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CONFERENCE ABSTRACTS

# FIP Montreal 2026

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## *Social and administrative pharmacy*

### Exploratory cost-effectiveness analysis of biologic agents versus apremilast for the short-term treatment of moderate-to-severe psoriasis

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**Background:** Psoriasis is a persistent, non-contagious inflammatory skin disease influenced by a combination of genetic predisposition and various external triggers. Common inducing factors include endocrine changes, allergic reactions, childbirth, bronchitis, the use of oral or injectable corticosteroids, alcohol and tobacco consumption, and psychological stress. The disease is clinically classified into four primary types: plaque psoriasis, guttate psoriasis, pustular psoriasis, and erythrodermic psoriasis, with an estimated incidence rate of approximately 0.5% in Taiwan. Management of mild psoriasis typically involves topical therapies, such as moisturizing and antipruritic agents, corticosteroids of varying potencies, coal tar, retinoids (A acid), and Vitamin D analogues. For more advanced cases, oral systemic medications including Methotrexate, Cyclosporine, Retinoids, and Apremilast are utilized, typically yielding improvement rates between 30% and 60%. However, for patients suffering from moderate-to-severe psoriasis, biologic agents such as Adalimumab, Etanercept, and Ixekizumab have become the primary treatment choice, offering a significantly higher clinical improvement rate of 50% to 90%.

Objective: This research adopts the perspective of the health insurance payer to evaluate the cost-effectiveness of common biologic agents, specifically Adalimumab, Etanercept, Ixekizumab, and Certolizumab pegol. Using Apremilast as the reference comparator, the study focuses on the outcomes of short-term treatment over a 16-week period for patients with moderate-to-severe psoriasis.

**Method:** The study utilized a systematic search of the Embase database using six key terms: psoriasis, psoriasis vulgaris, Apremilast, biological product, clinical trial, and efficacy. From an initial pool of 128 clinical documents, the researchers intended to select independent randomized double-blind clinical trials based on duration, medication criteria, and primary outcomes. Due to a lack of direct head-to-head comparative studies, data was instead sourced from specific Network Meta-Analysis (NMA) literature obtained via Center for Drug Evaluation (CDE) Health Technology Assessment (HTA) reports.
Clinical efficacy was quantified using the Psoriasis Area Severity Index (PASI) 75 at the 16-week mark. Economic calculations for the 16-week treatment costs were based on the official reimbursement prices provided by the Taiwan National Health Insurance (NHI) Administration.

**Results:** The pharmacoeconomic analysis revealed that Adalimumab 80mg demonstrated the most favorable economic profile compared to Etanercept 25mg, Certolizumab pegol 400mg, and Ixekizumab 160mg. Specifically, Adalimumab 80mg presented the lowest Incremental Cost-Effectiveness Ratio (ICER) at 120,409. This was followed by Certolizumab pegol, which recorded an ICER of 134,717. When visualized on a cost-effectiveness plane, Adalimumab was positioned in the optimal quadrant characterized by relatively lower costs and higher clinical efficacy.

**Conclusion:** Based on this exploratory cost-effectiveness analysis for moderate-to-severe psoriasis, Adalimumab appears to provide superior economic value. Although the clinical efficacy data were sourced from NMAs involving Western populations, the findings serve as a valuable reference for clinical practice and resource allocation. It is recommended that future studies incorporate Taiwanese Real-World Data (RWD) to further validate these findings and provide a localized basis for drug selection and the

refinement of National Health Insurance reimbursement guidelines.

## Reinventing Pharmacist Scheduling in a Hospital Pharmacy Department: Impact of the PETAL Platform on Efficiency, Satisfaction and Return on Investment

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**Background:** Hospital pharmacy scheduling is a complex operational challenge that directly affects equity, workforce satisfaction, retention and managerial workload. At the Centre hospitalier de l'Université de Montréal (CHUM), 101 pharmacists within the pharmacy department are scheduled across more than 13,000 shift assignments annually. Before 2020, pharmacist schedules were created in Excel, resulting in time-consuming planning, difficulty accommodating special requests, limited real-time visibility, low personalisation and a perceived sense of inequity. These challenges supported the need for a more agile and transparent scheduling model aligned with workforce needs and departmental priorities.

Purpose: To evaluate the impact of implementing PETAL, a web- and mobile-based scheduling platform, on scheduling efficiency, staff experience and economic outcomes within the CHUM pharmacy department. A secondary objective was to assess whether a shift toward self-managed scheduling could better support flexibility, fairness and pharmacist engagement.

**Method:** This work describes a single-centre practice innovation and impact evaluation conducted in the CHUM pharmacy department. PETAL replaced Excel-based pharmacist scheduling in March 2020. The intervention combined a technological implementation with a change in scheduling philosophy: pharmacists became more directly involved in managing their schedules, including declaring absences and expressing individual preferences such as weekend relief, evening shifts and call coverage. The platform supported automated schedule generation according to collective agreement rules, real-time updates, fairness reporting and simplified payroll validation. Impact was assessed using operational, experiential and economic indicators, including time allocated to schedule creation, staff-reported satisfaction, cost-benefit analysis and return on investment over four years. User experience data were collected from pharmacists (n=85).

**Results:** Implementation of PETAL was associated with a 78% reduction in time required for schedule creation, corresponding to 296 management hours recovered. Pharmacists reported improved satisfaction with scheduling, largely attributed to greater autonomy and flexibility in shift management (n=85). By year 4, economic benefits were 44% greater than costs, and return on investment reached 18.9%. Additional observed organisational benefits included improved anticipation of staffing needs, longer scheduling horizons (3 to 6 months), variable start times and better alignment with individual and sector-specific preferences. Following implementation, staff turnover remained below 3%, and subjective workplace happiness increased from 5.7 to 6.1 on a 7-point scale between 2019 and 2021.

**Conclusion:** The implementation of a digital, self-managed scheduling platform in hospital pharmacy was feasible and associated with substantial gains in efficiency, improved user experience and a positive economic return. Beyond schedule production, this approach functioned as a strategic workforce intervention supporting transparency, flexibility, engagement and retention. These findings suggest that scheduling technologies can generate meaningful value in hospital pharmacy when paired with organisational change. Future work should evaluate broader organisational effects across other professional groups and ongoing expansion of PETAL-supported tools, including automated shift replacement processes for pharmacy assistants and technician.

## Prevalence and determinants of self-medication among university students in Pakistan: A cross-sectional study

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**Background:** Self-medication is a prevalent and increasingly concerning practice among young adults, particularly university students, who often prefer independent management of minor illnesses without consulting healthcare professionals. This behavior is influenced by multiple factors, including easy access to medications, perceived knowledge about drugs, prior personal experience, and the desire to save time and money. Although self-medication can be beneficial for treating minor conditions when practiced responsibly, irrational use poses serious health risks. These include misdiagnosis, delayed treatment of underlying diseases, adverse drug reactions, harmful drug interactions, incorrect dosage, and the growing global threat of antimicrobial resistance due to inappropriate antibiotic use. In countries like Pakistan, where regulatory enforcement on prescription-only medicines is often weak, the widespread availability of drugs further facilitates this practice. Therefore, understanding the magnitude, patterns, and determinants of self-medication among university students is essential for

developing effective public health strategies and promoting rational drug use.

Purpose: The primary objective of this study was to evaluate the prevalence of self-medication among university students in Pakistan and to identify the key factors influencing this behavior. Additionally, the study aimed to explore commonly used medications, reasons for self-medication, and the level of awareness regarding its potential risks and consequences.

**Method:** A cross-sectional study design was adopted, utilizing a structured and self-administered online questionnaire distributed among university students from various academic disciplines across Pakistan. The questionnaire included sections on demographic information, frequency and type of self-medication, commonly used drug categories, reasons for engaging in self-medication, and awareness regarding associated risks. A total of 220 complete responses were collected and included in the analysis. Descriptive statistical methods were applied to summarize the data and identify patterns and relationships between variables influencing self-medication practices.

**Results:** The study findings indicated a high prevalence of self-medication, with nearly 80% of participants reporting that they engaged in self-medication practices. Analgesics were the most frequently used medications, followed by antibiotics and antihistamines. Other commonly reported drugs included antipyretics and gastrointestinal medications. The leading reasons for self-medication were convenience, previous experience with similar symptoms, and the perception that the illness was minor and did not require professional consultation. Cost-saving and time constraints were also significant contributing factors. Despite moderate awareness regarding the potential risks, including adverse drug reactions and antibiotic resistance, this knowledge did not effectively discourage self-medication behavior. Female students demonstrated slightly higher levels of awareness compared to male students. Importantly, the easy availability of medications without prescription from community pharmacies was identified as a major enabling factor, highlighting gaps in regulatory enforcement.

**Conclusion:** Self-medication is highly prevalent among university students in Pakistan and is driven by a combination of accessibility, socio-economic factors, and behavioral perceptions. Although students possess some awareness of associated risks, it is insufficient to ensure safe practices. These findings underscore the urgent need for targeted educational interventions, awareness campaigns, and stricter regulatory policies to control the non-prescription sale of medications. Strengthening the role in patient education and promoting responsible medication practices are essential steps toward minimizing the risks associated with self-medication.

## Assessing caregivers burden in the management of schizophrenia and bipolar disorder: A mixed-methods study at a teaching hospital in Ghana

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**Background:** In Ghana's low-resource psychiatric settings, family caregivers form the invisible backbone of mental healthcare, yet their lived experiences remain underexplored. The sociocultural expectation of kinship care, where tending to a relative with mental illness is seen as both duty and destiny, often collides with limited institutional support. Empirical data quantifying caregiver burden and integrating caregivers' lived experiences in Ghanaian psychiatric settings remain scarce. This study primarily aimed to assess the prevalence and severity of caregiver burden. Secondary objectives included identifying its determinants, exploring culturally grounded coping strategies, and documenting unmet caregiver needs.

**Method:** A mixed-method, cross-sectional study was conducted at Komfo Anokye Teaching Hospital (KATH), Kumasi-Ghana. Quantitative data were collected from 368 purposively sampled primary caregivers meeting inclusion criteria (≥18 years, ≥1 month of caregiving, care recipients with psychiatrist-confirmed DSM-5 diagnosis) using a semi-structured questionnaire incorporating the Zarit Burden Interview (ZBI-22). Qualitative data were obtained from 25 in-depth interviews using maximum variation sampling. Ethical approval was obtained from the KATH Institutional Review Board. Quantitative data were analyzed using STATA 17, while qualitative transcripts were thematically analyzed in ATLAS.ti. Findings were further triangulated.

**Results:** Overall, 85.1% of caregivers reported burden, with 18.7% reporting severe burden. Burden was significantly associated with caregiver age and employment status ($p < 0.05$). Qualitative findings revealed five interlinked themes: emotional strain, economic depletion, social isolation, spiritual coping, and systemic neglect. Caregiving was often framed through moral and spiritual meanings, balancing stigma and resilience within collective family expectations. Only 24.2% received formal training or structured support.

**Conclusion:** Caregiver burden remains high and affects recovery outcomes for individuals with schizophrenia and bipolar disorder in Ghana. Beyond psychosocial strain, caregiving is shaped by culture, faith, and weak health systems. Interventions should include caregiver psychoeducation, routine caregiver support within psychiatric care, and peer-based, task-shared models that align with local cultural frameworks. The findings highlight caregiver burden as a structural challenge in low- and middle-income mental health care. Future multi-site longitudinal studies should assess causal pathways and caregiver-focused

interventions, extending the discourse from individual stress to structural inequity.

## Staffing and workload initiative for safety and effectiveness (StaffWISE): Leveraging regulatory research to drive pharmacy quality and practitioner wellbeing

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**Background:** The Nova Scotia Pharmacy Regulator (NSPR) began work in 2019 to explore the impacts of reported stress levels and burnout on the quality and safety of care provided to the public, and subsequently how the NSPR could leverage their role to address staffing challenges impacting patient safety. The Staffing and Workload Initiative for Safety and Effectiveness (StaffWISE) is a robust regulatory research initiative aimed at supporting the NSPR in fulfilling its mandated role to govern the practice of pharmacy in the interest of the public's well-being. The purpose of StaffWISE is to ensure that community pharmacies have the staffing required to meet expected quality standards for the volume of pharmacy care it provides. The objective of the foundational research was to establish whether there was a relationship between staffing levels, quality, and practitioner wellbeing in Nova Scotia.

**Method:** A sequential explanatory mixed methods study was conducted consisting of two phases. Qualitative methods included: (1) literature synthesis, (2) qualitative interviews, and (3) structured strategic prioritization. Quantitative methods included cross-sectional surveys to collect data related to staffing, workload, quality and wellbeing from: (1) pharmacy owner groups, (2) pharmacy managers, (3) pharmacy practitioners, and (4) members of the public. Dispensing and clinical service data were also collected from the Nova Scotia Drug Information System (NS DIS) and CanImmunize. Data were transformed into a Staffing Score, Quality Score, and Wellbeing Score to allow for a standardized comparison across diverse pharmacy practice environments. Pearson correlation coefficients and mixed effects regression were used to identify correlations between scores.

**Results:** Over one million data points were collected from pharmacies and pharmacy professionals in Nova Scotia. The results indicated statistically significant correlations between staffing/workload and wellbeing ($r = 0.13$ ($p < 0.01$)), staffing/workload and quality ($r = 0.13$ ($p < 0.01$)), and wellbeing and quality ($r = 0.40$ ($p < 0.01$)). Six key findings emerged from the analysis: (1) burnout due to unsustainable workload, (2) reduced standard of care due to unsustainable workload, (3) expanded scope activities mitigate burnout, (4) business targets increase stress, (5) accessibility and public expectations of pharmacists creates stress, and (6) lack of overlap results in increased workload.

**Conclusion:** This research demonstrated statistically significant relationships between staffing levels, care quality, and practitioner wellbeing. These findings led to the implementation of the StaffWISE program in Nova Scotia, which calculates a bespoke staffing score for each community pharmacy, equips it with evidence-based remedies, and requires active implementation of a meaningful action plan. This represents a shift in pharmacy regulation toward data-driven, proactive oversight of the practice environment to ensure quality and public safety.

## Non-prescription antibiotic dispensing in community drug retail outlets in Sierra Leone: A simulated patient study

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**Background:** In Sierra Leone, licensed pharmacies and informal medicine vendors frequently serve as first points of care, particularly for common respiratory symptoms that are typically viral and do not require antibiotic treatment. However, evidence on antibiotic dispensing practices in these settings nationwide remains limited. This study assessed the prevalence and determinants of inappropriate antibiotic dispensing for uncomplicated upper respiratory tract infection symptoms using a simulated patient approach.

**Method:** We conducted a cross-sectional study using simulated patients across three districts in Sierra Leone, representing urban, peri-urban, and rural settings. Trained simulated clients presented with symptoms resembling an uncomplicated upper respiratory tract infection at community pharmacies. After each visit, a structured form is used to record findings, including the medications administered, the care approach, and various service characteristics. Antibiotics dispensed were categorised using the World Health Organisation (WHO) AWaRe (access, Watch, and Reserved) categorisation, focusing on prescriptions. We applied multivariable logistic regression to analyse factors influencing inappropriate antibiotic supply, accounting for outlet type and service quality indicators (such

as assessment, counselling, referral), along with field observations to understand the common antibiotics dispensed and their storage conditions.

**Results:** A total of 186 simulated patient visits were completed across 107 registered outlets and 79 unlicensed vendors. Antibiotics were dispensed in 62.4% (116/186) encounters due to client demand, limited dispensers' training, profit-driven practices, and weak enforcement of regulations. Unlicensed vendors were significantly more likely to dispense antibiotics without a prescription from a registered doctor compared with registered outlets (adjusted odds ratio [aOR] 2.34, 95% CI 1.29–4.26, p = 0.005). Most antibiotics supplied belonged to the WHO Watch category (Ciprofloxacin, Azithromycin, Cefuroxime), while a smaller proportion were Access antibiotics (Amoxicillin, Erythromycin, Cotrimoxazole). Referral to a health facility occurred in 30.1% (56/186) of encounters and was associated with lower odds of antibiotic dispensing (aOR 0.42, 95% CI 0.22–0.80, p = 0.008). Provision of non-antibiotic advice, such as recommending rest or fluids (18.3%, 34/186), was also associated with reduced likelihood of antibiotic supply (aOR 0.55, 95% CI 0.30–0.99, p = 0.047).

**Conclusion:** Non-prescription antibiotic dispensing for uncomplicated respiratory symptoms remains common in community pharmacies in Sierra Leone, particularly among unlicensed vendors. The predominance of Watch-group antibiotics raises concern about the acceleration of AMR. Strengthened regulatory enforcement, targeted engagement of informal vendors, and integration of antimicrobial stewardship strategies into the community retail sector are urgently needed to curb inappropriate antibiotic access.

## Financial toxicity related to the use of biological medicines: a scoping review

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**Background:** Financial toxicity (FT) measures objective financial burden and subjective financial distress experienced by patients due to medication and other treatment costs. FT constitutes a critical barrier to rational pharmacotherapy. Biological medicines offer significant therapeutic value for treating several chronic diseases. Due to their typically high price and increased use, they lead to significant medical expenses, which are often evaluated at the macro level. Even in publicly funded medication systems, patients may face substantial out-of-pocket (OOP) and indirect costs, leading to psychosocial, behavioural and other financial-related consequences. Witte et al.'s conceptual framework comprising six domains capture FT-related aspects. While extensively studied in oncology, FT regarding biological medicine use remains poorly studied.

Objectives: To explore and synthesise existing research on financial toxicity (FT) in relation to the use of biological medicines, and to identify its objective and subjective dimensions, as well as policy and research gaps.

**Method:** A scoping review was conducted following Arksey & O'Malley and Joanna Briggs Institute guidelines, and reported according to PRISMA-ScR. Key words of search strategy were: financial toxicity, biologicals, treatment (and their synonyms). Searches were performed in Scopus, Medline (Ovid), Web of Science, CINAHL, and EMB Reviews in October 2024. Eligible studies included patients treated with biological medicines and reporting FT-related outcomes, which were mapped according to Witte et al.'s framework. Screening and data extraction were conducted independently by two reviewers using the Covidence platform.

**Results:** Twenty-four studies (2008–2023) met inclusion criteria, representing over 3.1 million patients across high- and low-middle-income countries and studies with heterogeneous designs. Most studies were retrospective or cross-sectional. Key findings: 1) Objective financial burden: OOP costs were the most frequent driver of FT (22 studies). High co-payments, deductibles, and specialty-tier cost-sharing under insurance schemes were major treatment barriers. Indirect costs, including lost income, travel, and caregiver time, were reported in 10 studies, and often exceeded direct costs in low/middle-income settings. 2) Subjective financial distress: Six studies assessed psychosocial effects, and 11 studies reported treatment-related changes. Reported effects included anxiety, reduced quality of life, and coping behaviours such as skipping doses, delaying care, or seeking financial aid. 3) Other: Biosimilars were included in 8 studies. Although less costly, they often fail to reduce patient OOP spending due to co-insurance structures. Instead of a medicine class alone, insurance design often determined FT. No studies focused on switching of biologicals.

**Conclusion:** FT related to biological medicine use is multifaceted, encompassing direct and indirect costs, and financial burden and distress. The studies are considerably different in their measures and designs. Despite policy efforts, high OOP costs and time-related burden continue to compromise the rational use of biological medicines. A variety of psychosocial, behavioural and material consequences of financial distress are reported. Evidence gaps exist on validated FT measures and longitudinal patient-level outcomes. The studies suggest that policy actions should target objective burden (e.g., co-payments, income-based caps) and subjective distress (e.g., medicine and financial counselling, psychosocial support). Pharmacists and healthcare professionals play a key role in mitigating FT through counselling and advocacy for equitable access.

## Stakeholders' perspectives on interprofessional collaboration with pharmacists in community mental healthcare in Australia

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**Background:** People living with mental illness often have complex and ongoing healthcare needs, including psychotropic medication use, physical comorbidities, and psychosocial challenges, requiring coordinated, person-centred care across multiple healthcare providers. In Australia, community mental healthcare is predominantly delivered by general practitioners and psychologists, with psychiatrists involved in selected cases, typically through referral pathways. Although pharmacists are well-positioned to support people living with mental illness through their accessibility, expertise in medicines, and frequent contact with consumers, they are less commonly involved in providing community mental healthcare. Consequently, pharmacists remain underutilised in this area and are not routinely integrated within interprofessional models of community mental healthcare. This study aims to explore Australian healthcare professionals' perspectives on working with pharmacists when providing community mental healthcare and to identify strategies for enhancing interprofessional collaboration.

**Method:** Semi-structured interviews were conducted with healthcare professionals in Australia involved in caring for people living with mental illness in community settings. Participants were purposively recruited through professional networks, social media, and relevant healthcare organisations. The interview guide was informed by previous literature and designed to explore current collaborative practices with pharmacists, barriers to collaboration, and opportunities to enhance interprofessional working relationships. Interviews were conducted online, audio-recorded, de-identified, and transcribed verbatim. Data were analysed using reflexive inductive thematic analysis.

**Results:** Twelve healthcare professionals participated, including general practitioners (GPs; n=8), psychologists (n=3), and a psychiatrist. Four themes were generated: (i) Reactive and ad-hoc collaboration, (ii) Pharmacists in the periphery, (iii) Fragmented systems hinder collaboration, and (iv) Room for growth. Interprofessional collaboration in community mental healthcare was largely centred on GPs, with psychologists and psychiatrists commonly engaged through formal referral pathways. In contrast, pharmacists' involvement was often limited to reactive, medicine-related interactions such as dispensing issues, adverse effects, medication shortages, or concerns regarding misuse. Participants valued pharmacists as accessible medicine experts but often perceived them as external to the core mental healthcare team. Barriers to the provision of community mental healthcare by pharmacists included limited role clarity, lack of structured communication pathways, time constraints, fragmented systems of care, and challenges sharing sensitive mental health information across providers. Despite these challenges, participants identified opportunities for pharmacists to contribute more meaningfully through medication reviews, polypharmacy management, early identification of concerns, and facilitating access to appropriate services. Stronger professional relationships, clearer role expectations, and more formalised collaborative structures were seen to support interprofessional collaboration.

**Conclusion:** Healthcare professionals valued pharmacists' medicine expertise and accessibility but perceived their role in community mental healthcare as not yet fully integrated within interprofessional care. Current collaboration was largely reactive rather than embedded within routine team-based care. Strengthening collaborative frameworks, communication systems, and role clarity may support pharmacists to contribute more effectively to collaborative, coordinated, and person-centred mental healthcare in the community.

