primary care through traditional routes, either because they do not have a family physician or cannot obtain timely appointments. Nevertheless, what appears like an opportunity for pharmacists to step up has also created a major challenge. Pharmacists have reported concerns about staffing levels and corporate pressures impacting their ability to provide care.

Objective: To evaluate workplace conditions and well-being of pharmacy professionals as it relates to their ability to meet their provincial standards of practice for patient care.

Method: Design: Cross-sectional survey of workplace conditions and well-being of pharmacy professionals. Setting: Provincial pharmacy regulatory bodies in Ontario (ON) and Prince Edward Island (PEI). Population: Practising pharmacy professionals and pharmacy students. Data collection & analysis: The questionnaire was distributed electronically through the provincial regulatory body to all its registrants. It was divided into four sections 1) place of practice, 2) business pressure and its impact on ability to provide patient care, 3) wellness and 4) demographics. Statistical analyses were performed using R version 4.5.1 (Vienna, Austria; <https://www.R-project.org/>) and SAS version 9.4 (SAS Institute Inc., Cary, NC, USA). Primary outcome: The extent to which workplace/business pressures impact pharmacy professionals' ability to meet their provincial standards of practice for patient care.

Results: Of the 1387 pharmacy professionals who completed the questionnaire, 67% were pharmacists. Most of the pharmacists (95.5%) worked in the community and almost three-quarters of those (72.3%) worked in a corporate or a franchise. About two-thirds (62.3%) of the pharmacists indicated that they are experiencing business pressures and more than a fifth (21.2%) of those indicated that they can never or rarely meet provincial standards of practice due to those pressures. Comparing those who were practicing in a corporate or a franchise vs. banner or independent pharmacy, pharmacists experienced more business pressures (77.4% vs. 29.6%), felt burnt out more often (63.7% vs. 32.0%) and their wellbeing was majorly impacted by business

pressures (62% vs. 24.0%), all $p < 0.05$. Furthermore, for the first time, pharmacists expressed fear of retribution for speaking out against business pressures. Consistent findings were observed when the data were analyzed per province.

Conclusion: Our findings highlight that business pressures are a systemic challenge in pharmacy practice. Such pressures have significant implications for patient care, professional well-being, and workforce stability. Pressures were felt more prominently by those who practice in a corporate or a franchise when compared to those practicing in a banner or an independent pharmacy. Disturbingly, pharmacists now express fears of retribution if they speak out about this problem. Regulatory bodies, employers, and policymakers must prioritize interventions that safeguard clinical autonomy, ensure adequate staffing, and address structural drivers of business pressures. Without meaningful change, these pressures will continue to impact patient care, professional independence, sustainability and clinical evolution of the pharmacy workforce.

Promoting public awareness of pharmacy services: A thematic narrative review of dissemination strategies

Kathleen Bergin¹

¹Dalhousie University, Halifax, Canada

Background: Community pharmacists are increasingly expanding their scope of practice and can now provide a wide range of clinical and preventive health services. Despite this expansion, many of these available services remain underutilized. Previous research suggests that limited public awareness of pharmacists' expanded roles and availability of these services contributes to this underutilization. Unlike traditional healthcare services, pharmacy-based services often rely on patients initiating care without formal referral pathways, making effective dissemination of service information particularly important in this context. Identifying strategies that effectively communicate the availability, accessibility, and credibility of pharmacy-based services to the public may therefore play a key role in improving service uptake and sustainability.

Objective: To identify dissemination strategies used to promote public knowledge of pharmacy-based services and enhance public engagement with these services

Method: A thematic narrative review of the literature was conducted to examine how pharmacy-based services are communicated to the general public. A systematic search of three databases (PubMed, Embase, and CINAHL), along with reference checking, was conducted up to February 2026 to identify studies describing dissemination strategies aimed at increasing public awareness of pharmacy-based services.

Data from eligible articles were extracted and analyzed using thematic analysis to generate themes related to promoting knowledge of pharmacy-based services among the general public.

Results: A total of 1,948 studies were identified, of which 42 met the inclusion criteria and described at least one strategy used to disseminate or promote knowledge of pharmacy-based services to the general public. Four broad dissemination strategy themes were identified: (1) the use of clear and targeted messaging to communicate available pharmacy services, (2) emphasizing privacy and confidentiality to address potential patient concerns, (3) promoting pharmacists' professional expertise and clinical capabilities to strengthen public trust and understanding of pharmacists' roles in healthcare, and (4) engaging with patient partners in the development of communication materials.

Conclusion: Findings from this review highlight the importance of strategic communication approaches when promoting pharmacy-based services to the public. Dissemination efforts should clearly communicate available services and should use a medium that will reach the targeted audience. There should be clear messaging to address privacy concerns and emphasize pharmacists' expertise and educational background. In addition, involving patient partners in the development of dissemination materials may help ensure that messaging is relevant, accessible, and responsive to the needs and concerns of the communities who will benefit from these services.

Project ImPACT: Hyperlipidemia. Results from the APhA Foundation's research on pharmacists providing patient care through point-of-care testing in the management of hyperlipidemia

Benjamin Bluml¹

¹American Pharmacists Association Foundation, Washington, Dc, United States

Background: Project ImPACT: Hyperlipidemia was conducted to demonstrate community pharmacists' impact on persistence and compliance in medication therapy. Dyslipidemia was considered an ideal area to demonstrate the value that pharmacists can add to the patient care team. This project utilized a collaborative care model to improve persistence, compliance, and treatment to goal. Objectives of this initiative included demonstrating that pharmacists, working collaboratively with patients and physicians and having immediate access to objective point-of-care patient data, are able to promote patient persistence and compliance with prescribed lipid therapy that enables patients to achieve their National Cholesterol Education Program (NCEP) goals. Persistence was defined as a patient who started on

medication, remained on medication subsequent to drug therapy initiation, and continued to be on medication as of his or her last visit. Persistence as a percentage was calculated by dividing the number of persistent patients by the total number of patients who started on medication. Any patient who missed doses for 5 days or more or who missed a scheduled refill visit by more than 5 days was deemed to be noncompliant at that visit. Compliance as a percentage was calculated by dividing the number of visits at which patients were compliant by the total number of patient visits.