## Effect of edutainment on knowledge, attitude and utilization of sexual health services among in-school adolescents in selected secondary schools in Lagos, Nigeria

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**Background:** Adolescents in Nigeria face substantial sexual and reproductive health challenges, including inadequate access to accurate information and limited utilisation of youth-friendly sexual health services. National statistics indicate that a small proportion of adolescents demonstrate adequate knowledge of sexually transmitted infections, and utilisation of adolescent-friendly sexual health services remains low in Lagos State. Traditional health education approaches often fail to engage young people effectively, contributing to misconceptions, negative attitudes, and risky sexual behaviours. Edutainment, defined as the strategic integration of educational content with entertainment media, has emerged as an innovative communication approach designed to improve health literacy and influence behavioural outcomes. However, empirical evidence on its effectiveness among in-school adolescents in Nigeria remains limited. This study examined the effect of edutainment on knowledge, attitude, and utilisation of sexual health services among in-school adolescents in selected secondary schools in Lagos State, Nigeria.

**Method:** A quasi-experimental research design was employed. The study population comprised 905 adolescents from two selected secondary schools. A sample size of 60 participants was determined using a statistical power formula. The schools were randomly assigned to an Experimental Group (EG) and a Control Group (CG). Thirty participants were systematically selected into each group following parental consent. A structured and validated questionnaire with Cronbach's alpha reliability coefficients ranging from 0.75 to 0.90 was used for data collection. The EG received an edutainment intervention consisting of drama presentations, digital media content, and interactive discussions focused on sexual health service utilisation. The CG received standard health education sessions on exercise and nutrition. Both interventions were delivered for one hour weekly over four weeks. Data were collected at baseline (P0), immediately post-intervention (P1), and at 12-week follow-up (P2). Descriptive and inferential statistics were applied at a 5% level of significance.

**Results:** There were no significant baseline differences between groups in socio-demographic characteristics, except for religion ($p < 0.05$). Knowledge mean scores in the EG increased significantly across P0, P1, and P2 (1.30 ± 0.65, 2.93 ± 0.25, and 3.00 ± 0.00, respectively; $F = 170.80$, $p < 0.05$), whereas no significant improvement was observed in the CG ($p > 0.05$). Attitude mean scores in the EG improved significantly from P0 to P2 (14.27 ± 6.46 to 47.53 ± 1.11; $F = 70.43$, $p < 0.05$), while the CG showed no significant change. Similarly, utilisation of sexual health services in the EG increased significantly from 6.03 ± 1.10 at P0 to 15.17 ± 0.95 at P2 ($F = 228.10$, $p < 0.05$). The CG recorded no significant change in service utilisation ($p > 0.05$).

**Conclusion:** The edutainment intervention significantly enhanced knowledge, improved attitudes, and increased utilisation of sexual health services among in-school adolescents in Lagos State. The findings support the adoption of structured, theory-informed edutainment strategies within school health programmes to strengthen adolescent sexual health literacy and service uptake. Scaling such innovative educational approaches may contribute to improved reproductive health outcomes among adolescents across Nigeria.

## One health, one pharmacy in practice: District-level medicine planning, procurement and distribution in Archipelagic Indonesia

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**Background:** Ensuring continuous access to essential medicines is fundamental to primary health care and health system resilience. In archipelagic countries such as Indonesia, geographic dispersion, transport constraints, and administrative complexity challenge the effectiveness of medicine supply systems. District Health Offices are responsible for operationalising national pharmaceutical policies through planning, procurement, and distribution to primary health centres, yet evidence on system performance in hard-to-reach island settings remains limited. This study addresses this gap by evaluating district-level medicine supply management in an archipelagic context, contributing practice-based evidence aligned with the One Health, One Pharmacy approach by integrating data, professional practice, and system learning.

Purpose: To evaluate the effectiveness and efficiency of medicine planning, procurement, and distribution from the District Health Office pharmaceutical warehouse to primary health centres in Tual City, eastern Indonesia, and to identify lessons applicable to other countries facing geographic and logistical constraints.

**Method:** A descriptive evaluative study was conducted in Tual City, an archipelagic municipality in eastern Indonesia, covering 15 primary health centres (Puskesmas). Secondary data from 2023–2024 were analysed, including Drug Requirement Plans (RKO), procurement realisation records, budget utilisation reports, National Formulary (Fornas) compliance data, and monthly medicine utilisation and request reports (LPLPO). Performance indicators included alignment between planned and procured medicines, procurement modality, budget absorption, formulary adherence, and distribution performance relative to facility demand. Data were analysed descriptively using percentage-based indicators.

**Results:** Medicine planning demonstrated limited effectiveness, with notable discrepancies between planned and procured items (102 items planned vs 180 items procured in 2023), indicating misalignment between administrative planning and service needs. Procurement performance was financially efficient, with budget absorption reaching 97.07% in 2023 and 98.15% in 2024, largely supported by the national e-catalogue system. Compliance with the National Formulary declined from 84.44% in 2023 to 81.52% in 2024, driven by procurement of branded medicines and region-specific programme items. Distribution performance exceeded requested quantities, with fulfilment rates of 161.99% in

2023 and 109.92% in 2024, reflecting the strategic use of buffer stock to prevent stock-outs in remote island settings.

**Conclusion:** This study demonstrates how One Health, One Pharmacy principles can be operationalised through coordinated pharmaceutical management at district level. While efficient procurement and adaptive distribution strategies safeguarded medicine availability in an archipelagic context, weaknesses in planning accuracy and formulary adherence highlight the need for improved data integration, stronger regulatory alignment, and enhanced pharmacist capacity building. These findings provide transferable lessons for other countries with remote or hard-to-reach regions, emphasising the role of pharmacists in bridging science, practice, and education to strengthen equitable access to essential medicines.

## Co-designing an intervention to support antimicrobial prescribing for respiratory tract infections in hospital settings

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**Background:** Respiratory tract infections are among the most common indications for antimicrobial prescribing in hospital settings, with frequent guideline non-compliance and inappropriate use reported. Guideline non-compliance results in unnecessary antimicrobial use, increasing risk of patient harm, antimicrobial resistance, and healthcare costs. Many prescribing interventions have been developed and evaluated previously, with varying levels of success. However, many of these interventions are often developed without the involvement of relevant stakeholders, such as practising clinicians, which may limit their feasibility, acceptability, and implementation success. Co-design is a collaborative, participatory methodology where relevant experienced stakeholders work alongside researchers to jointly create, design, or solve problems. By engaging relevant stakeholders, co-design approaches will tailor the antimicrobial stewardship intervention to the clinical context to support its implementation in routine practice.

Purpose: To co-design an intervention with medical officers, pharmacists, and nurses, to support optimal antimicrobial prescribing for respiratory tract infections in hospital settings. Specific objectives include: (1) identify key enablers and barriers to antimicrobial prescribing, (2) obtain feedback on proposed intervention designs informed by evidence-based literature, and (4) describe future steps required for implementation and evaluation of the prescribing intervention.

**Method:** This study uses a participatory co-design approach underpinned by the Consolidated Framework for Implementation Research. Two facilitated workshops will be conducted between April and May 2026 at a metropolitan tertiary referral hospital in Sydney, Australia. The first workshop will explore barriers and enablers to optimal antimicrobial prescribing for respiratory tract infections and identify potential intervention strategies. The second workshop will focus on obtaining feedback on an intervention and identifying practical steps for implementation and evaluation within clinical workflows. An antimicrobial stewardship pharmacist and infectious diseases specialist have been recruited as collaborators for the project. Relevant stakeholders for workshop participation will include medical officers with experience in prescribing antimicrobials for respiratory tract infections, pharmacists, and nurses. Participants will be recruited through purposive sampling and will receive remuneration of AUD 50 per hour for their time. Workshop discussions will be facilitated by the research team and audio-recorded. All observation notes made by members of the research team and participant notes will also be collated for content analysis and intervention development. Participant characteristics will be collected using a brief sociodemographic survey. Engagement in the co-design process will be evaluated using the Patient Engagement in Research Scale evaluation tool administered following the workshops.

**Results:** The workshops will generate qualitative data describing perceived barriers and enablers to optimal antimicrobial prescribing and stakeholder-identified priorities for intervention. The co-design process is expected to result in the development of a relevant and informed antimicrobial stewardship intervention and a preliminary implementation plan tailored to the clinical context. Data analysis will identify key themes influencing prescribing behaviours and inform the design and implementation strategy.

**Conclusion:** Engaging clinicians in the co-design of antimicrobial stewardship interventions may enhance intervention relevance, acceptability, and implementation feasibility. Findings from this study will inform the development of a context-specific intervention to support appropriate antimicrobial prescribing for respiratory tract infections in hospital settings and contribute to improved antimicrobial stewardship practices.

## EARTH: Environmentally Aware Responsible Treatment for Healthcare waste programSAPS-001 - EARTH: Environmentally Aware Responsible Treatment for Healthcare waste program

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**Background:** Improper disposal of hazardous oncology drugs, particularly oral chemotherapy, poses acute environmental and public health risks due to their persistence and bioactivity. These agents can contaminate soil and water, disrupt ecosystems, and carry carcinogenic potential outside clinical settings. A previous study at the National Cancer Centre Singapore (NCCS) revealed that 86% of patients were unaware of recommended disposal practices. This highlights a critical gap between established guidelines and public behaviour, necessitating targeted interventions to mitigate the environmental and health impacts of pharmaceutical waste.

This study, titled the EARTH (Environmentally Aware Responsible Treatment for Healthcare) programme, aims to address these challenges through a multi-pronged approach. The primary objectives are (1) to assess the baseline knowledge, attitudes, and practices (KAP) regarding medication waste management among healthcare professionals, patients, and the public in Singapore, (2) to identify the barriers and facilitators influencing sustainable disposal habits; and to develop and evaluate a community-focused program designed to empower participants and promote safer, more sustainable healthcare practices.

**Method:** A cross-sectional study with two independent components was conducted from September to December 2025 in Singapore. Participants were recruited using convenience sampling. Healthcare workers (HCWs) and public participants completed a baseline KAP questionnaire. A separate sample completed a Post-Intervention Satisfaction (PIS) questionnaire was administered following a standardised educational intervention delivered via through posters, games, or both. Associations were analysed using chi-square tests and multivariable binary logistic regression.

**Results:** Baseline results (N=647) showed 45.6% adequate knowledge (HCWs 52.7% vs. public 38.2%), despite 95.4% awareness of environmental harm. Knowledge gaps reported in incineration, wastewater, and antibiotics management. Attitudes were 69% favourable, but donation acceptance was low (33%). Practices involved discarding spoiled/unused meds (64.8%) due to non-adherence. Barriers included knowledge gaps (female public aOR 0.54), access limits, and habits. Facilitators were education efficacy, HCW advocacy, and gains in older/educated groups (aOR 3.9/3.1).

**Conclusion:** Recommendations advocate scalable single-modality delivery, prioritizing older adults and HCW train-the-trainer models. Brief education effectively closes gaps, leveraging HCWs for sustainable behaviours in Singapore, despite sampling/self-report limitations. The EARTH programme is poised to provide a robust framework and validated resources for mitigating the environmental and public health impacts of medication waste. By integrating scientific rigor with community empowerment, this project aims to cultivate a culture of responsible medication management, contributing to a safer and more sustainable healthcare ecosystem.

## Evaluating humanitarian logistics performance in public pharmaceutical sector: A cross-sectional study

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**Background:** Effective humanitarian logistics management is critical for pharmaceutical supply chain resilience during public health emergencies. However, the relative contribution of internal organizational capabilities versus external contextual constraints to logistics performance remains poorly understood, particularly in resource-constrained settings like Ethiopia, where recurrent conflicts, environmental shocks, and health emergencies affect millions. Understanding these determinants is essential for strengthening emergency response systems in low-income countries.

Purpose: This study examines humanitarian logistics performance in Ethiopia's public pharmaceutical sector to: (1) assess performance across reliability, responsiveness, agility, cost efficiency, and asset management dimensions; (2) identify internal organizational factors predicting performance; (3) identify external contextual factors predicting performance; and (4) validate an integrated model combining Resource-Based View and Institutional Theory perspectives.

**Method:** We conducted an explanatory cross-sectional study (September–October 2021) involving 92 professionals from Ethiopia's Ministry of Health, Pharmaceuticals Supply Service, and Public Health Institute. Data were collected using a semi-structured questionnaire assessing five performance dimensions and nine factor domains. This study used Mix Methods Research (MMR) with an explanatory design strategy and Structural Equation Model-Partial Least Square (PLS) analysis. In this study, a measurement model simulation used a system dynamic approach. Seven key informant interviews triangulated quantitative findings. Composite indices were calculated as equal-weighted averages.

**Results:** Performance was perceived as moderately high across all dimensions (mean scores: 3.48–3.68), with asset management highest (3.68±0.98) and responsiveness lowest (3.48±0.89). However, qualitative data revealed systematic operational failures: inter-agency delivery agreement breaches, port clearance delays (causing demurrage costs), seasonal road impassability, and fragmented coordination causing duplication. Rank-order analysis identified ICT capability, donor funding adequacy, environmental suitability, infrastructure quality, and socioeconomic conditions as the five most influential factors (Kendall's W=0.056, p<0.001). The predictive model explained 75.3% of performance variance. External constraints demonstrated a large, significant association (β=0.742, 95% CI [0.667–0.817], p<0.001), while internal capabilities showed no significant association (β=0.037, p=0.720). Importance-performance prioritization confirmed external context as the highest-priority domain (score=1.215 vs. internal=0.026). Qualitative analysis identified four critical barrier themes: strategic planning deficits, coordination fragmentation, infrastructural bottlenecks, and financial system inefficiencies.

**Conclusion:** Humanitarian logistics performance in Ethiopia's public pharmaceutical sector is predominantly determined by external institutional constraints, with internal capabilities playing a necessary but secondary role. This challenges conventional supply chain frameworks focused on internal optimization and underscores the need for context-aware, institutionally grounded analysis. Sustainable improvement requires a dual strategy: addressing foundational external constraints through infrastructure investment and flexible multi-year donor funding, while strengthening internal capabilities in digitalization and strategic planning. Findings provide evidence-based priorities for policymakers and stakeholders to enhance emergency pharmaceutical delivery.

## Empowering government hospital pharmacies: Addressing Philippine anti-red act compliance and barriers for intervention

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**Background:** Government hospital pharmacies in the Philippines continue to experience persistent service delivery challenges, with approximately 73% reporting issues such as medication errors, inadequate patient counseling, and delays in medication dispensing. These challenges negatively affect patient recovery, continuity of care, and overall patient satisfaction, reflecting systemic inefficiencies within public healthcare delivery. In response to these concerns, the Congress and the Government of the Republic of the Philippines enacted Republic Act (RA) No. 11032, also known as the Ease of Doing Business and Efficient Government Service Delivery Act of 2018, which seeks to streamline administrative procedures, reduce bureaucratic red tape, and enhance efficiency across government services. Despite the enactment and implementation of this Act, operational inefficiencies persist in hospital pharmacy settings, highlighting the need to systematically assess the level of awareness, compliance, and perceived barriers related to the Act.

**Method:** This study investigated the level of knowledge, compliance status, and perceived barriers related to RA No. 11032 among Department of Health (DOH)-operated hospital pharmacies in Metro Manila, Philippines. A quantitative, cross-sectional research design was employed using a validated and pretested structured questionnaire. The study included all 64 consenting employees from 21 DOH-operated hospital pharmacies in Metro Manila. Data were analyzed using descriptive and inferential statistics, including independent t-tests, Mann–Whitney U tests, one-way analysis of variance (ANOVA), and Kruskal–Wallis H tests, utilizing the Statistical Package for the Social Sciences (SPSS).

**Results:** Results revealed that the majority of participants demonstrated poor knowledge (n=44, 69.84%) and low compliance status (n=56, 88.89%) with the overall requirements and provisions of RA No. 11032. Both minor (n=35, 55.56%) and major barriers (n=28, 44.44%), such as insufficient funding, inadequate staffing, and limited training opportunities, were perceived to similarly hinder compliance. Significant differences were observed across selected demographic and professional variables, highlighting the need for tailored and context-specific intervention strategies. Correlation analysis showed a moderate positive relationship between knowledge and compliance status ($r_s$=.58, $p < .001$), indicating that increased knowledge is associated with higher compliance. Conversely, perceived barriers were moderately and negatively correlated with both knowledge ($r_s$=-.49, $p < .001$) and compliance status ($r_s$=-.57, $p < .001$), suggesting that when knowledge and compliance status decreases, the barriers increase.

**Conclusion:** Based on these findings, three priority areas were identified to enhance compliance with RA No. 11032: strengthening knowledge through targeted capacity-building initiatives, implementing structured compliance improvement strategies, and addressing institutional barriers through policy, resource allocation, and workforce development. These results emphasize the critical role of regulatory awareness and administrative support in improving pharmacy service delivery within the Philippine government hospital settings.

## Rational over-the-counter drug dispensing among the pharmacy workforce: Evidence from community pharmacies to inform a public health intervention programme

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**Background:** Rational use of over-the-counter (OTC) medicines is essential for ensuring patient safety, preventing adverse drug events, and promoting responsible self-care. Community pharmacies serve as primary access points for OTC medicines, placing the pharmacy workforce in a critical position to provide appropriate counselling, assess patient needs, and ensure regulatory compliance. In the Philippines, Republic Act No. 10918, also known as the Philippine Pharmacy Act, defines the professional responsibilities of pharmacists and the supervision requirements for medicine dispensing. However, variations in knowledge, attitudes, and dispensing practices among pharmacy personnel may compromise rational OTC use. This study assessed the knowledge, attitudes, practices, and barriers (KAPB) of the pharmacy workforce regarding rational OTC drug dispensing in community pharmacies in Zambales, Philippines, and developed a public health intervention programme based on identified gaps.

**Method:** A quantitative cross-sectional descriptive design was conducted among 76 pharmacy personnel, including licensed pharmacists, pharmacy assistants, pharmacy technicians, pharmacy aides, supervisors, and pharmacy interns, selected through purposive sampling. Data were collected using a validated structured questionnaire assessing socio-demographic characteristics and KAPB components. Knowledge was measured using objective items, while attitudes, practices, and barriers were assessed using Likert-scale responses. Data analysis included descriptive statistics, Mann–Whitney U test, Kruskal–Wallis test, and Spearman's rank-order correlation, with statistical significance set at $p<0.05$.

**Results:** Findings indicated high overall knowledge levels among respondents. All participants (100.0%) correctly identified OTC medicines and the safe use, while 98.3% recognised potential safety risks associated with improper OTC use, and 94.8% understood that prescription-only medicines require a valid prescription. However, only 37.9% correctly identified legal provisions under Philippine Pharmacy Act, indicating a significant legal knowledge gap. Attitudes towards rational OTC dispensing were positive, with a mean score of 3.79 (standard deviation [SD]=0.353), reflecting strong agreement on the importance of counselling and pharmacist involvement. Dispensing practices were generally favourable, including counselling patients suspected of misuse (mean=3.65; SD=0.689) and ensuring correct medicine dispensing (mean=3.77; SD=0.500). Nevertheless, barriers were identified, including resource constraints (mean=2.56; SD=0.713), environmental limitations affecting counselling space (mean=2.76; SD=0.793), and community-related barriers such as limited access to training (mean=2.93; SD=0.961). Significant differences in dispensing practice were observed according to age ($p=0.014$), training attendance ($p=0.002$), and years of experience ($p=0.003$). Knowledge was positively correlated with attitudes ($r=0.687$, $p<0.001$) and practices ($r=0.592$, $p<0.001$), while attitudes showed a strong positive correlation with practices ($r=0.745$, $p<0.001$), indicating that improved knowledge and attitudes were associated with better dispensing performance.

**Conclusion:** Despite high foundational knowledge and positive attitudes, gaps in legal knowledge and practice implementation highlight the need for structured interventions. A public health intervention programme is proposed, including competency-based modular training on legal and clinical aspects of OTC dispensing, simulation-based counselling training, continuing professional development certification, mentorship programmes, workflow optimisation, and strengthened regulatory compliance aligned with national standards. These interventions aim to enhance workforce competencies, reduce systemic barriers, and promote safe and rational OTC medicine use in community pharmacies, thereby improving pharmaceutical care delivery and public health outcomes.

## New code of ethics for pharmacists in France

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**Background:** The National Council of the French Chamber of Pharmacists is responsible for drawing up the code of ethics. It is binding on all pharmacists and private practices registered with the Chamber. It is also binding on students authorised to work as locums under certain conditions. The Chamber ensures compliance with the code, in particular through its disciplinary chambers.

Purpose: The National Council of the French Chamber has completed work on revising the current code of ethics, which dates from 1995, to take into account changes in professional practice in recent years, particularly the development of new roles.

**Method:** The French Chamber has updated its professional rules to respond to changes in the healthcare system while reaffirming the fundamental principles of the profession : independence, responsibility and the protection of patients.

The Chamber first carried out significant work to update this code in 2016. The process continued during the past few

years with constant exchanges with national authorities to incorporate developments in the pharmaceutical profession (coordinated practice, new missions, etc.) and case law, particularly recent European case law.

**Results:** These discussions, which lasted a decade, resulted in a new code of ethics published in the Official Journal on 5 March 2026.

In a context of changing economic models in the healthcare sector, this code consolidates the guarantees for professional independence by specifying that no financial, commercial or hierarchical constraint can alter the freedom of judgement of the pharmacist. Provisions regarding the prevention of conflict of interests have also been reinforced.

The code regulates explicitly the use of digital tools, by recalling the obligation to guarantee quality of care and personal health data protection.

Finally, the rules regulating professional information and communication are clarified to better answer the misinformation challenges, while prioritising public health messages.

**Conclusion:** The new code thus places duties towards patients at the forefront. It reaffirms the obligation to act in the interests of the patient and public health, the protection of professional confidentiality and the advisory role of the pharmacist. It also introduces provisions strengthening support and reporting of situations of violence or vulnerability.

An annotated version and recommendations, particularly with regard to communication, will be published shortly to assist professionals in adopting the code.

## Study on gender-based and sexual violence faced by French pharmacists

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**Background:** Gender-based and sexual violence (GSV) in the healthcare sector is currently the subject of increased attention in France. At the end of 2024, two studies revealed a high prevalence of GSV among doctors and nurses. In response to this finding, the French Minister of Health announced a government plan to fight and prevent GSV in the healthcare sector in January 2025.

Purpose: The objectives are:
- to assess the current situation regarding GSV faced by pharmacists in the workplace;
- to evaluate their level of knowledge with regard to GSV, the criminal penalties incurred for acts of GSV and the support available for victims;
- to identify measures to be implemented.

**Method:** The French Chamber of Pharmacists has selected a pollster to assist it in conducting this study. The survey questionnaire will be circulated by email to all pharmacists registered with the French Chamber. The data collected via a personalized link will allow an analysis of results by type of practice, geographical areas and age groups. A study report will be drawn up once the results have been analysed and will be shared with the profession.

**Results:** The questionnaire is composed of about twenty questions and is sent to the 75 000 French pharmacists registered to the French Chamber of Pharmacists. The survey will be launched in April 2026 and results are expected in June.

**Conclusion:** This study maps out the problems linked to gender-based and sexual violence and meets the objectives of the French Chamber of Pharmacists to fight them by identifying any preventive and support measures that need to be implemented in that respect

## Individual shifts in influenza and COVID-19 vaccination uptake between 2023-24 and 2024-25: A cohort study among Portuguese adults aged 60 years or older

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**Background:** Vaccine hesitancy threatens the success of seasonal vaccination programmes. In Portugal, the 2023-24 and 2024-25 campaigns introduced major changes, including free influenza vaccination for adults aged 60–64 and the integration of community pharmacies into the vaccination network. This study aimed to identify factors associated with shifting from uptake to refusal of influenza and COVID-19 vaccination among adults aged 60 years and over.

**Method:** A prospective cohort study was conducted using data from telephone surveys applied to a sample of the Portuguese population aged ≥60. Individuals with vaccination data for both the 2023-24 and 2024-25 campaigns were included. Univariable and multivariable logistic regression models identified factors associated with moving from uptake in 2023-24 to refusal in 2024-25 (Yes/No vs Yes/Yes).

**Results:** Among 1,514 participants, 6.6% refused influenza vaccination, and 20.1% refused COVID-19 vaccination after having been vaccinated the previous season. Younger age (60–64 years), absence of comorbidities, better self-rated health, and lower concern about infecting family or friends were independently associated with refusal. Participants who never sought vaccine information or relied on non-health-professional information sources showed higher odds of refusal. Vaccination intention for 2024-25 was the strongest predictor of subsequent uptake or non-uptake.

**Conclusion:** Declines in vaccination uptake across successive campaigns were primarily driven by clinical and health-related factors, beyond mere demographics and aligning with the Health Belief Model. Low perceived risk, 'vaccine fatigue', and reduced cues to action emerged as key barriers that necessitate strategic mitigation. This knowledge is particularly relevant for refining vaccination promotion strategies, especially in community pharmacies, where a large proportion of the population aged 60 years and older receives vaccinations in Portugal. Tailoring communication and outreach efforts in these settings may therefore play a critical role in addressing these barriers and sustaining vaccination uptake among older adults.

## Establishing a Welsh language pharmacy network: Embedding first language care through collaborative practice

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**Background:** Language is a critical determinant of safe, person centred care, particularly in pharmacy where accurate understanding influences adherence, shared decision making and clinical outcomes. In Wales, more than a fifth of the population speaks Welsh as a first language, and national policy frameworks emphasise the importance of receiving care in one's preferred language. In response to these needs, partners across education, practice and national health bodies collaborated to establish a Welsh Language Pharmacy Network to strengthen the capacity and confidence of pharmacy professionals to provide care in Welsh. Although developed in a specific cultural context, the principles underpinning first language care are globally relevant to multilingual populations and minority language communities.

**Method:** A collaborative, cross sector approach was used to design and launch the network. Grant funding supported initial development, alongside strategic alignment with national policy drivers. Activities included stakeholder engagement, mapping workforce needs, establishing governance structures within a national workforce organisation, and developing resources to support bilingual practice. The network was promoted to pharmacy professionals across all sectors, including undergraduate students and trainees, to create a sustainable community of practice.

**Results:** Early outcomes include the creation of a pharmacy professionals membership base, increased visibility of first language care in pharmacy workforce planning, and strengthened collaboration between national organisations, universities and professional bodies.

Sixty members who attended the launch event in October 2025 identified seven key themes for taking the network forward. These were related to: 1) Underpinning ethos, 2) Clear goals, 3) Resources/Translation, 4) Planned events, 5) Student/trainee perspectives, 6) Advertising/Promotion and 7) Other considerations.

The network is informing national discussions on language sensitive service design. The model has demonstrated that supporting first language care requires both cultural and structural commitment within the wider health system.

**Conclusion:** The Welsh Language Pharmacy Network provides a replicable framework for embedding first language care into pharmacy services. Its development highlights the importance of linguistic identity in achieving equitable, person centred care. Countries with multilingual populations or minority language communities can adapt this model to enhance patient safety, cultural competence and workforce capability.

## Cardiovascular and renal outcomes associated with dapagliflozin use after transcatheter aortic valve implantation: A nationwide population-based cohort study in Taiwan

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**Background:** Transcatheter aortic valve implantation (TAVI) has become an established therapeutic option for elderly and high-risk patients with severe aortic stenosis, with rapidly increasing utilisation following national reimbursement in Taiwan since 2017. Despite procedural advances, patients undergoing TAVI remain at substantial risk of adverse post-procedural outcomes, including heart failure deterioration, rehospitalisation, renal function decline, and mortality. Sodium–glucose cotransporter 2 (SGLT2) inhibitors, particularly dapagliflozin, have demonstrated significant cardiovascular and renal protective effects in patients with heart failure and chronic kidney disease across diverse clinical settings. However, evidence regarding the effectiveness and safety of dapagliflozin in patients following TAVI remains limited. This study aims to evaluate real-world cardiovascular and renal outcomes associated with dapagliflozin use after

TAVI using a nationwide population-based healthcare database.

**Method:** This nationwide retrospective cohort study was conducted using Taiwan's National Health Insurance Research Database, based on a representative population cohort of 2,000,000 insured individuals. Adult patients aged 18 years or older who underwent TAVI between 2017 and 2024 were identified using validated procedure codes. Patients who initiated dapagliflozin within 30 days following TAVI were classified as the exposure group, while those who did not receive any sodium–glucose cotransporter 2 inhibitor served as the comparison group. Propensity score matching was applied to balance baseline demographic characteristics, comorbidities, and concomitant medications between groups. Primary outcomes included all-cause mortality and heart failure–related rehospitalisation. Renal outcomes included acute kidney injury, progression to long-term dialysis, and renal-related hospitalisation. Cox proportional hazards models were used to estimate hazard ratios with 95% confidence intervals after adjustment for baseline characteristics.

**Results:** Using a nationwide population-based cohort derived from 2,000,000 beneficiaries, this study is expected to capture real-world cardiovascular and renal outcomes among patients undergoing TAVI in routine clinical practice. Dapagliflozin use following TAVI is hypothesised to be associated with a reduced risk of heart failure deterioration and rehospitalisation, as well as improved renal outcomes, without an increased risk of major adverse events. These benefits are anticipated to be more pronounced among patients with pre-existing heart failure or chronic kidney disease. The large-scale population coverage enhances the generalisability and robustness of the findings in an ageing population with high cardiovascular risk.

**Conclusion:** This nationwide population-based cohort study provides real-world evidence on the potential cardiovascular and renal benefits of dapagliflozin use following TAVI. The findings may support the role of SGLT2 inhibitors as part of post-TAVI pharmacological management and contribute to optimising medication strategies for elderly and high-risk patients. Further prospective studies are warranted to confirm these observations and inform clinical practice and healthcare policy.

## Enhancing chronic disease management for rural patients: Analysis of a targeted pharmacist-led lifestyle and wellness counseling program

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**Background:** Individuals residing in rural areas often encounter significant barriers to accessing quality healthcare and achieving optimal health outcomes. This is particularly the case for patients managing chronic conditions such as diabetes and hypertension. Collaborative models that bridge academic and community resources have the potential to address gaps in care. Pharmacists have a critical role in helping to provide accessible healthcare for patients with chronic conditions in rural areas. The purpose of this program evaluation is to analyse the outcomes of a unique partnership between an academic institution and a rural community-based health centre, designed to deliver pharmacist-led telephonic Medication Therapy Management (MTM) services alongside a lifestyle and wellness counselling program for rural patients diagnosed with diabetes and/or hypertension in the Southwestern United States.

**Method:** In this academic-community collaboration, staff at a rural health centre in the Southwestern United States identified eligible patients to receive an MTM lifestyle and wellness counselling service from an academic-based pharmacist. Patients attending the health centre with diabetes and/or hypertension and met the criteria for MTM services were eligible to receive the service which was offered between July 2020 and June 2023. During the service, data were collected on demographic and clinical characteristics, medication adherence, and recommendations made by the pharmacist. After 90 days, a nurse reviewed the patient's electronic health record to ascertain whether the pharmacist's recommendations had been acted upon by the primary care provider. Data were analysed descriptively.

**Results:** A total of 93 patients completed the program. Most patients were female (55%), non-Hispanic (73%), white (61%), and spoke English (86%). The top three medication-related concerns identified by the pharmacist were: drug-drug interactions (24%), adverse drug reactions (15%), and utilization or cost concerns (12%). The pharmacist commonly recommended the following vaccines that were due: pneumonia vaccine (45%), flu vaccine (37%), COVID vaccine (29%), and shingles vaccine (24%). The pharmacist also provided appropriate counselling and made recommendations for exercise, diet and nutrition, and cholesterol management. The pharmacist identified patients missing any dose of their diabetes medications (12%), hypertension medication (11%), and hyperlipidaemia medications (9%) in the past two weeks, and provided appropriate adherence counselling. Of the 309 pharmacist recommendations made to the primary care providers, 113 (37%) were accepted within 90 days.

**Conclusion:** The results of this evaluation suggest that a pharmacist-led MTM lifestyle and wellness counselling program can be a valuable resource for underserved rural populations managing diabetes and hypertension. The program demonstrated some success in having pharmacist recommendations accepted and implemented by primary care providers. However, these findings also suggest that more work is needed to better understand the factors influencing provider acceptance of pharmacist recommendations and to explore strategies for expanding the reach and sustainability of such programs. These findings highlight the potential of academic-community collaborations to address chronic disease management challenges in rural settings. Continued evaluation and adaptation may help improve the impact and sustainability of pharmacist-led programs in rural areas.

## Qualitative analysis of student pharmacists' perspectives completing a research project in the Doctor of Pharmacy curriculum

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**Background:** Doctor of Pharmacy programmes in the United States may require students to complete a research project as part of the curriculum. However, the students' perspective of completing a research project has not been investigated. The objective of this study was to assess student pharmacists' perspectives of completing a research project in the Doctor of Pharmacy curriculum at one southwestern college of pharmacy.

**Method:** Semi-structured interviews were conducted from November 2024 to February 2025 with fourth year student pharmacists. The semi-structured interview guide was developed by researchers with expertise in teaching pharmacy research projects and qualitative research methods. The guide included five core questions with additional probing questions asked as necessary, alongside a final opportunity to share any final perspectives. Virtual interviews were conducted at mutually convenient times until data saturation was reached. Interviews were audio recorded and transcribed for thematic analysis using the Braun & Clark analytical approach with support from Dedoose® qualitative analysis software. Two researchers reviewed and coded each transcript, then sought consensus on the final code list. Key themes were identified with representative excerpts.

**Results:** In total, 11 interviews with students were conducted, and four main themes were compiled. Theme 1 described how completing a research project helped students develop their critical analysis skills. One participant stated: "It exposes us to reading research … and being able to differentiate between a good research study versus bad." Theme 2 described the development of students' interpersonal skills, with one student sharing: "I had to learn how to change how I communicate, and I feel like that's going to help me in the future." Theme 3 described how the research project helped students prepare for a residency program. One participant explained: "In residency, you're expected to evaluate a lot of literature, so having that background of how a study is formed, developed, how data is analysed, I think, is very important." Theme 4 described some of the challenges that students had to overcome to complete their project. For instance, one student recalled: "We don't have enough time to really forego putting in a lot of time and effort into the project in order for it to be a success."

**Conclusion:** The findings from these semi-structured interviews highlight some of the important professional and transferable skills developed by student pharmacists as they complete a research project, demonstrating the value of research projects in the curriculum. The challenges experienced by students exemplify the rigorous nature of research and offer opportunities to provide additional support in the pharmacy curriculum.

## EcoRx: A circular pharmaceutical innovation model for household medicine waste management

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**Background:** The improper disposal of unused and expired household medicines poses a growing environmental and public health challenge in the United Arab Emirates (UAE). Households discard up to 86% of expired medicines via municipal waste or sewage systems, introducing active pharmaceutical ingredients into water bodies and soil with poorly understood long-term consequences. The UAE currently lacks national legislation governing household pharmaceutical waste and a structured take-back programme, with pharmaceutical waste costing an estimated USD 33 million annually. Concurrently, over five billion people globally lack access to essential medicines, underscoring a stark inequity between pharmaceutical surplus in higher-income settings and unmet need elsewhere. Addressing this dual challenge requires a circular pharmaceutical innovation model, one that simultaneously leverages digitalization and collaboration, reduces waste, ensures safe disposal, and improves access to quality-assured medicines.

Purpose: To develop and prototype EcoRx, a circular pharmaceutical innovation model comprising a mobile application and a Smart Reverse Vending Machine (RVM), and

to present the business case for its adoption as a pharmacy-led, policy-supported solution to household pharmaceutical waste.

**Method:** A mixed-methods approach was employed, comprising: (1) a structured literature review of international pharmaceutical take-back and circular economy programmes; (2) a needs assessment of UAE general public to evaluate awareness, attitudes, and willingness to participate in initiatives like EcoRx; (3)stakeholder mapping and semi-structured interviews with pharmacists, healthcare providers, regulators, community partners, and environmental agencies; (4) Strengths, Weaknesses, Opportunities and Threats (SWOT) and Political, Economic, Social, Technological, Legal and Environmental (PESTLE) analyses of the UAE pharmaceutical and waste management landscape; and (5) iterative prototype development of the EcoRx mobile application and RVM system.

**Results:** A functional EcoRx prototype is under development, integrating two components. The mobile application enables users to register unused medicines, verify eligibility for redistribution based on quality standards, locate nearby collection points, and access safe disposal guidance. The RVM uses barcode scanning and weight sensors to accept, categorise, and securely store returned medicines, issue eco-credits as participation incentives, and transmit real-time collection data. Stakeholder analysis identified regulatory reform, community pharmacist engagement, and Extended Producer Responsibility (EPR) financing as critical enablers. Needs assessment findings are currently being analysed.

**Conclusion:** EcoRx demonstrates that a pharmacy-centred, technology-enabled circular model is technically feasible and contextually appropriate for the UAE. The model addresses the gap in household pharmaceutical waste, reduces environmental contamination, and creates a regulated pathway for quality-assured unused medicines to reach underserved communities. Scale-up requires a national regulatory framework mandating household medicine take-back, EPR financing, and integration of pharmaceutical waste stewardship into pharmacy practice standards, consistent with the International Pharmaceutical Federation's (FIP) 2025 environmental sustainability Knowledge and Skills Guide. EcoRx offers a replicable model for Gulf Cooperation Council countries and other high-income settings facing similar household pharmaceutical waste challenges.

## Addressing gender based violence in the pharmacy workforce: tools, strategies and insights

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**Background:** Gender-based violence(GBV) in the workplace is increasingly recognised as a significant occupational hazard with consequences for wellbeing, job satisfaction and workforce sustainability. While evidence for physicians, nurses and other frontline health workers is well documented, pharmacy professionals remain underrepresented in research and policy initiatives.

In Portugal, there is limited published evidence specifically addressing workplace violence in pharmacy, yet national data indicate that healthcare workers experience substantial psychological and physical violence. Professional organisations, such as Ordem dos Farmacêuticos, have committed to national initiatives targeting gender-related violence, reflecting growing institutional engagement. International studies also indicate that pharmacy teams are exposed to verbal, psychological and physical violence, highlighting the need for evidence-informed, profession-specific interventions.

This work aims to synthesise existing evidence on gender-based violence affecting pharmacy professionals and to highlight practical tools, strategies and frameworks, with a particular focus on the BRAVE-WOW (Building Respectful And Violence-free Gender-inclusive Environments in the World of Work) project outputs, that can support prevention, capacity-building, reporting and workforce support in pharmacy practice.

**Method:** A narrative review was conducted of peer-reviewed literature, policy documents and professional reports addressing workplace and gender-based violence in healthcare, with attention to pharmacy-specific contexts where available.

National Portuguese sources were examined to provide local context. The BRAVE-WOW project was analysed as an evidence-based framework providing validated measurement instruments, participatory approaches and organisational tools to address gender-based violence and promote inclusive workplace cultures.

**Results:** The review indicates that pharmacy professionals are at risk of verbal and psychological violence, with gendered dynamics, customer-facing roles and organisational culture influencing both prevalence and reporting. Existing international and national tools include structured risk assessments, reporting protocols, staff training modules and organisational policy frameworks, However, gender-based violence at work is still under-researched and under-addressed.

BRAVE-WOW provides practical resources, including participatory measurement instruments and workplace intervention strategies, which can be applied to pharmacy settings to strengthen prevention, improve reporting and enhance institutional support.

The outputs of the BRAVE-WOW project are highly relevant to the pharmacy sector, as the project involves a range of organisations and roles across the healthcare sector. A relevant output is the Gender-Based Violence at Work Questionnaire (GBVW_Q), which collects data on GBV in workplace settings. This tool aims to enhance understanding of the phenomena and provide evidence-based insights for organisations regarding employees' knowledge of the phenomenon, perceptions and experiences. Complementing this, a Community of Practice is being established to connect stakeholders from different backgrounds, facilitating collaborative efforts to identify, understand, prevent and combat GBV, including through targeted working groups.

**Conclusion:** Addressing gender-based violence in pharmacy requires moving beyond problem identification toward actionable solutions. Integrating tools and strategies such as those developed by BRAVE-WOW can support pharmacy organisations in building safer, more inclusive work environments. These approaches promote professional wellbeing, enhance retention, and provide replicable frameworks for embedding gender-sensitive policies and practices into social and administrative pharmacy globally.

## Assessment of public awareness and behaviors towards antibiotic use and resistance in Kuwait: A cross-sectional online survey

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**Background:** Antimicrobial resistance (AMR) is a major global public health challenge, driven partly by inappropriate antibiotic use and persistent public misconceptions about when antibiotics are effective. Although Kuwait has prioritised AMR through national stewardship efforts, contemporary evidence describing public knowledge and behaviours remains limited. This study assessed awareness and behaviours related to antibiotic use and antibiotic resistance among adults in Kuwait and examined predictors of (1) the misconception that antibiotics treat cold and influenza and (2) risky antibiotic practices.

**Method:** A cross-sectional online survey was conducted in Kuwait between December 2025 and January 2026 using a World Health Organization (WHO) validated questionnaire adapted to the local context. Adults residing in Kuwait were recruited through convenience and snowball sampling via community and online channels (N=360). Descriptive analyses summarised antibiotic use patterns, access behaviours, knowledge of antibiotic indications, and awareness of antibiotic resistance. Two multivariable logistic regression models were used to identify predictors of the misconception that antibiotics treat influenza (Model A) and predictors of risky antibiotic practices (Model B). Adjusted odds ratios (aORs) with 95% confidence intervals (CIs) were reported.

**Results:** Nearly half of participants (43.6%) believed that cold and influenza could be treated with antibiotics, while 48.6% answered "No" and 7.8% were unsure. One in five participants (19.7%) reported that antibiotics should be stopped once symptoms improve rather than after completing the prescribed course. During the most recent antibiotic episode, 10.3% reported not obtaining antibiotics (or a prescription) from a doctor, and 15.3% reported receiving no advice from a doctor, nurse, or pharmacist on how to take antibiotics. Awareness of antibiotic resistance terminology was mixed: 50.6% had heard the term "antibiotic resistance", while 41.7% reported not hearing any related terms. A common misconception was that antibiotic resistance occurs when the body becomes resistant rather than bacteria; 77.0% considered this statement true. Despite these gaps, most participants strongly endorsed stewardship actions, including using antibiotics only when prescribed.

In Model A, males had higher odds of believing antibiotics treat influenza than females (aOR 1.73; 95% CI 1.06 to 2.81). Low-income participants had nearly double the odds compared with middle-income participants (aOR 1.96; 95% CI 1.12 to 3.44), while being married was protective (aOR 0.39; 95% CI 0.15 to 0.98). In Model B, participants who had not used antibiotics for more than one year were 84% less likely to report risky practices compared with recent users (aOR 0.16; 95% CI 0.05 to 0.51). Lack of professional advice showed a trend towards higher risk (aOR 3.12; p=0.067).

**Conclusion:** Public knowledge and behaviours in Kuwait remain insufficient for optimal antibiotic stewardship. Misconceptions about antibiotics for viral illness are socially patterned, while risky practices appear more closely linked to frequent antibiotic use and gaps in point-of-care counselling. Strengthening counselling at dispensing, reinforcing completion of prescribed courses, and targeting higher-risk groups may support implementation of Kuwait's AMR action priorities.

## Career shifting of Filipino pharmacists: Factors affecting changing profession

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**Background:** Despite significant contributions to healthcare delivery, a significant pharmacist workforce shortage exists worldwide, with approximately 30,000 active pharmacists versus a national need of 57,500 in the Philippines alone. An increasing proportion of Filipino pharmacists are transitioning from the traditional pharmacist role to alternative careers. Existing literature attributes shifts to burnout, turnover intentions and systemic changes, limited studies quantified the motivational factors driving career shifts. This study thus aimed to assess factors influencing career shift decisions among Filipino pharmacists, determine career shift motivation and examine relationships between demographic variables, motivational domains and the Career Shift Motivation Index (CSMI).

**Method:** An analytical cross-sectional survey was conducted using a validated online questionnaire. Filipino pharmacists aged 21 years and above who had transitioned to non-pharmacy careers were recruited through purposive and snowball sampling. Career shift motivation was measured using a five-point Likert scale across five domains: personal factors, economic factors, work environment, external or societal factors, and personal development and aspirations. The Relative Importance Index (RII) was used to rank the influence of each domain. The CSMI was computed as the mean score across all five domains. Descriptive statistics, Pearson correlation, and multiple linear regression were performed.

**Results:** A total of 240 respondents participated in the study, most of whom were female (78.8%). The majority (54.2%) had previously worked in community pharmacies, with 58.8% having between one and five years of experience and a mean age of 28.9 years (SD = 4.72). Across motivational domains, economic motivational domains (RII = 0.94) ranked highest, followed by personal development and aspirations (RII= 0.88), personal factors (RII = 0.87), and work environment (RII = 0.80) and societal/external motivational domains (RII = 0.66). Additionally, the overall CSMI was found to be 4.16 (SD =0.41), indicating high career shift motivation. Correlation analysis revealed that all five domains were significantly and positively associated with the CSMI ($p < 0.001$). Work environment showed the strongest correlation with CSMI ($r = 0.751$) followed by personal factors ($r = 0.722$) and external or societal factors ($r = 0.714$); while economic factors showed moderate correlation ($r = 0.532$). Regression analysis indicated that self-employment ($p = 0.021$) and pharmacy tenure between 1-5 years and 6-10 years were significantly predictive of the CSMI and could account for 15.6% of the variance observed.

**Conclusion:** Career shifts among Filipino pharmacists represent a workforce sustainability concern. Shift decisions reflect a convergence of unmet economic needs, limited professional growth, and unsustainable working conditions. While economic factors ranked highest on the RII, work environment and personal factors revealed the strongest relationship to overall career shift motivation indicating salary improvements alone are unlikely to stem attrition. Also, demographic factors were not significant predictors of career shift motivation, suggesting professional's structural conditions have greater influence on those individual decisions. Results support the Push–Pull–Mooring model and Herzberg's Motivation–Hygiene Theory, underscoring the need for comprehensive retention strategies focusing on compensation, workload, professional development, and professional recognition within the Philippine pharmacy workforce.