Method: Twenty-six community-based ambulatory care pharmacies were recruited to participate, including independent, chain, grocery, home health/home infusion, clinic, and health maintenance organization/managed care organizations. Patients were identified through referrals from local physicians or other providers, by the project pharmacists or by patient self-referral. Patients enrolled in the program were either newly diagnosed with dyslipidemia or were already receiving lipid lowering medications. The process of care included utilization of a point-of-care testing technology to obtain a fasting lipid profile from a fingerstick blood sample, and documenting the results. After the initial visit and consultation with the pharmacist, patients were asked to make follow-up visits every month for the first 3 months and quarterly thereafter. The practice model emphasized establishing a process for seamless flow of data between patients, pharmacists, and physicians, obtaining timely and objective information about the patient's progress, documenting the patient visits conducted, and having discussions with prescribers as needed.

Results: In a population of 397 patients seen over an average period of 24.6 months, 345 patients started on medication, and 323 patients continued with drug therapy, for a resultant patient medication persistence rate of 93.6%. Additionally, of 2,817 documented visits for patients on medications, there were 2,539 occurrences of compliance (i.e., within 5 days of expected refills) reported, for a resulting per-visit medication compliance rate of 90.1%. In addition, 62.5% of patients had reached and were maintained at their NCEP lipid goal at the end of the project.

Conclusion: Working collaboratively with patients, physicians, and other health care providers, pharmacists who have ready access to objective clinical data, and who have the necessary knowledge, skills, and resources, are able to leverage point-of-care testing in order to provide an advanced level of care that results in successful management of dyslipidemia.

Impact of pharmacist prescribing policy on overall health system utilization for urinary tract infections among equity-deserving groups

Fiona Chan¹, Colin Dormuth¹

¹*Therapeutics Initiative, Department of Anesthesiology, Pharmacology, and Therapeutics, Faculty of Medicine, The University Of British Columbia, Vancouver, British Columbia, Canada*

Background: While policies that supporting independent pharmacist prescribing have existed in various jurisdictions in Europe and North America for almost two decades, evidence is lacking on the system-level impacts of these services. Additionally, as certain equity-deserving groups (EDGs) have been observed to use these services at reduced rates, the level of impact among these groups may also differ compared to their more advantaged peers. Amidst the current crisis in lack of timely access to primary care in the Canadian province of British Columbia, the Pharmacist Prescribing for Minor Ailments and Contraceptives policy (PPMAC) was implemented in 2023. This created a natural experiment to study the impacts of this policy on the health system in the overall population, as well as to evaluate if the impact differs among EDGs compared to more advantaged groups.

Method: Using an interrupted time series (ITS) design and provincial administrative health databases, a rolling cohort was created comprising of females over the age of 18 who were continuously enrolled in the provincial health insurance plan for at least one year from Jun 1, 2021 to Mar 31, 2025. The exposure was the policy's implementation date of Jun 1, 2023. Urinary tract infection (UTI) was chosen as the ailment of concern, as it was the most frequently assessed ailment under the PPMAC policy. The outcomes of interest were the rate of prescriptions for antibiotics used to treat UTIs, as well as the rate of outpatient visits for UTIs (combined physician and emergency room visits). Using person-months as the unit of analysis, the immediate (level) and gradual (trend) effects of the policy was first estimated in the overall population using negative binomial regression models. Then, in separate models, interaction terms were included between the exposure and various dichotomous neighbourhood-level socioeconomic characteristics to determine the differences in impact between various EDGs and their more advantaged peers.

Results: Immediately after implementing the pharmacist prescribing policy, the rate of outpatient visits decreased by 8% (RR for level change 0.92, 95%CI 0.88-0.95) with a steady 1% decline over time (RR for trend change 0.99, 95% CI 0.99-0.99). There was an immediate increase in use of antibiotics to treat UTI following policy implementation (RR for level change 1.10, 95%CI 1.06-1.13), which was sustained over time. The models including interaction terms suggest that the rate of outpatient visits did not vary among EDGs and those more advantaged. Regarding prescription use, while there were no differences in impact immediately after the policy was implemented, the sustained increase in prescriptions

over time was only present among those residing in neighbourhoods with higher English-speaking ability, less visible minorities, and less immigrants, but not their counterparts.

Conclusion: These findings suggest that the PPMAC pharmacist prescribing policy may have modestly decreased outpatient visits for UTI over time, while potentially providing access to treatment for those who may not have sought care previously. Further evaluations are needed to understand if the differences in impact among certain EDGs result in disparate health outcomes.

Qualifying primary healthcare to promote services' diversity and provide LGBTQIAPN+ inclusive care in Brazil

Livia Maria De Souza Goncalves¹, Luciano Soares, Beverley Glass, Kyle Wilby, Swapna Chaudhary, Megan Ross, Silvana Nair Leite

¹Federal University of Santa Catarina, Florianópolis, Brazil

Background: Access to Primary Health Care (PHC) within Brazil's Unified Health System (Sistema Único de Saúde, SUS) remains inequitable for lesbian, gay, bisexual, transgender, queer, intersex, asexual, pansexual, non-binary, and other sexual and gender diverse (LGBTQIAPN+) populations. Although the National Policy for Comprehensive LGBT Health established equity-oriented directives, care provision continues to be shaped by cis-heteronormative and pathologizing logics that insufficiently recognise diverse gender identities and sexual orientations. Regional studies document persistent barriers, including discrimination, invisibility of health needs, restricted scope of care, and limited professional preparedness. Within SUS, pharmacists are highly accessible PHC professionals and play a key role in medicines management, health promotion, and the rational use of medicines. However, pharmaceutical services remain underexplored in LGBTQIAPN+ health research, and emerging qualitative evidence indicates substantial gaps in pharmacists' education and preparedness to deliver inclusive care. This pharmacist-led national study aims to identify competency needs and develop, validate, and pilot an interprofessional qualification model for PHC teams, with explicit inclusion of pharmacists within interprofessional PHC teams.

Method: This publicly funded project has a sequential, multi-phase mixed-methods design that will be conducted at the national level. Phase 1: nationwide surveys with PHC users and health professionals to identify perceived barriers, facilitators, and competency gaps in inclusive care. Concurrently, a meta-synthesis will be undertaken using the Joanna Briggs Institute meta-aggregation approach to identify competencies for delivering inclusive care to

LGBTQIAPN+ populations and for fostering inclusive work environments for PHC professionals. The protocol will be registered in the Open Science Framework. Independent critical appraisal and synthesis will follow JBI methodological guidance, with confidence in findings assessed using GRADE-CERQual and reporting aligned with ENTREQ standards. Phase 2: qualitative in-depth interviews with key participants to explore how professional qualification, collaborative practice, and organisational culture shape inclusive environments, guided by Minayo's thematic analysis framework and reported according to COREQ. Findings will inform the development of national competency matrices for PHC professionals, explicitly including pharmacists, and will underpin the design of an interprofessional qualification programme grounded in Interprofessional Education and a decolonial perspective. The programme model and its evaluation framework, based on Kirkpatrick's four-level model, will be validated through a Delphi panel including experts and LGBTQIAPN+ community representatives. Phase 3: a pilot implementation of this programme in a Brazilian municipality will assess feasibility, acceptability, and scalability. The project involves collaboration among three Brazilian and three international public universities, strengthening methodological rigor and global knowledge exchange.

Results: The study is expected to generate national evidence on pharmacists' preparedness for inclusive LGBTQIAPN+ care within SUS; identify core and profession-specific competencies; produce validated competency matrices and an evidence-based qualification programme; and establish an evaluation model for workforce development outcomes. The project will commence in the first semester of 2026.

Conclusion:

Conclusion. By strengthening pharmacists' contribution to inclusive interprofessional PHC, this project advances pharmaceutical workforce development aligned with equity, human rights, and health systems strengthening. The resulting model may inform policy, education reform, and international discussions on strengthening pharmacists' roles in equitable health systems.

Barriers and enablers of policy formation and adoption of pharmacist scope of practice: Stakeholder views

Simone Diamandis¹, Tracey Thornley², Shalom (charlie) Benrimoj¹, Sarah Dineen-griffin¹

¹The University Of Newcastle, Callaghan, Australia

²The University of Nottingham, Nottingham, United Kingdom

Background: Translating research on Pharmacy Practice Environments and Pharmacists' Scope of Practice into actionable policy requires a comprehensive understanding of

key policy components, policy processes, and the identification of barriers and enablers influencing both policy formation and adoption. A study of the roles and use of evidence in pharmacy policy in Australia highlighted that whilst research-based evidence is necessary in policy making, it is often insufficiently influential to inform policy change (1). This research aims to examine the key influences on the development and adoption of pharmacy practice environment and pharmacist scope of practice policies, and whether frameworks, theories or models are utilised to support these processes.

Method: Three focus groups and ten semi-structured interviews were conducted between May and September 2025. Participants included pharmacists across different practice settings, medical practitioners, federal and state government department and ministerial representatives, consumer and pharmacy organisational representatives. Focus groups and interviews were recorded, transcribed and deductively thematically analysed using NVivo and applying a 16-item checklist.

Results: Twenty-six participants took part in the three 90-minute focus groups (n=16) and ten 60-minute semi-structured interviews (n=10) including 14 pharmacists and 12 non-pharmacists. Six themes were identified as critical to the development and adoption of pharmacy practice environment and pharmacist scope of practice policies: "Actors", "Narratives", "Politics", "Environment", "Structural and Systemic Factors" and "Implications" along with twenty-five sub-themes. Government representatives and medical practitioners, focused more on "Implications" and "Risks" compared to pharmacists and consumers, who focused more on "Narratives" and "Evidence". Barriers to policy development and adoption included misalignment or opposition to pharmacy practice environment and pharmacist scope of practice policies by "policy actors", "implications" including risks associated with expanded scope, "structural and systemic factors" related to jurisdictional differences in funding and legislation, and political influences. Enablers included alignment and collaboration amongst "policy actors" and political parties' leadership of the "policy narrative" with contextualised evidence, positive "environmental" conditions such as diffusion of policies from other jurisdictions, and "implications" where future innovations supported the policy and positive outcomes. Established health policy frameworks, theories and models were underutilised by policy makers and decision makers in the development or adoption of pharmacy practice environment and pharmacist scope of practice policies.

Conclusion: The development and adoption of pharmacy practice environment and pharmacist scope of practice policies depend on alignment and leadership amongst policy actors, navigation of systemic constraints and strategic foresight of policy implications. A coherent narrative grounded in robust evidence and contextual understanding considering the policy environment is essential. Current approaches to the development and adoption of pharmacy

practice environment and pharmacist scope of practice policies highlights gaps in the use of established frameworks, theories or models, underscoring the need for a flexible framework for policy makers and decision makers to strengthen and accelerate potential policy outcomes.

Existing models through which pharmacist prescribers, in the UK, US, Canada, Australia and New Zealand, provide clinical services in community pharmacies: A scoping review

Ghulam Haydar¹, Wasim Baqir², Anne Joshua³, Ilhem Berrou⁴

¹University of the West of England, Bristol, United Kingdom

²NHS England, London, United Kingdom

³NHS England, London, United Kingdom

⁴University of the West of England, Bristol, United Kingdom

Background: Health systems globally are experiencing increasing demand due to ageing populations, rising multimorbidity, and workforce shortages. Community pharmacies represent highly accessible healthcare settings and are increasingly utilised to improve timely access to medicines and clinical care. In response, many jurisdictions have expanded pharmacists' prescribing authority. However, models of pharmacist independent prescribing in community pharmacy vary widely in terms of legislation, commissioning arrangements, clinical delivery, and measurable impact. Existing evidence is dispersed across countries and service types, limiting understanding of how prescribing services are implemented and what outcomes they achieve. A systematic mapping of these models is therefore required to inform policy, workforce planning, and service development.