## A review of the use of medicine access programmes as a strategy for expanding access to emerging health technologies under Ghana's national health insurance scheme

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**Background:** In Ghana, the National Health Insurance Authority (NHIA) has made substantial progress in improving access to essential medicines by leveraging on Framework Contract Policies and Medicine Access Programmes (MAP). Through these negotiated pricing and contractual arrangements, otherwise high-cost medicines have been made available on the National Health Insurance Scheme's (NHIS) Medicines List at no cost for members.

This review examines the application of MAP under NHIS, with particular emphasis on the policy development process. The review also highlights the role of MAP in supporting health systems to manage rising medicine costs and expanding treatment needs.

**Method:** A retrospective review of policy documents and NHIA reports was conducted to assess the inclusion process for Trastuzumab Recombinant Human Hyaluronidase Subcutaneous Injection 600 mg/5 ml (TRHHSI) and Hydroxyurea Capsule 500 mg (HC) onto the NHIS Medicines List. The review covered the period January 2018 to December 2021.

Relevant documents were retrieved from the institutional records of the National Health Insurance Authority and included technical review reports, committee minutes, pricing negotiation records, budget impact analysis, and reimbursement policy documents. Documents were screened for relevance to reimbursement decision-making and pricing negotiations. The review data were analysed to describe the inclusion pathway, key actors, enabling contextual factors, pricing and reimbursement protocol considerations that influenced the final decisions of coverage.

**Results:** Between 2018 and 2022, Medicine Access Programmes (MAPs) supported the inclusion of Trastuzumab Recombinant Human Hyaluronidase Subcutaneous Injection, 600 mg/5 ml and Hydroxyurea Capsule, 500 mg on the NHIS Medicines List. This was accomplished through government-led memoranda of understanding (MOUs) between pharmaceutical manufacturers and the Ministry of Health. The process involved engagement among policymakers, clinicians, and patient groups, such as the Sickle Cell Foundation, who drove the policy agenda and highlighted access gaps. The National Health Insurance Authority served as the financing and price-negotiating body during policy discussions.

The Trastuzumab MOU, signed in January 2018, led to its listing for reimbursement in July 2019, with implementation starting at the Korle Bu and Komfo Anokye Teaching Hospitals. The standard international price was reduced by 70% under a cost-sharing arrangement, resulting in a projected expenditure reduction of 68% for an estimated 18,360 annual doses in 2020.

The Hydroxyurea MOU was signed in January 2019, with listing occurring in July 2022. Negotiations achieved a 65% price reduction. Within the first 12 months of implementation, 11 accredited facilities dispensed Hydroxyurea to eligible patients under the MAP.

The viability of the access programme was protected through the development of clear reimbursement protocols that spelt out patient eligibility, facility and prescriber requirements, claims submission guidelines and monitoring parameters. These protocols functioned as a gatekeeping system to ensure the appropriate utilization of resources.

**Conclusion:** MAPs have provided an avenue for making otherwise expensive life-saving medicines accessible to NHIS members. This strategic purchasing mechanism has proven to be a cost-containment measure that can be further employed to expand coverage to other critical interventions in a financially sustainable manner, particularly in the face of evolving health system needs and fiscal constraints.

## Addressing polypharmacy to improve patient Safety: Co-developed tools for shared decision making conversations

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**Background:** In Canada, 2 in 3 adults aged 65 years and older take 5 or more medications (polypharmacy). While often necessary, as the number of medications increases, so does the risk of adverse effects such as drug interactions, falls, fractures, and other complications. Patients are not always aware of potential risks, and managing polypharmacy can be complex.

To address this, Canada's Drug Agency (CDA-AMC) collaborated with deprescribing.org and the Institute for Safe Medication Practices Canada to develop a set of tools, 5 Questions to Ask About My Multiple Medications (for patients) and 5 Tips to Manage Polypharmacy (for health care providers who prescribe and manage medications in primary care settings). Crucially, these were developed with input from patients and clinicians to create pragmatic tools that support more consistent, patient-centred, shared decision-making conversations around taking multiple medications.

This project is exemplary of CDA-AMC's recent 5-year pan-Canadian Appropriate Use Strategy to work with system partners, prescribers, and patients to enhance the appropriate prescribing and use of medications to improve health outcomes and promote patient safety.

The project aimed to:
•Raise awareness about polypharmacy
•Provide practical resources for patients and primary care providers

**Method:** Tool development was informed by evidence reviews and consultations with patient and prescriber communities (including pharmacists, nurse practitioners, physicians) across Canada, and the Appropriate Use Coalition (a grassroots group comprised of Canadian health care organizations and public representation committed to improving outcomes through appropriate prescribing).

A multifaceted, tailored knowledge mobilization approach was used. For primary care providers, dissemination was supported with partners through forums, conferences, and webinars targeted for this group, leveraging established relationships and trusted networks. For patients, dissemination was aligned with Canadian Patient Safety Week, with partners engaged to support co-development of a patient-facing webinar, including participation from an individual with lived experience of polypharmacy. Tools were

further disseminated through partner channels including social media, e-blasts, and newsletters.

**Results:** Early qualitative feedback suggests the tools are highly relevant, easy to understand, and practical for supporting polypharmacy management. Reach has expanded through national and regional partner networks. Dissemination through the College of Family Physicians of Canada newsletter reached approximately 47,000 physicians. As of February 2026, 150 brochures were distributed across two provinces, with additional circulation through newsletters reaching ~60,000 readers each. A national pharmacy webinar delivered with Choosing Wisely Canada attracted 250 registrants, while a patient safety webinar engaged 189 participants, including clinicians and policymakers, who reported intent to use and share the tools. As of mid-March 2026, the patient handout has been downloaded over 400 times. These findings demonstrate early uptake, broad reach, and strong interest in applying the tools in practice.

**Conclusion:** This project represents an early but foundational step in operationalizing the Appropriate Use Strategy through partnership-driven implementation. It demonstrates that pragmatic, co-developed tools are feasible and well-received across care settings, supporting more consistent and patient-centred polypharmacy conversations.

Future directions include expanding this model to other priority areas, exploring integration with digital clinical decision supports, strengthening outcome measurement, and pursuing international knowledge exchange.

## From the residency program to professional practice: Pharmacists' perceptions of interprofessional training in primary health care in Brazil

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**Background:** In Brazil, Primary Health Care (PHC), organised within the Unified Health System (SUS), is a strategic setting for comprehensive care and teamwork. In this context, multiprofessional residency programmes represent an important form of in-service training, guided by interprofessional education and collaborative practice. However, evidence remains limited on how these training programs contribute to the development of interprofessional competencies and how such learning relates to pharmacists' subsequent professional practice in PHC. This study examines the professional experiences of pharmacists following the completion of interprofessional residency programs in primary health care across all regions of Brazil.

**Method:** This qualitative study is part of the #FuiResidente project, funded by the Brazilian Ministry of Health through (TED 113/2023), which investigates the impacts of residency programs (including 11 different health professions) on quality of care and teamwork in PHC in Brazil. To date, six in-depth interviews have been conducted with pharmacists who completed interprofessional residency programmes in health. This abstract presents preliminary findings from a thematic analysis of this initial set of interviews, focusing on participants' perceptions of the relationship between interprofessional training experienced during residency and subsequent professional practice in PHC.

**Results:** Initial analysis points to an important difference between the practice setting experienced during residency and later professional practice. Residency is described as a setting intentionally organised for collaborative teamwork, with supervision, shared learning spaces and interprofessional practices. Interviewees describe it as an experience that articulates theory and practice and fosters learning about other professions and multiprofessional work. In contrast, later professional practice in PHC is described as being more strongly shaped by technical, bureaucratic and managerial demands associated with emerging problems and priority needs within health services, particularly in supply-chain demands. In this context, the actual organisation of services and pharmaceutical work in PHC facilities within SUS may constrain the mobilisation of interprofessional competencies developed during residency, making their transfer into everyday practice more difficult. At the same time, there are indications that residency contributes broader elements, such as a wider understanding of PHC attributes, SUS principles and guidelines, healthcare networks and comunication and continuing learning, which may remain relevant across different fields of practice. Preliminary analysis also suggests the importance of distinguishing between practical activities carried out in daily work and the competencies required to perform them in a conscious, grounded and reflective way.

**Conclusion:** These preliminary findings indicate that interprofessional residency is an important training strategy for teamwork in PHC. However, its relationship with subsequent professional pharmaceutical practice suggests tensions between education and the concrete demands of health services. In this sense, the organization of pharmaceutical work can influence the possibilities for mobilizing interprofessional competencies, reinforcing the importance of critical and reflective training that integrates theoretical foundations with practice. In this way, it is possible for pharmacists to develop interprofessional competencies and apply them in any setting.

## Assessing initiatives in promoting green procurement among pharmacists in Accra, Ghana

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**Background:** Green procurement practices form an important aspect of sustainable pharmaceutical supply chains but their use in low- and middle-income countries remains limited. In Ghana, environmental sustainability is increasingly recognised as a priority within the health systems. It is important to understand the level of awareness and preparedness among pharmacists, regarding the adoption of green procurement to promote sustainable pharmaceutical practice. This study addresses an existing research gap by examining current initiatives and challenges influencing community pharmacists in Accra to adopt sustainable procurement practices.

Purpose: This study aimed to evaluate initiatives promoting green procurement among community pharmacists in Accra, Ghana.

**Method:** The qualitative study design was adopted using semi-structured in-depth interview guided by the study objectives. Qualified pharmacists were purposively sampled from community pharmacies within Accra Metropolitan Assembly. Sixteen (16) pharmacists in charge of pharmaceutical procurement were interviewed and audio recorded. The audio data was transcribed verbatim and analysed using thematic analysis to identify emerging patterns and themes related to awareness, educational needs and barriers to implementation.

**Results:** The study found generally low awareness of the concept of green procurement among community pharmacists in Accra, with some respondents encountering the concept for the first time during the interviews. Pharmacists interpreted green procurement as selecting environmentally friendly supplies and ensuring proper waste disposal. Participants identified educational approaches such as seminars, workshops, online programmes, and continuing professional development activities as effective strategies for promoting sustainable procurement. Key barriers included limited integration of green procurement content in pharmacy education, absence of government-led sustainability initiatives, and insufficient practitioner knowledge regarding implementation strategies. Despite the challenges, pharmacists expressed willingness to adopt green procurement practices provided adequate training and institutional support are available.

**Conclusion:** Community pharmacists in Accra demonstrate little understanding of green procurement, although they recognise its importance for environmental protection. The absence of structured institutional support and insufficient integration of sustainable procurement concepts within pharmacy education represent significant barriers. Strengthening awareness initiatives targeting pharmacists and integrating sustainable procurement principles into pharmacy curricula may accelerate the adoption of green procurement within Ghana's pharmaceutical sector.

## Analysis of vaccine hesitancy using machine learning techniques: A structured review

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**Background:** Vaccine hesitancy (VH) remains a major global health challenge, aggravated by the COVID-19 pandemic and the rapid spread of digital misinformation. Conventional public health strategies are often reactive and limited in their ability to anticipate changes in vaccine attitudes. Machine learning (ML) offers a data-driven alternative capable of integrating sociodemographic, psychological, behavioural, and digital indicators to predict VH and uptake patterns. This systematic review examines the application of ML techniques in analysing vaccine hesitancy, with three objectives: (1) to identify key predictors and influencing factors of hesitancy trends, (2) to assess how social media sentiment analysis reflects and shapes vaccine attitudes, and (3) to evaluate the predictive performance of ML models in forecasting vaccine uptake.

**Method:** The review was conducted in accordance with the PRISMA framework. A structured search was performed in Scopus and PubMed databases using predefined keywords related to vaccination, hesitancy, and machine learning. Inclusion criteria comprised English-language journal articles published between 2023 and 2025 within relevant subject areas. Of 432 records identified, 30 studies met the inclusion criteria after screening and eligibility assessment. Quality appraisal was conducted using a six-criterion framework. Data were synthesized thematically to identify recurring predictors, analytical methods, and implications for public health practice.

**Results:** The included studies demonstrated generally high methodological quality, with most achieving strong appraisal

scores. Three overarching themes emerged. First, vaccine hesitancy is shaped by complex sociodemographic, psychological, and political determinants. Predictors consistently included age, education, political affiliation, institutional trust, perceived vaccine safety, conspiracist ideation, and comorbidities. Regional clustering patterns highlighted contextual variability across countries. Second, social media platforms function as both amplifiers of misinformation and valuable data sources for real-time sentiment monitoring. Natural language processing, sentiment analysis, and deep learning approaches demonstrated strong performance in detecting sentiment trends and misinformation narratives. Third, ML based predictive models, including ensemble and deep learning methods, showed robust accuracy in forecasting vaccine uptake, with hybrid and interpretable models improving practical relevance.

**Conclusion:** The findings highlight the potential of ML to enhance public health surveillance and support proactive, targeted intervention strategies. Integrating behavioral theory constructs, demographic variables, and digital sentiment indicators enables earlier identification of populations at higher risk of vaccine hesitancy. However, challenges remain, including data heterogeneity, limited representation of low and middle income countries, inconsistent evaluation metrics, and concerns regarding model interpretability and ethical use. Conclusion: Machine learning provides effective tools for understanding and predicting vaccine hesitancy, particularly when combined with sentiment analysis and hybrid modeling approaches. To facilitate scalable and equitable public health applications, future research should prioritize methodological standardization, explainable AI frameworks, longitudinal data, and interdisciplinary collaboration.

## Professional role orientation – validation of a pharmacy-specific Professional Role Orientation Inventory (PROI*) as adapted from Dentistry

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**Background:** The Professional Role Orientation Inventory (PROI) is a survey designed to assess a healthcare professional's perception of his or her professional role, as defined in terms of Authority, Responsibility, Agency and Autonomy. Pharmacists who differ in their tenure in practice and/or in their professional roles would be expected to differ on the PROI.

How a person views his or her professional role is claimed to influence a wide variety of professional choices and actions. These influences may include the global priority one places on different career options, as well as the more specific way in which a professional interacts with colleagues and clients. Hence an objective measure of professional roles, such as the PROI, has the potential to support self-appraisal and continuing professional development.

Use of the PROI is well established in dentistry. It has been adapted to accommodate the practice of pharmacy and this study reports on the extent to which Pharmacists who differ in their tenure in the profession and/or in their professional roles and/or gender differ on the Professional Role Orientation Inventory (PROI) as adapted for Pharmacy from the Dental PROI, (1991).

**Method:** The 40 questions used by Bebeau, Born and Thoma were adapted where necessary from dentistry specific concepts, by agreement between the researcher (Cicely Roche) and Prof Bebeau, to Pharmacy practice in Ireland. The adapted format was piloted with 5 pharmacists to confirm suitability of item language for the Irish Pharmacy context. The survey was then formatted so that each of the 40 questions had recoded values according to Bebeau, Born and Thoma's earlier work on the dentistry PROI.

Five additional questions facilitated stratification including e.g. based on tenure in the profession, context of undergraduate training, proportion of career in patient-facing role(s) and gender. Following piloting, all 6510 pharmacists registered with the Pharmaceutical Society of Ireland were invited to complete the PROI (Pharmacy], emails having been provided by the Pharmaceutical Society of Ireland for the purpose of the study. Qualtrics Online Survey Software (Qualtrics) was used for this study. A total of 396 responses (6% of the register) were available for analyses.

**Results:** The sample was determined to provide an acceptable representation of the population of pharmacists on the PSI Register at the time of data collection. Variations amongst groups in the context of key independent variables generally correlate with one or more of the four dimensions. Results show dispersal across the dimensions, especially when plotted across the Authority-Responsibility scores. Each of the dimensions was influenced by one or more variables. Differentiation according to tenure in practice and/or in their professional roles, as would be expected to differ on the PROI, is apparent. Further investigation is underway.

**Conclusion:** Initial investigations indicate that the PROI (Pharmacy) can differentiate pharmacists' perception of their professional role, as defined in terms of Authority, Responsibility, Agency and Autonomy.

It therefore has potential value as a tool for self-appraisal for pharmacists. Further studies are needed to explore its use in curriculum to support professional Identity Formation in student pharmacists.

## Scaling innovation safely: Implementing a regulatory sandbox for pharmacist scope of practice in Nova Scotia

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**Background:** A regulatory sandbox is an agile policy tool that allows health professional regulators to test innovations in scope of practice within a controlled environment. This approach ensures that regulatory frameworks keep pace with rapidly changing healthcare needs and primary care demands. In 2022, the Nova Scotia Pharmacy Regulator (NSPR) implemented a regulatory sandbox to enable pharmacist prescribing within the context of specific research or pilot protocols. The primary objective of this work was to foster innovation while maintaining rigorous safeguards and ensuring that any expansion of scope is supported by robust, evidence-based data for long-term regulatory decision-making.

**Method:** A provision was added to the Standards of Practice: Prescribing Drugs to enable pharmacists to prescribe for conditions when participating in a research or pilot project. Guidance was then created for research and pilot teams which outlined requirements for approval of proposed pharmacist expanded scope for the regulatory sandbox. The framework requires project teams to submit evidence of entry-to-practice competencies and potential health system barriers prior to approval. Post-implementation, the submission of raw outcome data ensures regulatory decisions are based on clinical evidence rather than anecdotal success. Process and outcomes data is then used by the NSPR to determine whether to more broadly enable the researched scope for all pharmacists in Nova Scotia.

**Results:** A total of five research and pilot protocols have been submitted and approved through the NSPR's regulatory pharmacist prescribing regulatory sandbox, enabling exploration of pharmacist prescribing for the following: human immunodeficiency virus pre-exposure prophylaxis (HIV PrEP), diagnoses that are already established, pharmacist-diagnosed diabetes and hypertension, sinusitis, otitis media and externa, group A streptococcal pharyngitis, and menopausal hormone therapy. Notably, this framework has already successfully transitioned two high-impact clinical areas (HIV PrEP and GAS pharyngitis) into broad pharmacist authorization across the province.

**Conclusion:** The creation of a regulatory sandbox has proven to be a successful and essential tool for the NSPR, enabling ongoing innovation in pharmacist scope while prioritizing patient safety. By bridging the gap between research and policy, the sandbox ensures that scope evolution is both safe and sustainable. Moving forward, the NSPR intends to expand this model to other domains of practice, including drug administration by injection and point-of-care testing.

## The Jordan pharmacy licensure pathway (JPLP) pilot: A model for modernized international licensure and workforce integration

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**Background:** Nova Scotia is facing significant pharmacy workforce shortages. This shortage is complex and is driven by an aging population with significant care needs, pharmacy professional attrition, and the rapid evolution of the pharmacist's scope of practice, which has expanded the workload beyond traditional dispensing to also include primary care delivery. In 2023, the NSPR used its authority under the Patient Access to Care Act to streamline licensing requirements for five international jurisdictions (Australia, Great Britain, Ireland, New Zealand, United States). In 2025, the NSPR established the Jordan Pharmacy Licensure Pathway (JPLP) pilot, to explore a modernized licensure pathway for pharmacy professionals in Jordan. The objective of the JPLP pilot is to establish, implement, and evaluate an innovative, modernized model that integrates recruitment, modernized licensure, immigration, and resettlement into a single, efficient pathway for internationally educated pharmacy professionals.

**Method:** Unlike one-time high-stakes exams, the JPLP programmatic assessment model utilizes longitudinal performance data to build a comprehensive competency profile for each candidate. This longitudinal approach begins with a competency assessment and an employability assessment conducted in Jordan. Candidates receive robust immigration assistance, pre-departure training, and comprehensive relocation and settlement support. Upon relocation to Nova Scotia, candidates are oriented to life in Nova Scotia and the Canadian healthcare system, assigned a peer support, and issued a "Pharmacist Assessment Candidate" conditional licence, allowing them to practice under the supervision of a pharmacist mentor. Assessment is a continuous, practice-based process where candidates demonstrate their clinical competence in real-life settings over several months. Participating employers are foundational to this model, providing the required practice settings and mentors, and covering both recruitment and resettlement expenses. The Dalhousie Practice Readiness Assessment Program (PRAP) Competency Committee reviews this aggregate performance data to make final licensure recommendations to the NSPR. To ensure the program is both effective and sustainable, a realist evaluation is being

conducted explore "what works for whom, in what circumstances, and why".

**Results:** As of January 2026, 17 pharmacists and their families have successfully relocated from Jordan to Nova Scotia as the first cohort of the JPLP pilot. These candidates are currently practicing in both community and hospital pharmacies in Halifax, Dartmouth, and New Glasgow while undergoing their practice-based assessments. The successful relocation and supervised practice of this first cohort demonstrate the operational feasibility of this integrated model. Early findings gleaned from the first cohort through pragmatic evaluation have already been utilized to refine the model's processes for a subsequent 2026 cohort, which will expand the program's reach to eight additional Nova Scotia communities

**Conclusion:** The JPLP provides a scalable and fair model for international pharmacy recruitment and retention by integrating and aligning a modernized licensure pathway with dedicated employer, immigration, and settlement support. The use of programmatic assessment ensures that licensure decisions are based on sustained clinical performance and successful integration into the Nova Scotia practice environment. The NSPR intends to leverage this model to ensure a robust, resilient, and representative pharmacy workforce for the province.

## Adverse reactions associated with different administration routes of cyclosporine: A pharmacovigilance analysis based on the FAERS database

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**Background:** It is imperative that organ transplant recipients undergo long-term immunosuppressive therapy in order to prevent rejection. Cyclosporine, a calcineurin inhibitor derived from fungi, is widely used in post-transplant immunosuppression. Although clinical trials have demonstrated its safety and efficacy, real-world evidence regarding adverse drug events (ADEs) associated with different administration routes of cyclosporine remains limited. This study utilised the U.S. Food and Drug Administration Adverse Event Reporting System (FAERS) database and employed disproportionality analysis methods to investigate the association between the spectrum of cyclosporine adverse reactions, their timing of occurrence, and the administration route (oral versus intravenous).

**Method:** Cyclosporine-related adverse event reports were extracted from the FAERS database. Disproportionality approaches, including the reporting odds ratio (ROR) and proportional reporting ratio (PRR), were implemented to compare adverse reaction signals and onset patterns associated with oral and intravenous administration.

**Results:** A total of 46,316 cyclosporine-related ADE reports were included, comprising 10,281 associated with oral administration and 3,408 associated with intravenous administration. Oral cyclosporine has been demonstrated to be associated with a higher frequency of ocular and dermatological adverse reactions. Conversely, intravenous cyclosporine has been associated with a greater incidence of infection-related events. Furthermore, a substantial variation in onset time were also observed: Weibull distribution analysis demonstrated a median onset time of 84 days for oral administration and 18 days for intravenous administration. The two routes displayed early failure signals, suggesting that the risk of adverse reactions diminished over time.

**Conclusion:** The types of adverse reactions and their onset timing differ substantially between oral and intravenous cyclosporine. In clinical practice, the appropriate administration method should be selected by comprehensively considering the risk of adverse reactions alongside efficacy assessment.