Objective: This scoping review aimed to identify and characterise existing models through which pharmacist independent prescribers provide clinical services in community pharmacies internationally. Specifically, the review sought to determine: (1) the countries and jurisdictions where such prescribing exists, (2) how services are commissioned and funded, (3) how prescribing services are operationalised in practice, and (4) their reported impacts on patients, pharmacists, and healthcare systems.

Method: A scoping review was conducted following Joanna Briggs Institute methodology and reported in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews guidance. Searches of major bibliographic databases and grey literature sources identified studies describing pharmacist prescribing services delivered in community pharmacy settings. Eligible studies were screened and data were extracted using a

structured framework capturing jurisdiction, prescribing model, commissioning arrangements, clinical processes, required resources, and reported outcomes. Findings were synthesised descriptively to map international service models and implementation characteristics.

Results: Thirty-one studies were included, representing evidence from the United Kingdom, Canada, the United States, and Australia. Prescribing models ranged from protocol-driven services for minor ailments or contraception to broader independent prescribing roles embedded within national primary care strategies. Commissioning arrangements varied substantially. Publicly funded models, such as nationally commissioned services in the United Kingdom or provincially funded minor ailment programmes in Canada, were associated with more consistent service uptake and integration into patient pathways. In contrast, services reliant on patient payment or lacking reimbursement mechanisms demonstrated lower adoption despite supportive legislation. Operational delivery typically involved structured patient assessment protocols, targeted training requirements, and varying levels of access to electronic health records. Reported outcomes included improved access to timely treatment, high patient satisfaction, expanded pharmacist clinical roles, and potential reductions in general practitioner workload and healthcare system costs.

Conclusion: Internationally, pharmacist independent prescribing in community pharmacy is implemented through diverse legislative and commissioning frameworks. Evidence suggests that when supported by sustainable funding, digital infrastructure, and workforce capacity, these services can enhance access to care and contribute to health system efficiency. However, variability in implementation models and outcome reporting limits cross-jurisdictional comparison. Future research should focus on consistent commissioning frameworks, integration into health information systems, and long-term evaluation of outcomes to ensure pharmacist prescribing develops equitably, safely, and at scale within community pharmacy.

Post-qualification support and supervision among pharmacist independent prescribers in primary care: A qualitative study from the UK

Amar Bataw¹, Samera Hussain¹, Hala Shokr¹, Ali Hindi¹

¹The University Of Manchester, Manchester, United Kingdom

Background: Independent prescribing (IP) has expanded significantly across primary care in the United Kingdom, enabling healthcare professionals such as pharmacists, nurses and paramedics to prescribe medicines independently. This development has been promoted to improve patient access to care, enhance multidisciplinary working and alleviate pressures on general practitioners.

However, evidence suggests that newly qualified independent prescribers often experience challenges when transitioning from training to independent prescribing practice. Studies have highlighted variability in the availability and quality of post qualification support, including mentorship, clinical supervision and organisational guidance. Insufficient supervision structures, unclear role expectations and workload pressures may limit prescribing confidence and restrict the full utilisation of prescribing qualifications. Understanding how independent prescribers experience post qualification support within primary care is therefore essential to inform workforce development and ensure safe and effective prescribing practice. This study aimed to explore the experiences and perceptions of post qualification support and supervision among pharmacist independent prescribers working in primary care.

Method: A qualitative study design was used. Semi structured interviews were conducted with 12 pharmacist independent prescribers working in primary care settings. Participants were recruited through professional networks and represented a range of prescribing roles and clinical environments. Interviews explored experiences following qualification as an independent prescriber, including access to supervision, mentorship, organisational support, confidence in prescribing practice and perceived barriers or facilitators to prescribing activity. Interviews were conducted using a structured topic guide and focused on participants transition from training to practice, availability of formal and informal support and the impact of organisational context on prescribing practice. Interview data was analysed using thematic analysis to identify common themes relating to post qualification support and supervision.

Results: Several key themes influencing independent prescribers experiences following qualification. First, structured supervision and mentorship emerged as a central facilitator of prescribing confidence and competence. Participants described the value of experienced prescribers providing clinical guidance, feedback and reassurance during the early stages of independent practice. Second, organisational and multidisciplinary support was identified as an important factor enabling integration into prescribing roles, with supportive practice environments and access to senior colleagues facilitating prescribing activity. Third, confidence and role development were closely linked to opportunities for clinical experience and supportive supervision, while limited prescribing opportunities or unclear role expectations reduced confidence. Fourth, workload pressures and time constraints were perceived as barriers to accessing supervision and continuing professional development. Variability in governance and support structures across primary care settings also contributed to inconsistent experiences among prescribers.

Conclusion: Pharmacist independent prescribers in primary care report varied experiences of post qualification support and supervision. Access to structured mentorship, supportive organisational cultures and clear governance frameworks appears essential in facilitating prescribing confidence and

effective role integration. However limited supervision opportunities, workload pressures and inconsistent organisational support may hinder the utilisation of prescribing qualifications. Strengthening structured post qualification support systems may therefore enhance prescribing confidence and ensure safe, sustainable expansion of independent prescribing across primary care.

Construction and empirical study of an application model for localized large language models in perioperative medication reconciliation for gastric cancer patients

Lingli Huang¹, Yuxuan Zhu^{1,2}, Ji-fu Wei¹

¹Jiangsu Cancer Hospital, Jiangsu Institute of Cancer Research, Nanjing Medical University Affiliated Cancer Hospital, Nanjing, China

²China Pharmaceutical University, Nanjing, China

Background: Due to the prevalence of issues such as fragmented information, low verification efficiency, and significant differences in personnel experience, the implementation of drug reorganization still faces numerous challenges and potential risks. In the context of multi-stage, cross-source, and high-risk medication management for gastric cancer, this study introduces a localized large language model to assist in medication reorganization and management, and enhance individualized decision-making support for medication use.

Method: A total of 189 hospitalised patients with gastric cancer and a history of chronic medication use prior to admission were retrospectively enrolled from the Department of Gastric Surgery at Jiangsu Cancer Hospital. Based on perioperative guidelines, expert consensuses, and institutional medication protocols, a standardised medication reconciliation workflow and a structured knowledge base were established. A locally deployed DeepSeek-V3 LLM was integrated with a retrieval-augmented generation (RAG) framework to perform chronic medication identification, perioperative risk recognition, and medication recommendation generation. Among the included patients, 154 cases were used to verify the coverage and executability of the workflow and knowledge system in real-world clinical scenarios, while 35 cases served as an independent evaluation cohort. The quality and clinical usability of the generated recommendations were assessed using BERTScore, ROUGE metrics, and pharmacist-based manual evaluation according to the 7-Dimension Indicator (7DI) system.

Results: A knowledge base covering 12 categories of commonly used perioperative medications was established to support structured retrieval for the LLM. The average BERTScore F1 of the model-generated recommendations was 0.793, while the average ROUGE-1, ROUGE-2, and ROUGE-L

F1 scores were 0.558, 0.314, and 0.444, respectively, indicating good semantic understanding and coverage of essential information. The pharmacists' average 7DI scores ranged from 31.49 to 33.40. The model's automatic scores showed significant positive correlations with manual evaluations (highest $\rho = 0.811$, $P < 0.001$), and inter-rater consistency among pharmacists was high (Cronbach's $\alpha = 0.850$).

Conclusion: The medication reconciliation model integrating a localised LLM, structured knowledge base, and automated reasoning demonstrates high accuracy, consistency, and clinical usability in the complex perioperative medication management of gastric cancer. It can significantly improve the efficiency of medication reconciliation and reduce potential medication risks, offering a scalable pathway for intelligent medication management.

Patient perceptions of the experiences and outcomes that matter most when receiving pharmacist-led primary care

Jennifer Isenor¹, Andrea Bishop², Natalie Kennie-kaulbach¹, Carla Garrett³, Noel Guscott³, Claire Keenan³, Elizabeth Lappin³, Amy Grant³

¹College Of Pharmacy, Dalhousie University, Halifax, Nova Scotia, Canada

²Nova Scotia Pharmacy Regulator, Halifax, Nova Scotia, Canada

³Maritime SPOR SUPPORT Unit, Halifax, Nova Scotia, Canada

Background: Pharmacists play an important role in delivering primary care by providing care such as prescribing and immunization in the communities in which people live. Existing literature has found that patients accept pharmacist provided care and are satisfied with it. However, there is a need to understand how pharmacist-led primary care impacts the experiences and outcomes important to patients.

Objective: This study aimed to identify and describe patient-reported experience measures and outcome measures that matter most to patients when receiving pharmacist-led primary care.

Method: A two-phase mixed methods design was used with adult participants (18+ years of age) living in the Maritime Provinces in Canada who had received clinical care from a pharmacist (community or pharmacy primary care clinic) in the last year. Phase I involved interviews and focus groups aimed at describing what patients value about pharmacist-led primary care in order to identify potential experience and outcome measures using thematic analysis. Phase II consisted of a patient survey which used the experience and outcome measures identified in Phase I to more broadly ascertain their importance to patients measured on a 5-point Likert scale

(not important to extremely important). Descriptive statistics were used to summarize survey findings.

Results: Findings from Phase I interviews and focus groups (n=13) included the following experience and outcome themes: access to care, clarity and consistency of experience, coordination of care, medication expertise and accuracy, connection and trust, and primary care delivery. The Phase II survey consisted of 473 respondents with diverse characteristics, with a mean age of 46.73±16.01; 50.3% women; 65% White; 52% rural/suburban. Getting help or advice on a medication (86.3%), being assessed or prescribed a medication renewal (86.2%), and being assessed or prescribed a new medication (81.3%) were most frequently rated as important by patients when receiving care. For patient experience, easy access (90.4%), pharmacists' knowledge of patient's individual health needs (89.7%), and care covered by provincial medical insurance (88%) were most frequently rated as important. Health outcomes rated as most important to patients included physical symptoms being improved or managed (76.3%), managing medication side effects (73.4%), and being directed to other healthcare providers if needed (73.2%).

Conclusion: Overall findings emphasize access (accessibility, cost), pharmacist expertise through advice and prescribing, and management of symptoms and side effects as important to patients, much of which has international applicability in pharmacist-led primary care delivery. It is anticipated that this work will generate frameworks and tools that better assess the provision of primary care by pharmacists and improve patient experiences and health outcomes. These results may also inform policy changes, as policymakers should consider these findings in positioning pharmacists within primary care redesign to better support patient experiences and outcomes, helping to ensure patient needs are met.

When policy approves but practice decides: Integration of community pharmacy in primary care setting

Jennifer Lake^{1,2}, Monika Roerig^{2,3}, Laura Brady¹, Sara Allin^{2,3}

¹Leslie Dan Faculty of Pharmacy, University of Toronto, Toronto, Canada

²Dalla Lana School of Public Health, University of Toronto, Toronto, Canada

³North American Observatory on Health Systems and Policies, Toronto, Canada

Background: Pharmacists in Canada have experienced rapid scope expansion through legislative changes, new funding models, and positioning community pharmacies as first-contact points within the primary care setting. This research focused on how community pharmacists enact these changes

in real-world practice. The goal of this analysis was to produce implementation ready lessons that support sustainable integration.

Method: This research employed a multi-method design, including an environmental scan (2020–2025) of policies and programs related to interdisciplinary primary care and scope expansion in Ontario and Quebec. An interpretive qualitative study undertaken using multiple data sources, including semi structured interviews with community pharmacists across both provinces (n = 11; May–August 2024) and a virtual key-parties dialogue (January 2025). Data were analyzed inductively and deductively using iterative coding across stages to generate themes. Triangulation across documents, interviews, and dialogue enabled evaluation of experiences across provinces, corporate and independent settings, and local contexts.