## Multimodal analgesia: Synthesizing clinical evidence to inform pharmacist led selection and dispensing of nonprescription analgesics

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**Background:** Multimodal analgesia, which employs interventions with complementary mechanisms to improve analgesic efficacy, is increasingly used in community self-care. Pharmacists play a central role in guiding safe and effective short-term use of over-the-counter analgesics, including selection, dosing, risk mitigation, and escalation strategies for optimum pain management. Combination analgesics, including acetaminophen/paracetamol (APAP) and non-steroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen are commonly adopted when monotherapy yields suboptimal pain control and are consistent with observed real-world utilization patterns in pharmacy practice. However, evidence on these combinations is dispersed across heterogeneous pain models and study designs, limiting its utility for frontline decision-making. A consolidated synthesis of available data is

therefore needed to support evidence-based pharmacist-led pain management.

**Method:** A comprehensive literature search of PubMed and Embase was conducted from inception to January 2026. Search strategies utilized both keywords and controlled vocabulary, including terms such as “acetaminophen”, “NSAIDs”, “nonprescription”, “combination analgesics”, “efficacy”, and “safety.” To ensure comprehensive coverage, supplementary searches were performed in Google Scholar and ClinicalTrials.gov. Eligible studies in English language were clinical trials, or post-hoc analyses evaluating oral nonprescription analgesics, including fixed-dose combinations (FDCs) and loose-dose combinations (LDCs). Only pharmacological interventions were included in the synthesis, non-pharmacological pain management approaches were reviewed but not formally appraised.

**Results:** Thirty clinical studies (12,124 participants, ≥16 years) were identified across acute pain conditions, including postsurgical dental pain, osteoarthritis flares, episodic or tension-type headache, and acute musculoskeletal or low-back pain. All studies evaluated multimodal analgesia through FDCs or LDCs of APAP with NSAIDs primarily ibuprofen, followed by diclofenac, naproxen, aspirin-caffeine, and aceclofenac. APAP-ibuprofen combinations, evaluated extensively in both FDCs and LDCs, consistently outperformed monotherapy demonstrating faster onset, greater pain-intensity reduction, and reduced rescue-medication use, especially in dental pain, with several studies also reported opioid-sparing effects. APAP-ibuprofen FDCs often showed better predictable analgesic profiles than LDCs and were associated with higher patient satisfaction. Other combinations such as APAP-diclofenac and APAP-naproxen provided additional benefits in dental pain, headache, and osteoarthritis flares, with naproxen offering prolonged analgesia (~12 hours) complementing APAP’s rapid onset in post-operative dental pain. APAP-aspirin-caffeine FDCs improved speed and magnitude of relief in episodic headache. Limited evidence for APAP-aceclofenac suggested early, clinically meaningful improvement in osteoarthritis flares. In contrast, neither FDCs nor LDCs outperformed monotherapy in acute musculoskeletal or low-back pain. Across studies, FDCs demonstrated practical advantages, including reduced pill burden, and simplified dosing, potential advantages in self-care. Both FDCs and LDCs were generally well tolerated in short-term use.

**Conclusion:** Multimodal analgesia using paracetamol-NSAIDs combinations provides clinically meaningful improvements over monotherapy in acute pain conditions relevant to community pharmacy practice. Evidence appears strongest and widely available in self-care for paracetamol-ibuprofen, while emerging data suggests potential benefits of other combinations with longer duration benefit when paracetamol is combined with naproxen. FDCs further enhance practical use through simplified dosing and reduced pill burden. These findings support pharmacists in delivering evidence-based, safe, and effective self-care recommendations within multimodal acute pain management.

## Society 5.0 and pharmacy 5.0: A multi-dimensional research framework

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**Background:** Society 5.0 is a vision of future society – a society where technology such as artificial intelligence, the Internet of Things, and big data analytics integrate with the physical space to create a human-centred "super-smart society." Society 5.0 promotes the integration of advanced digital technologies into societal systems to address complex demographic and healthcare challenges. Within this macro-framework, Pharmacy 5.0 represents the strategic digital transformation of pharmaceutical care toward predictive, preventive, personalised, and participatory models. Although technological innovation promises enhanced clinical performance and system efficiency, empirical validation of its multidimensional impact—including ethical and ecological implications—remains limited.

**Method:** A conceptual research design was applied using an integrative literature review and thematic synthesis across digital health, pharmacy practice, sustainability science, and health governance domains. Based on the identified constructs, a multi-layer analytical framework was developed that links technological adoption, professional transformation processes, outcome indicators, and risk domains. The model proposes empirically testable relationships and measurable performance metrics suitable for quantitative and mixed-method research designs.

**Results:** The framework conceptualises technological enablers (AI-based clinical decision support, telepharmacy, robotic dispensing, smart adherence monitoring, blockchain traceability) as independent variables influencing pharmacy process transformation (digital workflow integration, personalised pharmacotherapy, predictive analytics). Proposed measurable indicators include medication error rate reduction, adherence improvement percentages, digital maturity scores, patient satisfaction indices, cost-efficiency ratios, and carbon footprint metrics of digital infrastructure. Three core hypotheses are advanced:
H1: Higher digital integration levels are positively associated with improved medication safety and therapeutic outcomes. Such a hypothesis would lead to the pharmaceutical sector becoming a leader in sustainability, with increased patient confidence and reduced costs.
H2: Digital competency of pharmacists mediates the relationship between technology adoption and patient-centred outcomes. Most companies are introducing smart systems, but energy consumption is increasing. Regarding data privacy, patients are concerned about the misuse of health information. This realistic scenario results in pharma thriving, but sustainability depends on regulation and global cooperation.
H3: Without structured governance, increased digitalisation correlates with elevated ethical, cybersecurity, and ecological

risks, including energy-intensive data processing and electronic waste generation. Lack of regulation leads to patient data being misused and trust declining. This pessimistic scenario highlights the inequality: only rich countries have access to smart medicines and logistics.

**Conclusion:** Pharmacy 5.0 provides a strategic operationalisation of Society 5.0 within pharmaceutical care. Future empirical research should investigate digital maturity indicators, sustainability metrics, and governance mechanisms to balance technological innovation with ethical integrity, environmental responsibility, and equitable patient-centred care.

## Medication systems and the Belém health action plan: An international pharmacist commentary on climate-health implementation

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**Background:** The 2025 WHO COP30 Belém Health Action Plan (BHAP) provides a comprehensive framework for strengthening health systems in response to climate change, including surveillance, workforce development, financing, governance, infrastructure, and equity. Medications and pharmaceutical systems intersect with each of these domains: they are essential to emergency preparedness, infectious disease response, chronic disease management, patient accessibility, and health system resilience. At the same time, pharmaceutical systems contribute to environmental impacts and are also vulnerable to the climate crisis. As countries operationalize the Belém Health Action Plan, there is an opportunity to further articulate how medication systems can support its implementation. This commentary maps pharmaceutical considerations to the Plan's recommendations, offering a practical implementation resource for pharmacy leaders and health systems.

Purpose: To develop structured, medication-specific commentary aligned with each recommendation of the Belém Health Action Plan, supporting pharmacy leaders, policymakers, and health systems in integrating pharmaceutical strategies into climate-health implementation.

**Method:** An international working group of planetary health–focused pharmacists with professional backgrounds across eight countries (Australia, Canada, Egypt , Lebanon, Nigeria, UAE, United Kingdom, United States) conducted a structured collaborative review of the Belém Health Action Plan recommendations. Each recommendation was analyzed to identify intersections with medication systems. Medication-focused commentary was organized to align with the BHAP domains of governance, clinical practice, operations, research, and monitoring. Through iterative consensus discussions, the group developed corresponding medication-related commentary, drawing on expertise in procurement, formulary management, antimicrobial stewardship, supply chain resilience, pharmaceutical policy, digital health, and sustainable healthcare operations.

**Results:** Medication-relevant considerations were identified across all major pillars of the Belém Health Action Plan. Cross-cutting themes that emerged included:

1. Integrating pharmaceutical data into climate-informed surveillance and early warning systems
2. Supporting climate-resilient procurement, stockpiling, and cold chain infrastructure for essential medicines
3. Strengthening transparent,diversified, and resilient pharmaceutical supply chains, and improving resilience of individual community pharmacies and hospital pharmacies
4. Embedding equity-focused access planning for vulnerable populations during climate disruptions
5. Expanding antimicrobial stewardship in the context of climate-sensitive infectious disease patterns
6. Promoting sustainable prescribing practices including , inhaler transition strategies, and pharmaceutical waste reduction
7. Establishing medication-specific sustainability and resilience indicators as key quality metrics within monitoring and evaluation frameworks

The final output was a structured commentary document aligning medication systems with each BHAP recommendation, offering implementation-ready considerations for pharmacy leaders and health systems.

**Conclusion:** Medication systems are integral to achieving the objectives of the Belém Health Action Plan (BHAP). This international pharmacist-led commentary provides a practical implementation framework between global climate-health commitments and pharmaceutical policy and practice. The framework may support national pharmacy associations, regulators, and health systems in embedding medication considerations into climate adaptation and climate mitigation strategies. Finally, future work includes piloting implementation within health systems and developing measurable pharmaceutical climate indicators aligned with global reporting frameworks.

## Operational models for hospital reuse of metered-dose inhalers: A review of infection control practices and implementation strategies

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**Background:** Pressurised metered-dose inhalers (MDIs) are used in hospitals for the acute treatment of respiratory symptoms and are typically dispensed as patient-specific medications, despite containing many actuations per canister. For example, ipratropium MDIs contain approximately 200 actuations, yet in paediatric emergency departments they are administered to a single patient during a brief encounter and then discarded. Consequently, only approximately 10 to 15% of doses are used, leaving most actuations unused and contributing to medication waste.

Beyond drug wastage, MDIs have a recognised environmental impact because their propellants contain hydrofluorocarbons (HFCs), potent greenhouse gases released during use and disposal. Estimates suggest that 100 MDI actuations correspond to a carbon footprint comparable to a 290-km car journey. In response to medication shortages, pandemic-related supply disruptions, budget restrictions and growing interest in sustainable healthcare, several institutions have developed hospital-based MDI reuse protocols. However, no internationally endorsed guideline governs this practice, and concerns regarding cross-contamination persist. The objective of this project is to review published hospital-based MDI reuse protocols and characterise operational models, infection control practices, and implementation strategies across institutions.

**Method:** A structured narrative review of peer-reviewed studies, institutional policies, quality-improvement reports, and national evidence syntheses describing hospital-based MDI reuse was conducted up to March 12th, 2026, using PubMed/MEDLINE, Google Scholar, and grey-literature sources. References were eligible if they described reuse of pressurised MDIs in hospital or ambulatory settings and reported operational details regarding device handling, cleaning procedures, or programme outcomes. Data extracted included research setting, personnel involved, cleaning methods, device disassembly practices, spacer use, storage practices, and outcomes measured.

**Results:** Twelve published protocols were identified. Most were conducted in inpatient settings (91.7%), with one in an ambulatory setting (8.3%). Five protocols (41.7%) were developed during the COVID-19 pandemic to address inhaler shortages and supply disruptions, while the remainder were implemented as part of routine clinical care or quality-improvement initiatives. Pharmacy staff performed device cleaning in three protocols (25.0%), while respiratory therapists conducted device cleaning in seven (58.3%). Cleaning was performed by nursing staff in two protocols (16.7%), by sterile processing personnel in one protocol (8.3%), and by microbiology personnel in one protocol (8.3%). Most protocols reported surface disinfection of patient-contact inhaler components (83.3%), most commonly using 70% isopropyl alcohol, with one protocol incorporating sterilisation of actuator components (8.3%). Disassembly prior to cleaning was reported in seven protocols (58.3%), while four did not specify component separation (33.3%), and one identified no cleaning steps (8.3%). Spacers or valved holding chambers were used in all patient-administration protocols (100%).
Five studies (41.7%) performed microbiological cultures before and after cleaning; post-disinfection cultures showed no detectable differences in bacterial growth (rates below 6%), suggesting effective decontamination under the described procedures.

**Conclusion:** Hospital MDI reuse protocols consistently incorporate alcohol-based disinfection, device disassembly, and patient-specific spacers as infection-control safeguards. Available microbiological evidence suggests contamination rates below 6% when structured cleaning procedures are followed. However, further research is needed to better characterise infection risk and support the development of standardised, evidence-based protocols for safe hospital MDI reuse.

## From fragmented guidance to a global hazardous medicinal products list: A framework for international collaboration

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**Background:** Healthcare professionals routinely handle hazardous medicinal products (HMPs) with carcinogenic, mutagenic, reproductive, or other toxic properties. Historically, occupational safety efforts focused primarily on cytotoxic chemotherapy; however, contemporary healthcare practice now involves a broader range of potentially hazardous medicinal products, including biologics, hormonal therapies, and targeted agents. Despite this evolution, the identification of HMPs continues to rely largely on national

lists and fragmented guidance. Pharmaceutical innovation increasingly outpaces the capacity of national authorities to consistently evaluate occupational exposure risks. Consequently, healthcare institutions are often required to independently update the HMPs lists and associated policies, leading to variability in safety practices and placing a significant burden on local pharmacy teams responsible for protecting healthcare workers.

**Method:** This initiative proposes a conceptual, comparative framework to examine how HMPs are identified and managed across diverse healthcare systems. National hazardous drug lists and occupational safety guidance from regions including the United States, Canada, Europe, and other international healthcare settings will be used as reference points for comparison. The framework will assess shared principles, identify key differences, and highlight gaps in the classification of hazardous medicinal products, including approaches to protective handling and occupational exposure risk management. Findings from this comparative analysis are intended to inform the development of shared criteria and support an internationally coordinated approach to maintaining a dynamic hazardous medicinal product reference list.

**Results:** Existing hazardous drug lists remain essential tools for identifying medicinal products requiring special handling; however, they are typically developed at the national level and are often static and not routinely updated. As the number and complexity of medicinal products continue to increase, maintaining a comprehensive and current hazardous medicinal product list has become increasingly challenging for any single organisation or national authority. New drugs, biologics, and advanced therapies are introduced at a pace that exceeds centralised evaluation processes, leaving healthcare institutions responsible for independently assessing many occupational risks. This contributes to variability in interpretation, implementation, and safety practices across healthcare systems. These limitations underscore the need for an internationally collaborative framework, in which experts from multiple regions work together to establish shared criteria for identifying hazardous medicinal products and to continuously evaluate emerging therapies. Such an approach would support the development of a dynamic and evolving reference list that can adapt to ongoing pharmaceutical innovation, while providing a centralised resource for healthcare institutions worldwide.

**Conclusion:** This work proposes the development of an internationally coordinated hazardous medicinal product reference list to support the consistent identification of medicines requiring occupational safety precautions. Such a framework would complement existing national guidance while enabling collaborative evaluation of new and emerging therapies by experts from different regions. A globally coordinated reference list could provide healthcare workers with a single, reliable resource for identifying hazardous medicinal products and implementing appropriate safety measures. By reducing the need for individual healthcare institutions to independently assess hazardous drug risks, a centralised and continuously updated reference could enhance consistency in occupational safety practices and strengthen protection for healthcare workers as healthcare systems adapt to rapidly evolving therapies.

## Multiprofessional role in HIV pre-exposure prophylaxis prescription: A comparative analysis of access and equity within the Brazilian unified health system

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**Background:** The HIV epidemic remains a priority public health challenge, and while Pre-Exposure Prophylaxis (PrEP) is a highly effective biomedical strategy, structural barriers and service centralisation limit equitable access. Task-sharing, involving the inclusion of non-medical professionals such as nurses and pharmacists in PrEP prescribing, is recognised globally as a tool for expanding health coverage. In Brazil, the integration of pharmacist prescribing since 2022 aims to increase access points and qualify care, particularly for historically marginalised groups. This study aimed to analyse and compare oral PrEP prescribing performed by nurses, pharmacists, and physicians, evaluating the sociodemographic profile and HIV vulnerability of users within the public health system.

**Method:** This is a quantitative, observational, cross-sectional, and comparative study based on secondary monitoring data collected in the Federal District, Brazil. The study setting comprised health services linked to the Federal District Health Department, specifically within the context of the PROFARMA-SUS project, which implemented pharmaceutical prescribing following theoretical-practical training. The study population included users with at least one oral PrEP dispensation recorded between January 2018 and October 2025. Records from physicians, nurses, and pharmacists were compared regarding service network, user profile, and continuity of care. Discontinuity was defined as the absence of medication dispensation in the last 12 months or the lack of a valid dispensation at the end of the monitoring period. Descriptive analysis and Pearson's chi-squared test were utilised to verify associations between professional categories and user profiles, with statistical significance set at $p < 0.05$. The study adhered to ethical guidelines and was approved by the Research Ethics Committee of the University of Brasília (Opinion No. 7.185.344).

**Results:** The sample included 6,860 individuals. Significant differences were observed in the distribution of care

according to service location ($p < 0.001$). Pharmaceutical activity was primarily concentrated in Primary Health Care (91.0%), whereas physicians (71.0%) and nurses (73.0%) operated predominantly in Specialised Services. Regarding administrative nature, nursing (100.0%) and pharmacy (98.7%) activities were almost entirely within the public sector, while 63.1% of medical consultations occurred in the private sector. Sociodemographic analysis revealed that nurses and pharmacists attended higher proportions of Mixed-race (Pardo) and Black users (61.0% and 57.0%, respectively) compared to physicians (45.0%; $p < 0.001$). Nursing showed the highest insertion among priority populations, including people deprived of liberty (3.6%), alcohol users (66.8%), and sex workers (5.0%; $p < 0.001$). Furthermore, the 12-month continuity rate was higher among users followed by pharmacists (97.9%), followed by nurses (80.6%) and physicians (72.4%).

**Conclusion:** The expansion of the prescribing scope to pharmacists and nurses appears to contribute to widening PrEP access among vulnerable populations. The concentration of pharmaceutical care in Primary Health Care and the prominent role of nursing in the public network signal a potential for decentralising care and reducing inequities in access to combined HIV prevention technologies. Future integrated training strategies may further enhance the role of multiprofessional teams in promoting health equity.

## Simulation-based assessment of pharmacist's clinical competencies in prescribing and dispensing HIV prophylaxis

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**Background:** The HIV epidemic remains a global public health challenge. In Brazil, according to the Ministry of Health, more than 1.1 million cases have been reported since 1980, with an annual average of 36,000 new diagnoses. Pre-exposure prophylaxis (PrEP) and post-exposure prophylaxis (PEP) are integral to the combination prevention strategy and demonstrate high efficacy when coupled with adherence and clinical monitoring. Since 2022, the pharmaceutical prescription of these prophylaxes has been nationally endorsed in Brazil, expanding the clinical scope of pharmacists within the Unified Health System (Sistema Único de Saúde - SUS). However, despite this expanded role, evidence regarding the clinical competencies required for prescribing and dispensing PrEP and PEP remains scarce in the country. Given that realistic simulation has emerged as a robust method for performance evaluation, this study aimed to assess the clinical competencies of pharmacists in the prescription and dispensing of HIV prophylaxis, analysing their performance and decision-making through of simulated approach.

**Method:** A post-intervention, single-group observational study was conducted with pharmacists from the Federal District Health Secretariat (SES-DF) following their participation in a theoretical training course promoted by the University of Brasília. At the end of the training, participants performed clinical simulations with standardized patients at the Laboratory of Evidence and Pharmaceutical Studies. Performance was evaluated by three independent judges using validated instruments: PSAL-BRASIL (for prescription) and DISP-BRASIL (for dispensing), both comprising 15 criteria across five dimensions (total score 0–30). Competencies were classified into initial (0–10), intermediate (11–20), and advanced (21–30) levels. Descriptive statistics and association tests (Chi-Square or Fisher's Exact Test) were applied, with a significance level of $p<0.05$.

**Results:** A total of 98 pharmacists (75.4% of those enrolled) participated, predominantly women (76.5%) and holding specializations (57.1%). Although 62.2% reported prior training in PEP, 32.7% had never prescribed or dispensed this prophylaxis; for PrEP, 62.2% had no prior practical experience. In the prescription simulation (n=51), both PrEP and PEP achieved an advanced level of competence (mean scores of 25.87 and 24.05, respectively). Verbal and non-verbal communication reached 100% compliance. The main gap identified was in providing guidance on warning signs (60.0% for PEP; 30.8% for PrEP). In the dispensing simulation, PrEP reached an advanced level (21.1 points) while PEP was at a borderline intermediate level (20.6 points). Weaknesses were identified in safety assessment (0% in both groups), technical data recording (13.0% for PEP), and guidance on storage/disposal (a significant difference between groups; $p<0.001$). In the overall comparison between prescription and dispensing, prescription showed superior performance in use instructions (92.2% vs. 63.8%; $p=0.002$) and in addressing warning signs (58.8% vs. 29.8%; $p=0.007$).

**Conclusion:** Realistic simulation proved to be an effective strategy for measuring clinical competencies in HIV prophylaxis. Prescription prompted a more complete care plan compared to dispensing, suggesting greater clinical accountability in this context. Although overall performance was satisfactory, particularly in communication and anamnesis, gaps persist in pharmacovigilance, safety, and documentation. Continuing education programs should prioritize these dimensions to enhance the pharmacist's role in combination prevention and to expand safe access to PrEP and PEP.

## Healthcare resource utilisation among patients with epilepsy in Lebanon: Patterns of care, antiseizure medication use, and the role of seizure recurrence

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**Background:** Epilepsy imposes a substantial burden on health systems worldwide. In Lebanon, prolonged socioeconomic and health system crises have severely disrupted the availability and affordability of antiseizure medications (ASMs) and healthcare services. However, evidence on healthcare resource utilisation (HRU) among Lebanese patients with epilepsy, and how it differs according to seizure control, remains limited. This study aimed to characterise HRU patterns among Lebanese patients with epilepsy; including hospitalisation, outpatient consultations, diagnostic investigations, ASM use, and medication procurement sources, and to compare these patterns between patients with and without seizure recurrence during the previous 12 months.

**Method:** A national cross-sectional study enrolled adults with confirmed epilepsy across all Lebanese governorates. Participants were stratified by recent seizure activity (seizure during the previous 12 months). Data were collected over a three-month recall period on inpatient and day-case admissions, neurologist consultations, diagnostic investigations (EEG, MRI, CT, blood tests, and ASM serum levels), number and type of ASMs, medication procurement sources, informal and formal care support, transportation use, and financial aid receipt. Cross-tabulations stratified by seizure recurrence were performed using SPSS.

**Results:** Among 578 participants, 340 (58.8%) had reported uncontrolled seizures in the previous 12 months. Inpatient admissions were recorded in 82 patients overall (14.2%), with a notably higher rate among uncontrolled patients (17.6% vs 9.2%). Day-case admissions followed a similar pattern (18.8% vs 8.0%). Neurologist consultations in the preceding three months were required by 199 patients (34.4%), rising to 42.9% among those with uncontrolled seizures compared with 22.3% in the controlled group. Diagnostic investigations were undertaken by 175 patients (30.3%) overall, with blood tests (21.1%), MRI (14.9%), and EEG (13.0%) being the most frequently performed; rates were consistently higher among those with uncontrolled seizures. All patients (100%) were on at least one ASM (mean 1.31 ± 0.52), with sodium valproate (36.7%), levetiracetam (28.5%), carbamazepine (22.8%), and lamotrigine (17.5%) being the most common. Patients with uncontrolled seizures used slightly more ASMs on average (1.38 ± 0.58 vs 1.20 ± 0.41). Community pharmacies were the primary ASM source (93.9%), followed by hospital pharmacies (13.5%), primary care dispensaries (12.8%), and humanitarian aid donations (10.9%); 3.3% reported relying on online or informal sources. Informal care was reported by 22.0% of patients (25.9% uncontrolled vs 16.4% controlled), transportation to healthcare providers was used by 20.9%, and only 9.3% received financial aid in the three months prior to the survey.

**Conclusion:** Lebanese patients with epilepsy, particularly those with uncontrolled seizures, exhibit substantially higher rates of hospitalisation, specialist consultations, diagnostic testing, and informal care use. These patterns suggest that seizure recurrence is a key driver of healthcare resource utilisation, with hospitalisations, diagnostic investigations, and medication use representing important contributors to the economic burden of epilepsy. The near-universal reliance on community pharmacies, combined with dependence on humanitarian donations and informal sources for a meaningful minority, highlights fragile medicines access in crisis-affected Lebanon. These findings highlight an urgent role for pharmacist-led ASM management programmes and policies ensuring advocacy for uninterrupted medication supply to reduce the burden of epilepsy in this vulnerable population.

## Multi-stakeholder co-production of a service to reduce medication harm of older adults with sensory impairment (OAwSI)

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**Background:** More people are living longer due to improved sanitation and better healthcare. Older age (> 65 years) is associated with higher prevalence of multi-morbidity and polypharmacy. Older adults with sensory (visual and/or hearing) impairment (OAwSI) experience multiple medicine-related challenges resulting in harm and sub-optimal treatment.
Until recently, minimal empirical research had been undertaken of the needs and strategies to support medicines optimisation in OAwSI. The Sensory Impairment and Pharmaceutical cAre (SIPA) studies have generated much of the available evidence using the concept of the "medicine journey" (consultation, ordering, obtaining, storing, administering, disposal). Data from the SIPA studies has informed the development of a massive open online course (MOOC) ((https://www.futurelearn.com/courses/supporting-medicine-use-by-older-people-with-sensory-impairment)). A searchable online resource, SensorySupport4Medicines (https://www.sensorysupport4medicines.uk/), has also been created and launched in to 'match' products and devices to specific medicine-related needs.
The aim of this study was to adopt a multi-stakeholder approach to co-produce a set of functional and non-functional requirements for medicine-related services and products to support and enable the medicine journey of OAwSI. Functional requirements include what a service or product should do and how it should look, feel, and behave. Non-functional requirements include the usability, accessibility, and feasibility of a service or product.

**Method:** The study comprised a design-informed co-production process with multiple stakeholders and formal consensus. A pre-coproduction event was convened to select the tools to be used throughout the process. An Evidence Brief was developed and disseminated in accessible formats. Co-production comprised a workshop involving Deliberative Dialogue of the Evidence Brief followed by user journey mapping, Rose, Bud, Thorn, and MoSCoW design processes, to generate service and product specifications. The final stage was to derive consensus using a 2-round electronic Delphi study with consensus defined a priori as 80% agreement or disagreement with each statement. The study was conducted in Scotland, UK. Patient and Public Involvement (PPI) participants included OAwSI, carers of OAwSI, and charity and advocacy organisations, as well as Professional and Policy participants i.e. health and social care professionals.

**Results:** In total, 27 participants attended the co-production workshop (with a further six providing offline contribution). Of 232 items generated, removal of duplications and combining similar items resulted in 77 statements for inclusion in the consensus process. Delphi Rounds 1 and 2 were completed by 28 and 26 respondents, respectively; most were OAwSI. Consensus was achieved with 76 of 77 statements, most (n=58) of which exceeded 90% agreement. Two statements did not achieve consensus. Most statements were associated with service rather than product specifications.

**Conclusion:** This study achieved meaningful, inclusive and collaborative multi-stakeholder co-production with high levels of consensus being reached for medicine-related service specifications. Whilst the original intention had also been to generate product specifications, few items that were generated related specifically to products. The majority of participants were OAwSI and their sustained involvement throughout both stages and Delphi rounds reflects their engagement with the study and the person-centred methods used to meet their needs and facilitate their participation.

## Strengthening pharmacists' capacity to address neglected tropical diseases: Alignment with FIP Development Goals in a Brazilian initiative

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**Background:** Neglected tropical diseases (NTDs) remain a major global health challenge, disproportionately affecting vulnerable populations in endemic regions such as the Brazilian Amazon. Pharmacists are strategically positioned to contribute to early detection, patient counselling, and therapeutic management; however, gaps in training and access to updated scientific information may limit their effectiveness. This study aimed to assess pharmacists' knowledge, attitudes, and practices (KAP) regarding NTDs and to implement targeted educational interventions aligned with the International Pharmaceutical Federation (FIP) Development Goals.

**Method:** A structured, national cross-sectional online survey based on a Knowledge, Attitudes and Practices (KAP)

framework performed from April 2022 to November 2022 was administered to pharmacists, incorporating predefined categorical domains covering prevalent neglected tropical diseases, co-endemic conditions, patient-centered barriers, perceived health system challenges, priority diseases, and professional development needs; responses were systematically analyzed using descriptive statistics and thematic stratification to support the development of a clinically oriented, epidemiologically informed pharmaceutical decision-support algorithm.

**Results:** A total of 116 pharmacists answered the survey, with a predominance of female respondents (69%) and a notable representation from Acre state (26.1%), an endemic NTDs setting. Approximately 34% had between one and five years of professional experience, and 67.2% reported direct involvement in NTD-related activities. Dengue, malaria, Chagas disease, tuberculosis, leprosy and leishmaniasis were identified as priority conditions. While most participants reported updating their knowledge through professional events (79.1%), 95.6% expressed a strong need for structured continuing education, highlighting a critical gap in workforce preparedness.
Based on these findings, two evidence-based educational guides addressing key technical aspects of major NTDs were developed and disseminated. Knowledge translation activities conducted at local, regional, and national levels reached over 1,000 pharmacists. Furthermore, ongoing work focuses on the development of clinical–epidemiological algorithms to support pharmacists' decision-making, with particular focus on pharmacists leaving in remote areas, during patient assessment of suspected NTD cases. These initiatives directly contribute to FIP Development Goals related to labour force development (DG5), continuing professional development (DG9), and impact on patient outcomes (DG11).

**Conclusion:** This study identifies significant gaps in pharmacists' preparedness to manage NTDs and suggested that targeted, scalable educational interventions can effectively strengthen professional competencies. By aligning with FIP Development Goals, this initiative provides a model for workforce development and knowledge translation that can be adapted to other endemic and resource-limited settings, ultimately enhancing pharmacists' contribution to global health.

## Strategic outputs of the federal council of pharmacy's public health working group: Contributions to strengthening public health policy in Brazil

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**Background:** The Public Health Working Group (PHWG) of the Brazilian Federal Council of Pharmacy (CFF) comprises experts in pharmaceutical services, clinical care, and public health management, alongside PhD-level academics. In recent years, the PHWG has focused on consolidating the pharmacist's role within the Unified Health System (SUS), addressing regulatory gaps and enhancing the visibility of clinical practices through technical documents and normative frameworks.

Purpose: To describe the technical productions of the Public Health Working Group between 2024 and 2025, aimed at qualifying pharmaceutical services and strengthening the pharmacist's integration into multidisciplinary public healthcare.

**Method:** This is a descriptive study of the outputs generated by the CFF Public Health Working Group in the period spanned from January 2024 to December 2025. There were included technical publications such as brochures, manuals, and editions of the "Successful Experiences of Pharmacists in the SUS" journal, as well as the drafting of proposed Resolutions.

**Results:** During the study period, the PHWG delivered significant resources to qualify the pharmacist's role in public health. Key outputs included: 1) a guidance for pharmacists in Multidisciplinary Primary Care Teams (eMulti); 2) a manual for recording pharmacists' clinical activities in the SUS database; 3) technical guide on the New Brazilian Public Procurement Law and its applicability to essential medicine acquisition; 4) Clinical guidelines for iron supplementation; and 5) a comic book on vaccines for indigenous populations, published in Portuguese and the Tupi dialect. Additionally, the Working Group drafted a legislative proposal for Mobile Pharmacy activities, leading to the publication of Resolution No. 16/2025. In 2024, the 9th edition of the "Successful Experiences of Pharmacists in the SUS" journal was published (featuring 55 reports from various public health fields), followed by the call for the 10th edition. These initiatives provided a standardised framework for clinical and

administrative excellence, fostering evidence-based management and patient-centred care.

**Conclusion:** The Public Health Working Group's outputs reaffirm its strategic role in providing technical and political support to the CFF. By bridging the gap between regulation and practice, these productions have contributed to enhancing pharmaceutical activities and increasing their visibility, demonstrating the pharmacist's essential value in improving health outcomes in Brazil.

## Development and evaluation of a regional prescription review and evaluation model under pharmacist workforce shortage: Haidian's practice based on a government-led, hospital-supported, pharmacist-delivered (GHP) model

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**Background:** Pharmacist workforce shortage is a common challenge in primary care systems. In China, the 2024 Statistical Communiqué on the Development of Health Care in China reported only 0.42 pharmacists per 1,000 population.[1] Previous global data showed an average pharmacist density of 6.02 per 10,000 population,[2] while 2025 materials from the International Pharmaceutical Federation indicated an average of 12.1 per 10,000 population in high-income countries.[3] Studies in Chinese primary care have also shown insufficient pharmacist staffing, limited training in rational medicine use, and restricted pharmacist roles within family doctor teams.[4] Although existing practice in China suggests that administrative coordination and hospital pharmacist support for primary care are feasible, there is still limited evidence on scalable and sustainable regional prescription review and evaluation systems.[5] Therefore, exploring a government-led, hospital-supported, pharmacist-delivered (GHP) model is of practical importance.

Purpose: To develop and evaluate a regional prescription review and evaluation model based on the GHP model, and to assess its effects on management coverage, review efficiency and prescription quality in primary care institutions under pharmacist workforce shortage.

**Method:** A regional prescription management model based on the GHP model was established in Haidian District, Beijing. Health authorities were responsible for system design, coordination and quality supervision. Secondary and tertiary hospitals provided technical support, professional training, consultation for complex prescriptions and rule maintenance through regional prescription review and evaluation centres. Primary care pharmacists were responsible for prospective prescription review, feedback and correction of problematic prescriptions, and prescription evaluation. A three-level workflow was implemented: information system screening, primary care pharmacist review and district expert final review. A rotating team of hospital pharmacy experts and trained primary care pharmacists carried out routine prescription review and evaluation. Review rules for Chinese and Western medicines were continuously optimised, and regional evaluation standards were progressively unified. Outcomes included institutional coverage, prescription approval rate, prescription evaluation workload and primary care prescription qualification rate.

**Results:** Since implementation in January 2025, the GHP model has covered more than 200 community health service institutions in Haidian District, achieving near-complete regional coverage. In 2025, 10,655,566 prescriptions were reviewed, a 21.46% increase from 2024. The main problems identified were inappropriate indications (52.6%), inappropriate dosage and administration (32.4%), contraindicated use (11.1%) and duplicate medication (4.2%). The prescription approval rate increased from 96.2% in 2024 to 97.2% in 2025. A total of 293,364 prescriptions underwent evaluation in 2025, representing a 44.42% increase from 2024. The primary care prescription qualification rate rose from 94.60% to 97.26%, while the proportions of non-standard, inappropriate and abnormal prescriptions all declined.

**Conclusion:** The Haidian practice shows that the GHP model can achieve large-scale, continuous and relatively standardised prescription review and evaluation in primary care under limited pharmacist resources, while improving prescription quality. This model provides a practical and replicable regional solution for rational medicine use governance in settings with pharmacist workforce shortage.

## Vocation under strain: Determinants of career choice, job satisfaction, and mobility intentions among pharmacists in Costa Rica

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**Background:** Pharmacy workforce distribution is an established determinant of health system performance, yet in Latin America the individual and structural factors shaping pharmacists' career decisions remain poorly documented. Costa Rica presents a particularly relevant context: its pharmacy workforce has diversified rapidly across practice

areas, yet no national evidence exists on the drivers of professional area selection, the conditions sustaining workforce engagement, or the factors motivating career transitions and emigration. This evidence gap limits the capacity for strategic health workforce planning.

**Method:** A cross-sectional study was conducted using a structured online questionnaire administered over 27 days in February 2026 through institutional email and social media channels of the Costa Rican Pharmacists Association. Eligible participants were registered, active pharmacists. Of 315 responses received, 307 met inclusion criteria. Variables encompassed sociodemographic and academic characteristics, primary and secondary practice areas, motivations for area selection, working conditions, multidimensional job satisfaction, and intentions to transition areas or emigration. Descriptive statistical analysis was performed.

**Results:** Among 307 respondents, 70% were female, 34% were aged 40–49 years, and 81% resided in the Greater Metropolitan Area. Community pharmacy was the most common primary practice area (30.3%), followed by administrative and commercial management (15.3%), hospital/clinical pharmacy (14.7%), and pharmaceutical industry (13.4%). Personal vocation was the primary motivation for area selection among 37.1% of respondents; conversely, 10.4% reported entering their current area primarily due to a lack of alternative opportunities. Regarding training, 62% rated undergraduate clinical preparation as low or very low in quality, a finding that contextualises subsequent satisfaction data. Although 87–89% reported that their work contributes meaningfully to public health and patient wellbeing, only 32% perceived real opportunities for salary improvement or professional advancement. This disparity between high perceived social impact and limited structural prospects was directly reflected in career intentions: 56% expressed interest in transitioning to a different pharmaceutical area, most commonly regulatory sciences, hospital pharmacy, research and teaching, while, beyond internal mobility, 57% had considered emigrating for professional reasons.

**Conclusion:** Costa Rican pharmacists demonstrate strong professional purpose; however, structural conditions, including limited salary progression, restricted advancement pathways, and perceived deficiencies in clinical training, represent meaningful threats to long-term workforce retention. The coexistence of high perceived social impact and constrained career prospects points to emerging pressures for both internal mobility and international migration. Although findings derive from self-reported data from a voluntary, non-probabilistic sample, their consistency and scale underscore the need for strategic workforce policies. Strengthening clinical education, establishing transparent career development pathways, and improving remuneration structures will be essential to sustaining a pharmacy workforce capable of meeting Costa Rica's evolving health system demands. These findings also offer a transferable framework for pharmacy workforce assessment across Latin America, where comparable evidence remains scarce.

## Inventory of national medicines policies in selected high-income countries: Alignment of contents supporting rational pharmacotherapy in accordance with WHO guidance

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**Background:** The pharmaceutical system is a critical component of national health systems, supporting disease prevention and treatment. As complex and dynamic entities, pharmaceutical systems must address country-specific health needs while functioning within globally interconnected supply chains, regulatory structures, and market dynamics. This dual position, national responsibility embedded within international interdependence, highlights the need for coherent national medicines policies (NMP) capable of guiding system development, balancing local priorities with global pressures. Although medicines policy is increasingly recognised as an independent research field, systematic descriptions of NMPs and their governance arrangements remain limited. This study examined the content and governance structures of NMPs in selected high-income countries, with particular attention to identifying policy components that support rational pharmacotherapy in accordance with World Health Organization (WHO) guidance.

**Method:** The study applied a qualitative framework analysis guided by WHO NMP guidelines (WHO 2001). Data were collected from the selected high-income countries using first an email survey to the Heads of Medicines Agencies network and health-sector attachés of EU Member States, yielding responses from five EU countries. Supplementary Google and Microsoft Copilot searches across high-income nations, selected for their comprehensive service commitments and varied healthcare financing models, provided additional material. Due to the limited availability of comprehensive national medicines policy documents, the Google search strategy was extended to include sources describing rational pharmacotherapy, medication safety, and national pharmacovigilance procedures. All materials were verified for timeliness during the period from late 2025 to early 2026.

**Results:** The findings indicate that only a small number (5/18) of the high-income countries reviewed maintained comprehensive, publicly accessible NMPs addressing multiple domains of the pharmaceutical system. Where such policies existed, their structure, content, and implementation approaches varied substantially. Within the WHO NMP

framework, contents related to medicinal products, such as availability and pricing, were most commonly and consistently documented. Similarly, the most consistently covered themes concerning rational pharmacotherapy were market access, marketing authorization, and drug safety protocols. NMP contents appeared to be well aligned, particularly in areas with harmonised EU legislation on medicinal products. Underlining driving forces influencing pharmaceutical systems were also similar. These include ensuring access to affordable medicines, strengthening supply chain continuity, reducing harmful global dependencies and mitigating medicine shortages, enhancing interprofessional medicines optimization, and leveraging digitalisation to achieve efficiency gains. A notable challenge was absence of consistent terminology, particularly concerning medication safety. Although conceptual frameworks varied, most countries acknowledged the overarching aim of promoting rational pharmacotherapy. However, integration of rational pharmacotherapy elements into broader health policy contexts differed substantially.

**Conclusion:** Although WHO's NMP guidelines were launched in 2001, few countries have so far established a comprehensive, integrated NMP covering the full pharmaceutical life cycle that aligns with public health priorities. A notable finding was that most of the countries missed medication safety as part of their NMP. Furthermore, better terminological harmonisation is needed to support shared understanding and integration of rational pharmacotherapy within health systems. Future priorities should include encouraging countries to develop more resilient, coherent national medicines policies, assisted by updated global guidance.

## Developing a structured hospital-based health technology assessment (HB-HTA) framework for innovative medicines

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**Background:** Innovative medicines offer significant clinical potential but often present substantial financial and operational challenges for hospitals. Pharmacy and Therapeutics (P&T) committees must balance breakthrough therapies against limited institutional resources; however, traditional reliance on expert-based qualitative reviews lacks a standardised framework to objectively integrate clinical and economic evidence, leading to inconsistencies in formulary management. This study aims to develop a structured Hospital-Based Health Technology Assessment (HB-HTA) framework that systematically integrates clinical and economic data to enhance the transparency and rigour of formulary decision-making.

**Method:** A mixed-methods approach is being adopted to design the HB-HTA framework in two stages. In the first stage, a two-round Delphi expert consensus process is being conducted with 21 multidisciplinary experts (9 physicians, 10 pharmacists, and 2 other healthcare professionals). Panellists rate the appropriateness of proposed evaluation indicators using a five-point Likert scale. Consensus is defined as a mean score ≥ 3.5 with a coefficient of variation (CV) ≤ 0.25. In the second stage, Analytic Hierarchy Process (AHP) pairwise comparison questionnaires will be administered to the same expert panel to derive quantitative weights and establish a hierarchical scoring structure.

**Results:** Preliminary results from the first round of the Delphi process are reported. Initial ratings demonstrated a high degree of expert agreement across all proposed evaluation indicators, with mean scores ranging from 4.38 to 4.81 and CVs below 18 percent. Relative effectiveness emerged as the highest-rated dimension (mean > 4.70). The preliminary framework comprises four primary dimensions, each with specific sub-indicators: (1) Relative safety, encompassing pharmacokinetic profile, dosage complexity, adverse reactions, and drug interactions; (2) Relative effectiveness, evaluating positioning in clinical guidelines and comparative efficacy evidence; (3) Innovation and clinical utility, assessing degree of innovativeness, therapeutic uniqueness, and operational convenience; and (4) Economics, comparing per-treatment-course costs and pharmacoeconomic evidence. These indicators will be further refined through subsequent Delphi rounds, followed by AHP-derived weighting.

**Conclusion:** This study presents a work-in-progress toward establishing a systematic, consensus-based HB-HTA framework for formulary decision-making. First-round Delphi results demonstrate strong initial expert agreement on the proposed evaluation dimensions, providing a solid foundation for subsequent rounds of refinement and AHP weighting. Upon completion, the framework aims to position pharmacists to play a central role in value-based healthcare by guiding hospital P&T committees to systematically appraise breakthrough therapies and optimise resource allocation. Future research will focus on the clinical validation of the framework through case studies, as well as integrating qualitative assessments for context-dependent factors such as social equity and supply chain resilience.

## The role of artificial intelligence in pharmacist-led medication reviews: Evidence synthesis and pilot case applications

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**Background:** Artificial intelligence (AI) has become increasingly integrated into healthcare, particularly in supporting clinical decision-making. In medication review services, AI provides opportunities to enhance quality and efficiency. However, evidence on its practical application in this context remains limited, creating uncertainty about its role in streamlining workflows and improving outcomes.

Objectives. To synthesize current evidence on AI integration in medication review, pilot the use of AI models to assess their potential in improving review quality and efficiency, and identify opportunities and limitations for implementing AI in pharmacist-led medication review services.

**Method:** A two-phase approach was applied. Phase I involved a literature review using Embase, PubMed, and Scopus to identify studies on AI applications in medication review. Phase II was a pilot study using two case vignettes in the form of Home Medicines Review (HMR) to compare outputs from two AI systems (ChatGPT and Microsoft Copilot). Each system generated letters to referring general practitioners, which were analysed for accuracy, comprehensiveness, and ethical considerations.

**Results:** Phase I: From 1,093 articles screened, nine met inclusion criteria, highlighting AI's strengths in data processing, clinical decision support, and personalised care, alongside limitations such as lack of transparency, ethical concerns, and the need for human oversight. In Phase II, both AI systems identified major medication-related issues but lacked specificity regarding dose adjustments, tapering strategies, and non-pharmacological interventions. ChatGPT produced more comprehensive, patient-centred letters, while Copilot was concise and clinically focused. Neither system incorporated patient cultural or social context.

**Conclusion:** AI-based tools show promise in enhancing medication review processes and streamlining services. Their integration into medication reviews like HMR could improve prioritisation of problems and help generate broader recommendations. However, current limitations such as lack of contextual understanding and the need for human oversight underscore that AI should complement, not replace, pharmacist-led reviews.

## Fifty years of pharmaceutical specialisation in Costa Rica: Growth and diversification of the pharmacy specialist workforce (1971–2025)

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**Background:** Pharmacy practice has evolved globally from product-centred activities toward patient-centred pharmaceutical care and expanded roles within healthcare systems. Pharmaceutical specialisation reflects this transformation and strengthens the pharmacy workforce. In Costa Rica, the Colegio de Farmacéuticos de Costa Rica (COLFAR), founded in 1902, has played a central role in pharmacists' professional development. Since 1929, COLFAR has formally recognised pharmacists who qualify as specialists, initially through practice-based pathways and later through academic postgraduate degrees aligned with the nomenclature defined by the National Council of Rectors (Consejo Nacional de Rectores, CONARE). Despite the relevance of this trajectory, evidence describing the long-term evolution of pharmaceutical specialisation using national registry data remains scarce, particularly in Latin America.