Results: Legislation is the starting line for change. Implementation of these changes determined impact on patients and communities. Pharmacists reported variability in capacity, shaped by skills, staffing, and access to clinical information. Participants felt without bilateral documentation in electronic charts, no success was possible. Corporate infrastructures were double-edged: they provided templates and training yet sometimes imposed productivity pressures and contingent rewards. Overall, participants focused on the patient experience and maintaining the pharmacist-patient longitudinal relationship. These were both strategic and ethical drivers. Pharmacists described being acutely aware that patients choose their pharmacist, and this was actively cultivated to protect trust and loyalty over time. Participants framed continuity as both a business reality and a care ethic, especially amid family physician scarcity. The community pharmacy's role as frequent first contact underscored this patient-centred orientation. Collaboration was both ambiguous, requiring a distinction between collaboration between people (interprofessional collaboration), and integration of a profession into a healthcare setting. Legislation integrates the community pharmacy into primary care setting more than it mandates collaboration. Recent changes primarily brought more services into community pharmacies rather than codifying individual/team-level collaboration. Participants emphasized that the enablers and success metrics differ for these and examples were provided that pharmacists' legislated actions were perceived as "non-collaborative" to some providers. This added cognitive and moral load when maintaining harmony with physicians impacted the pharmacists' service provision. Pharmacists described dilemmas when a patient-appropriate, legislated service risked damaging relationships with physicians. Many prioritized preserving relationships with physicians (and thereby access for many patients) over delivering the immediate service, accepting delays for the individual patient. Participants characterized these choices as hidden implementation costs, including cognitive, emotional, and ethical work not captured in typical rollout plans.

Conclusion: This study moved beyond "what changed" to how change was enacted in community pharmacy practice.

Legislated scope expansion positions community pharmacies within primary care, but implementation determines its value. Sustainable integration requires shared clinical documentation and must explicitly support local capacity, or expanded services risk underuse, delay, and unintended strain. Future work should evaluate whether continuity with community pharmacists is a marker of primary care system performance.

PRxOACT: A randomized trial of an electronic tool to help pharmacists implement cardiovascular risk reduction

Shania Liu¹, Ross Tsuyuki¹, Michelle Graham¹, Dorothy Nelson², Gary Semeniuk², Yazid Al Hamarneh¹

¹University Of Alberta, Edmonton, Canada

²Patient Partner, Calgary, Canada

Background: Cardiovascular (CV) disease is the leading cause of death worldwide. The risk factors contributing towards cardiovascular disease (CVD) have been well-known for decades, but treatment gaps are known to persist. In Alberta, Canada, pharmacists' broad scope of practice, including prescriptive authority allows them to address CVD and its risk factors, but implementation has been challenging. The PRxOACT study is a trial of an electronic tool designed to streamline pharmacists' comprehensive CV preventive care and is being tested in a 1000 patient randomised trial. Herein, we present the baseline data for this trial.

Method: PRxOACT is a per-patient randomised trial being conducted in 100 community pharmacies in Alberta, Canada. We enrolled adults with at least 1 uncontrolled CV risk factor between November 2024 to December 2025. Patients were randomized to receive either the intervention or control. Patients randomized to the Intervention group received comprehensive care from their pharmacist, using an electronic tool which incorporated Canadian guideline-based care for hypertension, dyslipidemia, diabetes, and tobacco cessation. The tool provides guidance on Case-finding, Assessment, Red flags/referral, Evidence-based treatment, and Structured follow-up (CARES Pathway), including shared decision-making and imbedded quality indicators (taken from the guidelines). Control (usual care) patients were referred to their physician/walk-in clinic. Follow-up was monthly for six months for Intervention patients. Patients from both groups were assessed at six months for the primary outcome, which was change in CV risk between groups (CV risk was estimated using validated cardiovascular risk equation(s) such as the Framingham, United Kingdom Prospective Diabetes Study [UKPDS], or Second Manifestations of Arterial Disease [SMART] equations). Baseline data and opportunities for pharmacist care in CV risk reduction are reported here.

Results: A total of 984 participants were recruited (mean [standard deviation; SD]): age 62.2 [14.4] years, 487 (49% female). At baseline, 67% had hypertension (36% controlled), 71% dyslipidemia (28% controlled), 43% diabetes (30% controlled), and 22% used tobacco. Participants' mean CV risk was 22.3% (SD 18.7%, expressed as risk of a major CV event in 10 years). In terms of primary care access, 27% did not have a family physician and 88% had never had their CV risk calculated. Full outcome results will be available later in 2026.

Conclusion: CV risk factors are poorly managed in the community and may be driven by poor access and lack of comprehensive care. Electronic CARES Pathway tools may help pharmacists efficiently and comprehensively assess, manage, follow up, and document CV risk.

Evaluation of skiptheq intervention implemented to reduce patient waiting times at an outpatient pharmacy of a tertiary hospital in gauteng province, South Africa

Nkekolo Lydia Maifo¹, Manimbulu Nlooto², Rajesh Vagiri³

¹University of Limpopo, Polokwane, South Africa

²Department of Pharmacy, Faculty of Health Sciences, University of Limpopo, Mankweng 0727, South Africa, Polokwane, South Africa

³Division of Pharmacology, Faculty of Pharmacy, Rhodes University, Makhanda, 6139, South Africa, Makhanda, South Africa

Background: Long waiting times at outpatient pharmacies negatively affect patient satisfaction, medication adherence, and healthcare efficiency, particularly in low- and middle-income countries. In South Africa, tertiary hospital pharmacies face mounting pressure from high patient volumes, staffing shortages, and growing demand for chronic medication services. The SkipTheQ (STQ) mobile and web-based appointment system was implemented at a tertiary hospital in Gauteng, South Africa, to reduce waiting times and improve service delivery. This study evaluates the impact of STQ on patient waiting times, satisfaction levels, and implementation challenges. Methodology: A descriptive, cross-sectional, quantitative study was conducted among 297 adult STQ users at a tertiary hospital outpatient pharmacy in Gauteng province. Data were collected over five weeks (April–May 2025) using structured questionnaires covering socio-demographics, digital connectivity, booking experiences, and satisfaction (12-item scale, 0–4 Likert). Waiting times were recorded manually and compared with pre-implementation hospital data. Statistical analysis included descriptive statistics, Mann-Whitney U and Kruskal-Wallis tests, and multiple linear regression ($\alpha = 0.05$).