Purpose: To analyse the growth, diversification and structural distribution of pharmaceutical specialisations in Costa Rica using data from the national registry of pharmacy specialists.

**Method:** A retrospective descriptive study was conducted using the national registry of pharmacy specialists maintained by COLFAR. Records of pharmacists incorporated as specialists between 1971 and 2025 were analysed. Variables included year of incorporation and specialty area. Specialty titles were standardised and grouped into five domains: traditional pharmaceutical sciences, clinical pharmacy, health system management, regulatory sciences, and public health and education. Temporal trends, workforce diversification and structural distribution were assessed using descriptive time-series statistics, the cumulative diversification index, the Herfindahl–Hirschman Index (HHI), and the Gini coefficient. Contextual information on the regulatory framework and competency profiles developed by COLFAR was incorporated.

**Results:** Of 570 pharmacy specialists identified, 550 (96.5%) had valid incorporation dates and were included; 20 were excluded due to missing or unreadable data. Specialist incorporation increased substantially over time: 1 in the 1970s (0.2%), 104 in the 1980s (18.9%), 2 in the 1990s (0.4%), 109 in the 2000s (19.8%), 205 in the 2010s (37.3%), and 129 between 2020–2025 (23.5%), with 80.5% incorporated after

2000. The decline observed in the 1990s likely reflects a regulatory transition.

After standardisation, 59 distinct specialties were identified across five domains. The cumulative diversification index increased from 1 specialty in the 1970s to 59 by the 2020s, demonstrating sustained expansion. Despite diversification, specialist distribution remained uneven: the HHI (≈0.14) indicated moderate concentration, while the Gini coefficient (≈0.48) indicated moderate-to-high inequality. COLFAR has also developed competency profiles across domains and implemented communication campaigns to promote the Specialties System.

**Conclusion:** Pharmaceutical specialisation in Costa Rica has expanded markedly over five decades, evolving toward a diversified structure. Persistent inequalities in distribution highlight structural imbalances requiring attention in workforce planning and policy development. Institutional actions by COLFAR have contributed to consolidating the national specialties system. These findings provide a baseline for evaluating workforce alignment with evolving health system needs and demonstrate the value of registry-based analyses in Latin America and similar settings worldwide.

## The overview of orphan drug utilization in Taiwan in 2024

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**Background:** The analysis of the orphan drug utilization is very important for clinicians and rare disease patients Purpose: This research analyzed the utilization of orphan drug in Taiwan to provide government the reference for importing medications, physicians for prescribing medications, pharmacists for providing medications.

**Method:** In order to let all rare disease patients obtain medication smoothly, the government has even created several regulations related to orphan drugs management such as the Ad Hoc Applications for Orphan Drugs Regulation to support the whole administration needs.

For those orphan drugs that already obtain license approval, the PSUR (Periodic Safety Update Reports) is needed to be provided to TFDA every year. For those orphan drugs that without license approval but with special import permit, the hospitals need to provide the utilization evaluation report to MoHW.

**Results:** In 2024, the hospitals reported total 137 orphan drugs in utilization. There are 13 orphan drugs with special import permit and used by 174 patients. In 2024, there are 159 utilization evaluation reports collected and the recovery rate is 91.4%. Studying those reports, the adverse events happened in 8 patients (incident rate: 5.0%). Those events include fever, dizziness, headache, diarrhea, nausea and etc…

**Conclusion:** The efficacy and safety of orphan drugs has been closely monitor in Taiwan. The monitor and management has kick off since granting Orphan-Drug Designation, pre-license management, post marketing risk management to efficacy and safety reevaluation.

## The impact of public procurement policy reform on the medicine procurement efficiency: Evidence from two district health offices in Indonesia

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**Background:** Since 2014, Indonesia has implemented dynamic medicine procurement policies under UHC, governed by the National Procurement Agency and the Ministry of Health. Two major policy phases can be identified: 2014-2022 and 2023 onward. From 2014 to 2022, medicine prices and providers were fixed through centralized national tendering conducted by the government. However, starting in 2023, both price and provider have varied because individual health facilities are allowed to negotiate directly with suppliers. This study aims to analyse the impact of these two policy approaches on medicine prices, planning accuracy, and purchase volumes.

**Method:** This study employed an observational design with quantitative analysis of 14 selected medicines from the National Essential Medicine Lists. The study was conducted at two district health offices in Central Java and Kalimantan. Central Java is a region near industrial centres, whereas Kalimantan is an island region far from industrial centres. Enumerators collected medicine procurement data, including prices, volume, and planning records for 2022, 2023, and 2024, representing two different policy periods. We compared pricing ratios, volume, value, and planning accuracy in 2023 and 2024 against the baseline year of 2022. Planning accuracy was calculated by comparing the planned procurement volumes with the actual purchase volumes.

**Results:** After the policy implementation in January 2023, medicine prices increased substantially. In Central Java, 86% of items experienced price increases in 2023 (average increase = 1.59 times; range: 0.75–3.64), rising to 93% of items in 2024 (average increase = 1.86 times; range: 0.94–4.32). In Kalimantan, 93% of items showed price increases in

2023 (average increase = 2.18 times; range: 0.73–4.56), and all items (100%) increased in 2024 (average increase = 2.48 times; range: 1.30–4.26). The higher average price increase in Kalimantan may be attributed to its greater geographical distance from industrial centres, which results in higher distribution costs. Following the policy intervention, the annual procurement volume and value of medicines increased markedly. In Central Java, procurement volume increased by an average of 92% in 2023 (by value USD 16,307 to USD 97,957) and by 12% in 2024 (by value USD 16,307 to USD 45,294). In Kalimantan, procurement volume increased by an average of 194% in 2023 (by value USD 2,658 to USD 10,147) and by 738% in 2024 (by value USD 2,658 to USD 18,311). However, the overall accuracy of planning declined. In Central Java, planning accuracy across the three years was 43%, 0%, and 14%, respectively, while in Kalimantan it was 93%, 93%, and 21%. In 2024, 21% of medicines in Central Java were procured without prior planning, whereas no unplanned procurement occurred in Kalimantan. Overall, these findings suggest that the new policy may increase risks related to medicine price escalation and procurement inefficiencies.

**Conclusion:** The updated policy introduced in 2023, which allowed variation in medicine prices and providers, contributed to price increases and created potential procurement inefficiencies, posing a risk to the sustainability of Universal Health Coverage. Future policy revisions should therefore prioritize stronger price monitoring, consideration of geographical constraints, and improvements in planning accuracy.

## Pharmacists perspectives on e-pharmacy platforms in Ghana: Opportunities, barriers, and implications for safe digital pharmaceutical care

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**Background:** The rapid expansion of digital health technologies has accelerated the emergence of e-pharmacy platforms globally. In Ghana, the launch of the National Electronic Pharmacy Platform (NEPP) has created new opportunities to improve access to medicines and pharmaceutical services through digital platforms. However, the successful implementation of e-pharmacy services depends largely on pharmacists' awareness, acceptance, and ability to navigate emerging digital systems. Understanding pharmacists' perspectives is therefore critical to ensure safe, equitable, and sustainable digital pharmaceutical care. This study explored Ghanaian pharmacists' awareness of e-pharmacy platforms, their perceived benefits, and associated challenges in order to inform policy and practice for digital pharmacy implementation.

**Method:** An exploratory qualitative study was conducted using semi-structured interviews with 20 licensed community pharmacists practicing within the Kumasi metropolis. Participants were purposively sampled to capture diverse experiences from pharmacists actively engaged in community practice. Interviews were audio-recorded, transcribed verbatim, and analysed thematically using an inductive approach to identify key themes related to awareness, benefits, and challenges associated with e-pharmacy platforms. Ethical approval was obtained prior to the study and informed consent was secured from all participants.

**Results:** Awareness of e-pharmacy platforms among pharmacists was moderate. Many participants reported familiarity through government training initiatives and internet exposure, although several pharmacists remained unaware due to limited digital infrastructure within their pharmacies. One pharmacist noted that "the awareness of e-pharmacy in Ghana is growing steadily, although it is still a relatively new concept in community pharmacy settings."

Participants identified several perceived benefits of e-pharmacy platforms. These included improved efficiency and accessibility to medicines, enhanced patient adherence through medication reminders, improved opportunities for patient education and counselling, and potential cost savings for patients. Pharmacists also emphasized the value of digital platforms for health data collection and surveillance. As one participant explained, "with online ordering you can track medications patients purchase over time, which helps improve monitoring and continuity of care."

Despite these benefits, significant challenges were identified. Key barriers included digital literacy gaps among both pharmacists and patients, limited access to digital technologies, network instability, and concerns about platform quality. Pharmacists also highlighted the absence of clear regulatory frameworks and government oversight as a major concern. Data privacy risks and the potential proliferation of misinformation and counterfeit medicines through online platforms were also frequently mentioned. One participant cautioned that "without strong regulation, patients could easily obtain the wrong or even fake medicines online."

**Conclusion:** E-pharmacy platforms present important opportunities to enhance access, efficiency, and patient engagement in pharmaceutical care in Ghana. However, critical challenges related to awareness, regulation, digital infrastructure, and patient safety must be addressed. Strengthening pharmacist training, establishing robust regulatory frameworks, and improving digital infrastructure will be essential for the safe and sustainable integration of e-pharmacy services within Ghana's healthcare system.

## Supporting seamless transitions through pharmacist prescribing: Insights from hospital, community, and primary care pharmacists

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**Background:** In Quebec, pharmacists' scope of practice is expanding. Pending amendments to the Pharmacy Act will imminently grant residency-trained pharmacists near-full independent prescribing authority in hospitals, with prescribing in primary care focused mainly on chronic or self-limiting conditions. As their duties shift from dispensing to prescribing, pharmacists play an increasingly important role in ensuring seamless care during healthcare transitions when patients are most vulnerable to medication-related harm. To explore the impact of pharmacist prescribing on continuity of care, an intraprofessional committee comprising representatives from hospital, community, and primary care pharmacy associations and academia was formed under the leadership of the Association des pharmaciens des établissements de santé du Québec (A.P.E.S.), the professional association representing health-system pharmacists in Quebec.

**Method:** A literature review, including a review of grey literature sources, was conducted to explore pharmacy practice models at transitions of care and examine their effects on patients and the healthcare system. In addition, obstacles currently undermining safe and effective care during transitions of care, particularly in the context of pharmacist prescribing, were identified. A proposed definition of the continuum of care in pharmacy and a series of recommendations to ensure its sustainability were revised through meetings between members of the intraprofessional committee to achieve clarity and consensus. Recommendations were endorsed by the board of directors of each association in the committee, and insights were also gathered from the pharmacy regulator, pharmacy banners, and patient partners.

**Results:** Data from the literature review demonstrated patient-level and system-level benefits associated with clinical pharmacy activities at transitions of care. The intraprofessional committee's findings were published in March 2025. The continuum of care in pharmacy was defined as the timely and appropriate sequencing of clinical pharmacy activities during acute phases of illness or throughout the management of chronic conditions. This model places the patient at its core and incorporates pharmacist-led activities, including pharmacist prescribing, delivered in hospitals, community pharmacies, and primary care as well as during transitions between these settings. To optimise the continuum of care, twelve recommendations were laid out, such as establishing consultation mechanisms between first line and hospital pharmacists and facilitating bidirectional communication channels. The committee's findings were also communicated province-wide and with national and international health and pharmacy organisations. Advocacy efforts were deployed among government representatives and the media, and, in April 2025, a podcast episode on the continuum of care was published. In light of these results, the implementation of standardised patient care pathways across healthcare settings is also under consideration by the provincial health authority.

**Conclusion:** The recommendations developed by the intraprofessional committee highlight the importance of pharmacist prescribing in ensuring seamless care between hospitals, community pharmacies, and primary care. The committee's insights are notably in line with FIP's Development Goal 8, Working with Others, and with the revised FIP Basel Statements on the Future of Hospital Pharmacy. As their scope of practice expands, pharmacists will continue taking on broader independent prescribing authority to further support patients as they transition through the healthcare system.

## A tale of two cities: HIV/AIDS disparities across East & West Cleveland

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**Background:** Human Immunodeficiency Virus (HIV) remains a significant public health challenge despite advances in prevention and antiretroviral therapy. Although overall HIV incidence has declined in many high-income countries, persistent disparities continue to affect urban populations experiencing structural and socioeconomic disadvantage. Neighbourhood-level factors such as poverty, access to healthcare, and structural inequality influence both HIV transmission and engagement across the HIV care continuum. Cleveland, Ohio provides an important context for examining intra-city disparities. The city remains highly residentially segregated, with notable socioeconomic differences between neighbourhoods located east and west of the Cuyahoga River. Public health surveillance reports suggest that a disproportionate share of individuals living with HIV reside in central and eastern Cleveland communities. Examining how HIV burden and treatment outcomes differ across these geographic areas may help inform targeted prevention strategies and highlight opportunities for pharmacists and other healthcare professionals to support community-based HIV care.

**Method:** A cross-sectional ecological analysis was conducted using publicly available HIV surveillance and demographic datasets. Data were obtained from the Cuyahoga County Board of Health, the Ohio Department of Health, and national HIV surveillance databases. ZIP code geographic units within the Cleveland municipal boundary were used for analysis and categorised as East Cleveland or West Cleveland based on their location relative to the Cuyahoga River. Primary outcome measures included HIV prevalence, newly diagnosed HIV cases, and viral suppression among persons living with HIV. Viral suppression was defined according to standard surveillance definitions as achieving a viral load below clinically significant thresholds. Secondary indicators included neighbourhood socioeconomic characteristics derived from United States Census data, including poverty rates, insurance coverage, and demographic composition. Descriptive analyses were conducted to examine geographic patterns in HIV burden and treatment outcomes.

**Results:** The analysis identified clear geographic disparities in HIV burden across Cleveland neighbourhoods. East Cleveland ZIP codes accounted for a disproportionately high concentration of persons living with HIV compared with West Cleveland neighbourhoods. Newly diagnosed HIV cases were also more frequently reported in eastern and central Cleveland communities. Indicators of engagement in HIV care demonstrated similar patterns. Viral suppression rates were generally lower in East Cleveland neighbourhoods than in West Cleveland areas. Neighbourhoods with higher HIV prevalence also demonstrated greater socioeconomic disadvantage, including higher poverty rates and lower health insurance coverage.

**Conclusion:** Significant geographic disparities in HIV burden and care outcomes were observed across Cleveland neighbourhoods. Communities experiencing greater socioeconomic disadvantage demonstrated higher HIV prevalence and lower viral suppression rates. These findings highlight the importance of addressing social determinants of health when developing HIV prevention and treatment strategies. Pharmacists may contribute to improving HIV outcomes through expanded access to screening, adherence support, and preventive services such as pre-exposure prophylaxis (PrEP). Targeted, equity-focused interventions are needed to reduce disparities and improve HIV outcomes in underserved urban communities.

## From arrival to practice: A national initiative to mentor and integrate international pharmacy graduates (IPGs)

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**Background:** Canada often experience prolonged and uncertain pathways to registration. The licensure process is complex and varies across provinces, requiring candidates to navigate national examinations, province-specific requirements and experiential or practice readiness assessments – all while adapting to a new professional and regulatory environment.

Many IPGs also face barriers in securing paid work experience in pharmacy while unlicensed. Opportunities for meaningful engagement in Canadian pharmacy settings can be limited, restricting their exposure to local practice norms and limiting their ability to build relevant experience before entering supervised training and assessments.

Even when IPGs obtain assistant-level roles, these positions may not meaningfully support their advancement through licensure requirements. Together, these barriers can delay progress toward pharmacist registration and contribute to increased financial strain and uncertainty. In response to these persistent challenges and gaps, a coordinated national approach was developed to provide targeted mentorship and practical integration opportunities to IPGs.

The purpose of this initiative was to deliver a national mentorship and integration programme for IPGs to improve understanding of licensure pathways, reduce barriers in the licensure process, expand access to Canadian pharmacy experience and strengthen employment readiness and mobility.

**Method:** The programme was developed and led by the Canadian Pharmacists Association (CPhA), with input from partners and internationally educated pharmacists. Components included virtual learning, engagement and networking activities, one-on-one mentorship and paid mentored work placements in community pharmacy settings across nine provinces. Participant engagement and outcomes were monitored through structured check-ins and post-activity surveys.

**Results:** Since applications opened in October 2024, more than 963 IPG mentee applications and over 600 mentor applications have been received. Nearly 800 unique IPGs have participated in at least one project activity. More than 130 mentored work placements have been completed, representing over 29,233 hours of paid Canadian pharmacy experience.

Following work placements, 37% of participants were offered continued employment after their placement site. Of those, nearly three-quarters remained employed there five months later. Among participants who were not offered continued

employment at their placement site, more than half secured paid work elsewhere in the pharmacy sector.

At five-month follow up, 92% reported improved understanding of licensure processes (n=90) and increased readiness and confidence for exams and assessments (92%, n=52). In addition, 88% indicated that participation helped them move through licensure more quickly and with fewer setbacks (n=89). At the time of follow up, 12% of respondents were licensed pharmacists and 17% were completing internships, experiential requirements or practice assessments prior to registration (n=89).

**Conclusion:** This national mentorship and integration initiative demonstrates that a coordinated approach combining virtual learning and engagement, structured mentorship, employment supports and paid pharmacy experience can effectively reduce barriers in the licensing process for IPGs. Bringing together guidance, education and meaningful exposure to Canadian pharmacy practice, the programme enhances readiness and confidence, supports progression toward pharmacist registration and improves employment outcomes. The model offers a scalable approach that may inform future national or regional efforts to better support IPGs.

## Development, implementation and evaluation of a training module on the active offer of pharmaceutical services in French

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**Background:** Active offer refers to the proactive provision of services in French that are always available, clearly communicated, visible, accessible and of quality equivalent to those offered in English. Limited access to pharmaceutical services in French in Canada may create communication barriers and health inequalities. In minority Francophone communities, the ability to receive healthcare in one's preferred language has been associated with improved patient understanding, better adherence to treatment, and greater satisfaction with care. Language barriers in healthcare settings may lead to misunderstandings regarding medication instructions, reduced therapeutic adherence and an increased risk of adverse drug events. A recent survey in Ontario showed a relative lack of awareness of the concept of active offer among pharmacists, despite positive attitudes towards its relevance and interest in training in this area. These findings highlight the importance of developing practical educational tools that can support pharmacists and pharmacy teams in integrating active offer strategies into routine professional practice. However, no training on active offer in the field of pharmacy practice previously existed. This study aimed to design a training module on active offer adapted to pharmacy practice in Ontario and to pilot it with pharmacists, pharmacy technicians and pharmacy students from the University of Ottawa, the University of Toronto and the University of Waterloo.

**Method:** A bilingual module was developed over one year by a multidisciplinary working group composed of pharmacy experts, educators and the research team. The content was organised around five pharmaceutical care needs aligned with national standards: safe dispensing of medicines, access to primary care, optimisation of pharmacotherapy, continuity of care, and health education and promotion. The module was tested with a target group of pharmacists, pharmacy technicians and pharmacy students. Participants received a questionnaire including Likert-scale and open-ended questions to measure the impact on their knowledge, attitudes and behaviours related to active offer.

**Results:** Ten participants completed the questionnaire in French and three in English (N = 13). The majority reported having learned more about how to provide services in French, feeling more prepared to do so, and believing that it is very important to provide pharmaceutical services in French. Twelve participants found the module relevant and ten found it clear and easy to follow. Comments highlighted three main themes: offering service in French from the first contact with patients, increasing the visibility of French in healthcare settings, and better organising services to facilitate access in French.

**Conclusion:** A pharmacy-specific training module on active offer was successfully developed and piloted. Preliminary results show acceptance and improvement in participants' knowledge and preparedness. Further testing and feedback from English-speaking participants could provide additional insights to improve the module and enhance its uptake within this segment of the pharmacist community. Its impact on professional behaviours and access to pharmaceutical services in French will be examined in future studies.

## Public health prevention domains: Recognising the role of pharmacists

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**Background:** Community and hospital pharmacists routinely undertake activities that contribute to disease prevention, early detection, and long-term management of illness. However, these activities are often recognised as solely clinical services, rather than public health practices. In many settings, pharmacists associate the identity of a public health practitioner primarily with formal public health qualifications, such as a Master of Public Health (MPH). This perception

contributes to an identity gap in which pharmacists' existing public health contributions are not clearly articulated or recognised within professional pharmacy practice and health systems. There is therefore value in clearly describing pharmacists' routine activities using established public health frameworks to strengthen understanding, professional identity, and visibility. The purpose of this analysis is to identify and describe the existing public health roles of pharmacists by aligning routine pharmacy activities with recognised public health prevention domains - primary, secondary, and tertiary prevention; and to promote global recognition of these roles among pharmacists.

**Method:** This work classified and described routine professional activities of pharmacists, using established public health prevention frameworks. Common activities undertaken by community and hospital pharmacists were identified based on widely recognised pharmacy practice functions. These activities were examined according to their primary purpose, - as well as timing, in relation to disease onset and progression. Each activity was then categorised under primary, secondary, or tertiary prevention using standard public health definitions. The focus was on showing how existing pharmacy activities fit within public health prevention domains, rather than on measuring outcomes or effectiveness.

**Results:** The classification showed that pharmacists' routine activities align consistently with all three prevention domains. Activities aligned with primary prevention included: Health education, immunisation services, and risk-reduction counselling. Secondary prevention activities included: Screening, monitoring, and early identification of medication-related problems to limit disease progression. Tertiary prevention activities included: Chronic disease management, medication management, medication-adherence support, and prevention of treatment-related complications. Although these activities are widely undertaken in everyday pharmacy practice, they are rarely framed explicitly as public health practice - thereby contributing to limited professional recognition and visibility.

**Conclusion:** Pharmacists are already contributing meaningfully to public health through everyday professional activities across three prevention domains. The key issue highlighted by this perspective is not role expansion, but role recognition. Aligning pharmacy activities with established public health prevention frameworks can therefore strengthen professional identity, support inter-disciplinary collaboration, and promote more intentional integration of pharmacists within population health strategies. Future work may explore how clearer recognition of pharmacists' public health roles can influence education, policy, and workforce development.

## Frontline perspectives on differentiated medicine distribution: A knowledge, attitudes and practices study of CCMDD pick-up point personnel in two South African districts

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**Background:** The Central Chronic Medicines Dispensing and Distribution (CCMDD) programme is a differentiated service delivery initiative seeking to provide equitable access to chronic medicines in South Africa for stable patients. The programme enables patients to collect pre-dispensed medicine parcels from community or facility based pick-up points (PuPs), reducing congestion and waiting times at public health facilities. Programme efficiency depends on the personnel working at PuPs who are responsible for important operational functions, overall programme coordination and patient interaction. Therefore, their knowledge, attitudes and practices (KAP) may affect how well the programme is implemented and the ease of access patients experience. Despite the importance of these personnel within this service delivery model, there is little evidence regarding their readiness and perception of the CCMDD programme. Evaluating these aspects is essential for identifying workforce strengths and possible gaps that may affect the performance and sustainability of the decentralised scheme. This study assessed the knowledge, attitudes and practices of CCMDD pick-up point personnel in two districts in South Africa and looked at variables crucial to the overall success of these areas.