Method: A descriptive, cross-sectional, quantitative study was conducted among 297 adult STQ users at a tertiary hospital outpatient pharmacy in Gauteng province. Data were

collected over five weeks (April–May 2025) using structured questionnaires covering socio-demographics, digital connectivity, booking experiences, and satisfaction (12-item scale, 0–4 Likert). Waiting times were recorded manually and compared with pre-implementation hospital data. Statistical analysis included descriptive statistics, Mann-Whitney U and Kruskal-Wallis tests, and multiple linear regression ($\alpha = 0.05$).

Results: Participants were predominantly female (68.4%), aged 51–65 years (34.3%), with secondary education (63.6%). Most owned smartphones (89.9%) had internet access (82.8%) and could afford mobile data (76.4%). Website access (94.3%), booking confirmation (98.7%), and preferred slot allocation (93.9%) were high. Satisfaction scores ranged from 3.05 to 3.38 (mean), with the highest ratings for packaging/labelling and likelihood to recommend. Affordability of data, employment status, successful booking confirmation, and preferred time slot significantly predicted satisfaction ($p < 0.05$). Average waiting time decreased from 87 minutes (pre-STQ) to 29 minutes (post-STQ). However, 25% of users reported delays, with challenges including system downtime (21.8%), unprepared medication (18.8%), and full booking slots (12.5%).

Conclusion: STQ significantly reduced outpatient pharmacy waiting times and achieved high patient satisfaction. Digital connectivity, particularly data affordability and reliable booking confirmation, was a key driver of satisfaction. However, operational challenges (staffing, system reliability, digital literacy) must be addressed to ensure scalability and equitable access. Future implementation should prioritise strengthening infrastructure and implementing digital inclusion strategies to maximise public health impact.

Evolution of the role of infectious diseases pharmacists in Quebec hospitals

Jean-philippe Lemieux¹, Eve Plusquellec², Benoît Lemieux³, Jean-françois Tessier⁴

¹CIUSSS de la Capitale Nationale, La Malbaie, Canada

²Université Laval, Québec, Canada

³Centre universitaire de santé McGill, Montréal, Canada

⁴CIUSSS est de l'île de Montréal, Montréal, Québec

Background: In Quebec, pharmacists are integral members of the healthcare team and continue to engage in direct patient care and pharmacy operations as well as education, research, and professional affairs activities among other equally important responsibilities. Following a comprehensive literature review, a guidance document on the role of the infectious diseases pharmacist in hospitals was developed in 2021 by members of the Regroupement de pharmaciens experts en infectiologie of the Association des pharmaciens des établissements de santé du Québec (A.P.E.S.), a

professional group of clinical pharmacists experts in infectious diseases. In this publication, members of the professional group developed 23 recommendations to further hospital pharmacy practice in infectious diseases. To evaluate the impact of this publication on the role and involvement of infectious diseases pharmacists, an assessment of the implementation of the recommendations was undertaken.

Method: A cross-sectional, descriptive study using three electronic surveys was conducted among pharmacists members of the Regroupements de pharmaciens experts en infectiologie working in Quebec hospitals. The surveys contained a total of 51, 65, and 50 multiple choice, closed, and open-ended questions in 2020, 2023, and 2026, respectively, and were distributed using Google Forms. Descriptive statistics were conducted.

Results: Data were collected between October and November 2020, December 2023 and January 2024, and March 2026 for the three surveys. Response rates were, respectively, 95% (21/22), 60% (15/25), and 62% (13/21). Overall adherence to the recommendations laid out in the guidance document was high, ranging from 20% and 100%, particularly with regards to the recognition of the role of pharmacists specialised in infectious diseases. In 2026, 69% of respondents (9/13) reported having completed advanced training in infectious diseases, including year 2 post-graduate residency programs and board certification, an increase from 42% and 38% in 2020 and in 2023, respectively. Additional results revealed that the number of pharmacists engaged in antimicrobial stewardship activities in hospitals has increased over time yet remains below the staffing thresholds suggested in the guidance document.

Conclusion: Five years after the publication of the guidance document developed by the Regroupements de pharmaciens experts en infectiologie, the practice of the professional group's pharmacists members has evolved substantially. Additional specialised training and an increased involvement in antimicrobial stewardship are among several of the key advancements demonstrated by the study results. In Quebec, with the expansion of their scope of practice, including broader independent prescribing authority, infectious diseases pharmacists are expected to continue shaping hospital pharmacy practice in infectious diseases. Internationally, the guidance document has been viewed in countries, such as Belgium, France, and Switzerland, suggesting growing engagement with efforts to further develop the role of infectious diseases pharmacists globally.

Bridging perspectives: Stakeholder engagement for mHealth apps utilizing gamification and incentives to improve medication adherence^{crf}

Steven Tran¹, Stephen Carter¹, Lorraine Smith¹

¹University of Sydney, Sydney, Australia

Background: Medication nonadherence poses significant challenges to global health systems, contributing to preventable disease progression, increased hospitalization, and substantial economic burden. Mobile health applications that incorporate gamification and financial incentives have shown promise in improving medication adherence by enhancing user engagement. A prior study consulting patients identified their perspectives, concerns, and considerations regarding the use of gamification and financial incentives in medication adherence mHealth app. Understanding non-patient perspectives with respect to patient viewpoints is critical for informing future policy development and establishing feasible, industry-supported guardrails to protect consumers while supporting innovation.

Objective: This study aimed to explore the perspectives of non-patient stakeholders on the integration of gamification and financial incentives in mHealth apps designed to support medication adherence. Specifically, it sought to integrate these perspectives with previously reported patient perspectives to develop consensus statements that may inform responsible industry implementation and future policy development.

Method: A mixed-methods design was employed, incorporating a modified virtual Nominal Group Technique (vNGT) with AI-assisted thematic analysis. Participants included healthcare professionals, app developers, insurers, and policymakers. Data was collected through an online survey and analysed to identify key themes and patterns, focusing on feasibility, acceptability, and potential impact. Virtual focus groups were then conducted to evaluate the themes and patterns in the form of consensus statements.

Results: Of the 34 interested participants, 20 completed the study. Most were healthcare professionals with significant experience in the digital health sector. Thematic analysis identified six key themes: Tailored Gamification for Adherence, Financial Incentives – Contested Motivator, Designing for Diversity and Inclusion, Usability Barriers to Engagement, Trust Through Data Governance, and Validated and Sustainable Innovation. From these themes, 24 consensus statements were formulated, with more than half reaching unanimous consensus.

Conclusion: Non-patient stakeholder perspectives provide valuable insights into the design and implementation of mHealth apps aimed at improving medication adherence. The findings highlight the potential of gamification and financial

incentives to enhance engagement and adherence, while also identifying critical considerations related to ethical, usability, and data governance issues. These findings have important implications for policy development, particularly in establishing appropriate regulatory frameworks and guardrails to ensure safe, equitable, and transparent implementation of these strategies. Future work should focus on longitudinal studies to assess the long-term impact of these approaches and explore additional mechanisms to support medication adherence across diverse patient populations.

Pharmaceutical care network Europe's classification of drug-related problems translation into Swedish and validation of preliminary version 9.2 among Swedish pharmacists

Tommy Westerlund¹, Patricia Nilsson¹

¹Malmö University, Faculty of Health and Society, Dept of Biomedical Science, Malmö, Sweden

Background: The Pharmaceutical Care Network Europe (PCNE) defines drug-related problems (DRP) as "A Drug-Related Problem is an event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes" and is one of the most internationally accepted definitions. Most common drug-related problems (DRPs) are a lack of effect of treatment and adverse drug effects (ADRs), which can negatively affect patients' health, lead to unnecessary suffering, increased hospital admissions and high societal costs. However, a significant proportion of DRPs can be prevented and solved by pharmacists. A number of different classification systems for classifying DRPs have been developed, but the probably most widely used in scientific studies is the PCNE's DRP-classification. It is a hierarchical code-based system, consisting of primary domains for problems, causes, interventions, acceptance of interventions, and problem status (intervention outcome), each primary domain containing explanatory subdomains. It has been translated into several different languages, but not into Swedish so far.

Objective: To translate the PCNE DRP-classification preliminary Version 9.2 from English into Swedish and validate it among Swedish pharmacists.

Method: The PCNE DRP-classification was translated by a forward-backward translation procedure and validated through 32 pharmacists' classification of 20 patient cases, using a validation questionnaire. A code consistency benchmark of $\geq 80\%$ was chosen in accordance with validations in other countries.

Results: The results varied among patient cases and code-categories, but the average coding consistencies were 62-78.8%. However, several subdomains reached $\geq 80\%$. The code consistency benchmark was achieved in 7 out of the 20 patient cases in the problem domain, in 6/20 in the cause domain, in 14/20 in the intervention domain, in 6/20 in the acceptance domain, and in 4/20 in the problem status domain. The results were comparable to both a previous international validation by the PCNE and national validations in Germany and Slovenia.

Conclusion: The Swedish version of the PCNE DRP-classification is considered to be correctly translated and like other language versions to be useful in pharmacy and clinical practice, as well as in research.

The impact of professional pharmacist services on limiting waste in Ottawa nursing and retirement homes

Anas Bahnassi¹

¹Valley Health, Ottawa, On, Canada

Background: Within the National Capital Region's nursing and retirement home sectors, the prevalence of "excessive polypharmacy", defined as the concurrent use of ten or more medications, presents a critical challenge to resident safety and healthcare sustainability. In Ottawa's aging population, these complex drug regimens are frequently linked to adverse drug events, increased emergency department transfers, and higher mortality rates. As medication experts, pharmacists are central to mitigating these risks, yet their specific contributions within integrated care models require clearer definition.

Objective: This study synthesized global evidence to characterize the professional roles of pharmacists in managing high-burden polypharmacy, specifically filtering insights applicable to the multidisciplinary environments of nursing and retirement residences.

Method: Following the Arksey and O'Malley framework and Levac's enhancements, a scoping review was conducted in adherence to PRISMA-ScR standards. A systematic search of five major databases (MEDLINE, EMBASE, PubMed, CINAHL, and Cochrane CENTRAL) was performed through June 2025. Screening and data extraction were managed via Covidence, with a narrative synthesis applied to the final literature pool.

Results: From an initial records, 19 high-quality studies from high-income jurisdictions were analyzed. While 84% of the literature emerged post-2019, reflecting a modern shift in geriatric care, a notable research gap exists regarding community pharmacy-led interventions. Four essential

pharmacist functions were identified: First, Clinical Transition Management: Executing medication reconciliation during facility admissions. Second, Regimen Optimization: Evaluating drug appropriateness to reduce "pill burden." Third, Prescriber Advocacy: Enhancing awareness of deprescribing opportunities among attending physicians. Fourth, Longitudinal Monitoring: Providing rigorous resident follow-up. Success across these roles was contingent on interprofessional collaboration and the utilization of specialized geriatric screening tools.

Conclusion: Pharmacists serve as a vital safeguard against excessive medication use in congregate care settings. Their impact is maximized through clinical expertise, physical integration into care teams, and advanced geriatric training. For Ottawa-based facilities, these findings underscore the necessity of leveraging pharmacist-led reviews to transform polypharmacy management from a reactive task into a proactive safety standard.