**Method:** A cross-sectional descriptive study was conducted among 126 personnel working at CCMDD pick-up points, from August 2024 to March 2025, using a semi-structured, self-administered questionnaire. The survey evaluated staff knowledge of CCMDD origins and processes, attitudes toward programme efficacy, and the receipt, storage and issuing practices. Demographic characteristics and knowledge, attitude and practice scores Data was analysed using descriptive statistics. Bivariate comparisons between the gender groups were conducted using t-tests and Mann–Whitney U tests, while differences across professional categories were, participant education level and programme experience were assessed using ANOVA and Kruskal-Wallis tests where necessary. Predictors of overall KAP scores were identified through performing multiple regression analysis. Internal consistency of the KAP scales was assessed using Cronbach's alpha.

**Results:** The mean age of participants was 40.72 years (SD = 9.38), with majority being African (98.4%) and female

(74.6%). Regarding professional roles, the largest group of respondents were pharmacist assistants (n = 39, 31.0%), followed by receptionists (n = 23, 18.3%) and pharmacists (n = 20, 15.9%). Majority had 11-20 years of general work experience (38.1%), and 61.1% had 3-8 years of CCMDD specific experience. Mean KAP scores were 3.96 (SD = 0.48) for knowledge, 3.67 (SD = 0.48) for attitudes, 3.82 (SD = 0.55) for practices and 3.82 (SD = 0.42) overall. Scale consistency was acceptable (Cronbach's alpha: 0.693–0.869). Significant variations were detected across professional categories for knowledge ($p = 0.043$), practices ($p = 0.045$), and overall scores ($p = 0.050$). Knowledge ($p = 0.016$) and overall scores ($p = 0.028$) were significantly associated with Time spent on CCMDD activities. Years of CCMDD experience and professional groups were found to be significant predictors of higher overall KAP scores ($p \leq 0.005$) using regression analysis.

**Conclusion:** Personnel demonstrated favourable KAP towards CCMDD implementation. Workforce characteristics influenced performance, highlighting the need for strengthened staff capacity and targeted training to enhance decentralised medicine distribution and improve medicines access.

## Understanding the barriers to professional advancement and wellbeing of women of colour in pharmacy: An intersectional perspective

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**Background:** Women of colour (WoC) are increasingly represented in pharmacy yet continue to face significant barriers to professional advancement and wellbeing. A recent scoping review documented persisting gender- and race-based disparities in the health professions, but research examining the intersectional experiences of WoC pharmacists across identities (e.g. race, immigration status, age, cultural identity, etc.) remains sparse. A deeper understanding of the lived experiences of WoC pharmacists is essential to developing targeted interventions that adequately address the attendant multi-faceted barriers. The objectives of this study were to: (i) understand the unique challenges facing WoC pharmacists using an intersectionality lens; and (ii) develop a theoretical framework to address these challenges.

**Method:** Using a qualitative, interpretive methodology informed by intersectionality theory, nine focus group discussions were conducted with 22 WoC pharmacists across diverse practice settings, career stages, and racial/ethnic backgrounds. Thematic analysis was conducted using an ecological framework, with barriers organized across structural/systemic, workplace climate, interpersonal and individual levels.

**Results:** Participants' ages ranged from 25 to over 65 years (59% under 45); the majority held PharmD degrees (68%), with over one-third holding additional graduate qualifications. Four interconnected barrier categories emerged. At the structural/systemic level, themes included absence of formal support structures for WoC; structural limitations to accessing advancement opportunities; inequities in remuneration and resource allocation; promotion of exceptionalism over merit (the "only one" mentality); historical patterns of placing WoC in leadership without adequate institutional support; inequitable policies and procedures including those affecting individuals based on immigration status; lack of accountability mechanisms for sustaining equity initiatives; and underrepresentation of WoC in leadership.
At the workplace climate level, themes included institutional silence around race (in times of racial tension); tokenistic diversity, equity, and inclusion efforts widely described as superficial; a 'hidden curriculum' of unwritten professional norms that disadvantaged WoC particularly from immigrant and first-generation backgrounds who lacked access to informal networks critical for career advancement; negative workplace culture often associated with predominantly White workplace environments; and lack of institutional cultural responsiveness to diverse needs (e.g. religious accommodations).
Themes at the interpersonal level included direct interpersonal racism from patients and colleagues; microaggressions and questioning of competence; racial and ethnic stereotyping; intersectional discrimination and implicit bias; social exclusion and workplace isolation; perceived threat and active sabotage by colleagues; cross-cultural communication barriers; and alienation by other women of colour.
Individual-level themes included burden of proof; burden of advocacy for self, others, and the broader group; burden of service and its effects; experience of isolation; effects of marginalization and discrimination; effects of racism; effects and impact of underrepresentation; work-family balance; and perceived implicit bias of capacity and ability.

**Conclusion:** Barriers to professional advancement and wellbeing for WoC pharmacists are multi-level, intersectional, and mutually reinforcing. Addressing them requires structural accountability, racially inclusive workplace cultures, and equity frameworks that extend beyond gender. These findings provide the empirical foundation for an, intersectionality framework for the pharmacy profession, with implications for workforce policy, professional pharmacy organisations, and pharmacy education in the United States and beyond.

## Effectiveness of a multidisciplinary school-based sensitisation programme on sexual abuse, consent, and digital safety among adolescents in Ondo State Nigeria: A quasi-experimental study

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**Background:** : Sexual abuse (SA), both physically and virtually, has significant implications for societal health and human rights. SA occurs at alarming rates in Nigeria, with a prevalence of 69.4% among adolescents in South West Nigeria. The consequences of SA among adolescents are wide-ranging and severe, encompassing anxiety, depression, PTSD, poor academic performance, school dropout, low self-esteem, substance abuse, and long-term mental health disorders affecting adulthood wellbeing and socioeconomic outcomes. Persistent gaps in awareness, knowledge, and effective reporting of SA among adolescents highlight the urgent need for structured, school-based sensitisation programmes.

Aim: To assess baseline knowledge, attitudes, and protective behaviours related to sexual abuse, consent, and digital safety among secondary school students in Ondo State, South-West Nigeria, and to evaluate the impact of a structured school-based sensitisation intervention.

**Method:** A quasi-experimental pre-post study design was employed with 400 students of secondary schools (46.5% males and 53.5% females; age range 10-18 years old) in classes of Junior and Senior Secondary Schools. Participants completed a validated structured questionnaire immediately before and after a single-session intervention. Knowledge, attitude, and protective practice scores were computed for each participant, and independent samples t-tests were used to compare pre- and post-intervention scores across domains. The investigation was conducted by a multidisciplinary healthcare team, with oversight provided by a pharmacist serving as the lead investigator.

**Results:** The intervention had a significant positive effect on the Knowledge, attitude, and protective practices of students across all domains. Knowledge scores increased from 3.17 ± 1.57 to 3.94 ± 1.28 ($p < 0.001$), attitude scores improved from 20.16 ± 3.28 to 21.38 ± 3.51 ($p < 0.001$), and protective practice scores rose from 3.45 ± 0.76 to 3.62 ± 0.69 ($p < 0.001$). Significant improvements were observed across both sexes and all age groups, demonstrating the programme's effectiveness in improving knowledge of sexual abuse, consent, and digital safety, and in strengthening protective behaviours to prevent sexual abuse or enable an appropriate response if encountered.

**Conclusion:** A school-based sensitisation session on sexual abuse and online safety could significantly enhance adolescents' knowledge, attitudes, and self-protective behaviours regarding sexual abuse, both physically and online. It is recommended that similar interventions be formally integrated into the standard school curriculum to promote safer behaviours, reduce vulnerability, and foster informed help-seeking among adolescents in Nigeria and comparable low- to middle-income contexts.

## increasing screening, treatment, and ongoing monitoring of depression in a multicultural urban free clinic in the United States: A quality improvement initiative

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**Background:** In 2023, the estimated prevalence of depression in the U.S. was 13.1% and overall population treatment rate was 38%. Validated rating scales such as the Patient Health Questionnaire-9 item (PHQ-9) and 2-item (PHQ-2) are used to track symptom severity and response in depression. These instruments are recommended to be administered at baseline and at regular intervals. The PHQ-9 has been translated into many languages and validated in diverse cultural contexts, however, performance is context-dependent and cut points often differ from English-language data. Some items, such as somatic symptoms, may be interpreted differently across cultures, affecting validity and reliability. Cultural stigma can lead to underreporting of symptoms, particularly in some Asian and Latino populations, reducing detection rates. While the cut off point for a positive score in the English questionnaire is >/=10, the optimal cutoff may be >7 in other languages. This quality improvement (QI) project aims to implement a protocol for consistent PHQ-9 documentation, compare pre-post rates of mental health diagnoses and active treatment, and identify patient interest in talk-therapy, pharmacotherapy, or other mental health resources.

**Method:** This QI project began with a baseline chart review that evaluated documentation of scores from 1/1-12/30/25. Implementation of the new protocol was conducted between 1/1-4/30/26 at a free clinic in an urban setting in Pittsburgh, Pennsylvania. Each patient was screened using the standard PHQ-9 in their preferred language during their visit. Patients who scored <4 were indicated to receive PHQ-2 annually while those diagnosed with depression or anxiety had their scores monitored with each medication refill and primary care follow up. All other patients were screened annually. Reports were generated monthly by investigators and charts were reviewed to collect post-implementation data including questionnaire scores, psychotropic pharmacotherapy use,

and relevant demographic data: date of last encounter, age, gender identity, spoken language, active medication list, mental health diagnoses, and documented interest in counselling, medications, or other resources. This QI was approved by the University of Pittsburgh Medical Center board.

**Results:** Prior to implementing the protocol, of the 310 patients seen for primary care in 2025, only 15.5% had a documented PHQ-9 score, 41.9% had a PHQ-2, and 50.7% had no documented screenings. At baseline, 10% of all patients were receiving pharmacotherapy for a mental health diagnosis. Since protocol implementation, 83.5% of patients seen by primary care physicians have PHQ-9 scores in their charts, with an additional 7% with responses to the PHQ-2. Of those screened [n=189], 16% reported scores >/=10. 10% of patients have documented interest in talk therapy services. 20.1% are actively receiving pharmacotherapy for depression, anxiety, or mood disorders collaboratively managed by primary care and pharmacy. Of these patients, 47.4% were Spanish speakers, 39.5% were English speakers, and others include Brazilian Portuguese or Haitian Creole.

**Conclusion:** A standardized protocol increased the number of screenings, and treatment for depression. Pharmacists can enhance culturally responsive depression care by screening, monitoring treatment and supporting diverse patient needs. This work supports investing in services such as behavioural health resources and talk-therapy for non-English speaking patients.

## Transforming Medicine Shortages in Sri Lanka: Perspectives of Supply Chain Stakeholders

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**Background:** Medicine shortages, or the unavailability of medicines, are an ongoing global challenge for which health authorities are seeking sustainable and effective solutions at both international and national levels. Sri Lanka, a developing country with a well-documented history of medicine shortages during economic crisis, lacks comprehensive legislative frameworks and a structured, multi-stakeholder approach to decision-making for improved medicine shortages management. Sri Lankan literature is scant regarding pharmaceutical supply chain stakeholders' perspectives on medicine shortages in the public sector. This study aimed to identify strategies to mitigate medicine shortages by exploring perspectives of Sri Lankan supply chain stakeholders in the public sector.

**Method:** Using a qualitative approach, stakeholders from different levels of the public sector pharmaceutical supply chain, including regulatory, manufacturing, importation, procurement, distribution, and healthcare institutions, were purposively selected and interviewed using a structured interview guide. Recruitment was conducted via snowball sampling technique, and interviews continued until data saturation was achieved. Interviews were transcribed and translated into English and then analysed for thematic concepts using Leximancer™.

**Results:** A total of 69 stakeholders across the public sector pharmaceutical supply chain (healthcare professionals = 40, including medical practitioners, pharmacists, and nurses; distributors = 09; procurement officers = 09; local manufacturers = 04; importers = 05; regulatory officers = 05) proposed coordinated mitigation strategies spanning institutional to national level in Sri Lanka. At the institutional level, consensus emerged on the need to improve demand forecasting, strengthen computerised inventory control, enhance logistics infrastructure, and optimise patient care management to reduce wastage. At the distribution level, stakeholders emphasised the need for standardised protocols for medicine distribution and decentralised supply mechanisms integrated with the existing centralised system.

At the procurement level, participants recommended revising policies and digitalising processes, highlighting prolonged lead times, limited transparency, and weak supplier monitoring as major contributors to medicine shortages. The expansion of local manufacturing capacity, supported by favourable fiscal policies, was identified by most participants as a critical long-term solution. At importation level, stakeholders emphasised the need for standard protocols to monitor registered supplier performance. Regulatory reforms, including strengthened oversight, improved medicine selection, shortages reporting systems, and flexible pricing mechanisms, were also widely endorsed as essential components of medicine shortages management. Across all levels, there was a consistent emphasis on the need for stronger inter-institutional coordination, workforce strengthening, improved communication systems that link all supply chain levels, and sustainable financing to ensure an integrated and resilient medicine supply chain to alleviate and minimize medicine shortages.

**Conclusion:** The findings indicate that medicine shortages in Sri Lanka are systemic and require coordinated, supply chain–wide interventions rather than isolated operational changes. Stakeholders emphasised the need for integrated reforms across all supply chain levels, supported by stronger governance, digital systems, workforce capacity, and sustainable financing. These results highlight the importance of a comprehensive, multi-stakeholder policy framework to transform and improve medicine shortages management in Sri Lanka. Future research should evaluate the feasibility and

impact of these strategies and focus on their implementation to strengthen long-term supply medicine chain resilience.

## The role of pharmacists and pharmacy teams in the prevention, preparedness, response and recovery of HIV and hepatitis C virus outbreaks: a rapid systematic review

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**Background:** Pharmacy professionals are accessible members of the public health workforce and serve as key contact points for populations disproportionately affected by HIV and hepatitis C virus (HCV) outbreaks. They possess public health competencies that can support outbreak management within the World Health Organisation (WHO) emergency cycle of prevention, preparedness, response and recovery; these interventions may be at micro (individual/patient-facing), meso (regional/organisational), and macro (national) levels. This sub-analysis of a rapid systematic review aimed to identify the contributions of pharmacy professionals globally to HIV and HCV outbreak management and classify them within the WHO emergency management cycle and by level of intervention.

**Method:** In February 2025, Embase, Medline, and SCOPUS were systematically searched for articles on pharmacy professionals' roles in non-COVID outbreaks from 2014 onward. Papers were screened, extracted, and assessed for risk of bias by one reviewer, with a minimum of 10% reviewed by a second reviewer. Risk of bias assessment was undertaken using the Mixed Methods Appraisal Tool. The protocol was registered on PROSPERO (CRD 42024617152). Subgroup analysis focused on articles relating to HIV and HCV outbreaks, with findings synthesised thematically and reported narratively to account for study variability.

**Results:** Of the 1,489 articles identified, 161 underwent full-text extraction, of which 13 related to HIV and/or HCV outbreaks. Most papers (62%, n=8) were from the USA; others were from the UK (2), Nigeria (1), Malaysia (1), and Cameroon (1). Twenty-six roles were identified: 53% in the prevention phase of the WHO emergency cycle, 37% in response, and one each in preparedness and recovery. Four papers reported roles spanning multiple phases. When themed within the phases of the WHO emergency cycle, most identified roles (n=22) were related to micro level (individual/patient facing), the remainder (n=4) were meso level (regional/organisational roles), with no macro-level roles (national or international) reported.

Examples of roles identified included use of pharmacy data e.g. tracking prescription refills (Response, Preparedness - Meso level); Supply of syringes, preventive treatment, point of care testing (Prevention - Micro level), Educating other healthcare professionals (Response - Micro level)

**Conclusion:** This review shows that pharmacy team members have key roles during the management of HIV and HCV outbreaks globally, with evidence of involvement in all stages of the WHO emergency cycle. However it highlights an evidence gap for meso and macro level contributions and roles for pharmacy team members within preparedness and recovery phases. These findings underscore the need for strategic investment in workforce development (including strengthening public health competencies and outbreak response capability via education and training), as well as greater system-level integration of pharmacy professionals in HIV and HCV outbreak preparedness and response planning. Strengthening these capabilities across the global pharmacy workforce will help reduce variation in service delivery and improve equity of care for populations disproportionately affected by HIV and HCV outbreaks.

## Opioid stewardship: A systematic review of pharmacist-led deprescribing interventions

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**Background:** The global opioid epidemic is a pressing public health challenge, causing substantial morbidity and mortality, with more than 40.5 million people dependent on opioids and about 109,000 deaths annually from overdose worldwide. Although opioids are effective for acute and palliative pain, long-term use carries significant risks. As a result, healthcare systems have increasingly prioritised opioid stewardship to optimise prescribing, improve patient safety, and support appropriate deprescribing. Pharmacists, as integral members of multidisciplinary teams, are well positioned to lead such initiatives. This systematic review aims to evaluate the impact and outcomes of pharmacist-led opioid deprescribing interventions.

**Method:** A systematic literature search was conducted in December 2025 using PubMed, Embase, and Google Scholar. Studies were eligible for inclusion if they were peer-reviewed, evaluated pharmacist-led opioid deprescribing interventions

and were published in English between 2020 and 2025. Extracted data included pharmacist practice settings, roles of pharmacists in opioid tapering, pharmacist intervention acceptance rates, opioid dose reduction, and satisfaction with clinical pharmacy service. Data were summarised using descriptive statistics.

**Results:** Out of 23 studies, five met inclusion criteria. They represented diverse clinical settings, including Veterans Affairs systems, integrated health systems, primary care centres, and outpatient palliative care clinics. One study examined the roles of pharmacists in tapering and found that 98% of pharmacists provided tapering recommendations, 82% monitored patients during tapering, 47% conducted pre-treatment medication reviews, and 33% performed pre-treatment risk reviews . The study also identified variability in tapering strategies, highlighting the need for clearer practice guidelines. Two studies evaluated pharmacist intervention acceptance rates. One reported an 89% acceptance rate, while another found physician acceptance to be 75% and 54% among patients.

Three studies assessed opioid tapering outcomes. One found that mean morphine equivalent daily dose decreased by 44% at 6 months post-consultation, with 11% of patients experiencing adverse events during tapering. A second study reported a 22% opioid dose reduction with no hospitalisation for uncontrolled pain or withdrawal, although interventions required substantial pharmacist time (initial visits: 72 minutes; follow-up: 45 minutes). The third study reported an 11% reduction in mean daily opioid dose in intervention group, compared with a 15% increase in control group. Two studies evaluated satisfaction with clinical pharmacy service. One reported that 72% of participants described their pain as reduced or manageable, and 60% described a positive and satisfying experience with the pharmacist service. The second study reported 83% provider satisfaction, with 90% indicating plans to use the service in the future and to recommend it to other providers.

**Conclusion:** Pharmacist-led opioid deprescribing interventions appear effective, safe, and well accepted across diverse clinical settings. Although these interventions require intensive monitoring and substantial time, they foster a supportive environment where patients report manageable pain levels and positive experiences during tapering process. Despite this remaining a relatively understudied area of clinical research, the available evidence strongly supports the pharmacist's critical role in successful opioid deprescribing. Expanding these initiatives and developing standardised practice guidelines may further strengthen safe, patient-centered opioid use and reinforce the pharmacist's role in opioid stewardship.

## Understanding the factors underlying the underdevelopment of antimicrobial stewardship activities in community pharmacy: perspectives from Quebec pharmacists and physicians

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**Background:** Antimicrobial resistance is recognized as a major global health threat. Antimicrobial stewardship (AMS) is considered a key strategy to mitigate the development and consequences of bacterial resistance by promoting appropriate antimicrobial use. In Canada, approximately 92% of antibiotics are dispensed in community pharmacies, yet AMS initiatives in this setting remain underdeveloped. Existing literature on AMS focuses primarily on hospital settings, where AMS practices are already well established, leaving community pharmacy practice largely unexplored. Understanding the perspectives of frontline healthcare professionals is therefore essential to inform the development of effective AMS strategies in community care.

Purpose: This study aimed to explore the perspectives of Quebec healthcare professionals regarding antimicrobial stewardship in community pharmacy and to identify perceived barriers and opportunities for the implementation of structured AMS activities.

**Method:** A qualitative study design was used. Data were collected through a semi-structured focus group moderated by two facilitators using a predefined discussion guide. Participants included one general practitioner and four community pharmacists (two pharmacist-owners and two staff pharmacists) working in pharmacies with varying dispensing volumes. A socio-demographic questionnaire was used to collect basic participant characteristics, including age and years of professional experience. The discussion was audio-recorded and transcribed into verbatim. Data were analyzed using inductive and deductive thematic analysis. Potential sources of bias included researcher bias, volunteer selection bias, and sampling limitations, as patients and representatives of professional organizations were not included.

**Results:** A single 80-minute focus group was conducted with five participants: one general practitioner and four pharmacists representing pharmacies dispensing between fewer than 150 and more than 500 prescriptions per day. Participants had an average of 20 years of professional experience. Thematic analysis identified eight major themes influencing the implementation of AMS in community pharmacy: governance, work organization, patient

engagement, professional identity, communication of clinical information, stakeholder availability, collaboration with physicians, and financial incentives. Participants reported uncertainty regarding leadership and responsibility for AMS implementation and highlighted operational barriers such as heavy workload, staff shortages, and pressure for rapid service. Limited access to clinical information, incompatible digital systems, and difficulties communicating with prescribers were also identified as important challenges. Patient expectations and limited public awareness of appropriate antibiotic use were perceived as additional drivers of unnecessary antibiotic prescribing and dispensing. Despite these barriers, collaboration between pharmacists and physicians was generally described as positive and improving. Finally, participants emphasized that many AMS-related activities remain unreimbursed under the current funding model, limiting their integration into routine practice.

**Conclusion:** Multiple systemic and organizational barriers limit the implementation of antimicrobial stewardship in community pharmacy. Participants described AMS as often perceived narrowly as isolated clinical interventions rather than as a coordinated, multifaceted strategy. Strengthening digital infrastructure, improving interprofessional communication, expanding public education on antimicrobial use, and aligning financial incentives with stewardship activities may facilitate broader implementation. Regulatory bodies could also support AMS by integrating stewardship principles into professional practice standards. Further research should explore scalable stewardship models adapted to community pharmacy practice.

## Empirical antibiotic use and high multidrug resistance in pregnancy-associated urinary tract infections in primary care: A stewardship gap

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**Background:** Urinary tract infection (UTI) affects around 8% of pregnancies and is linked to adverse outcomes, making timely and appropriate treatment important. In primary care settings with limited microbiology confirmation, empirical prescribing can drift away from recommended first-line options and accelerate antimicrobial resistance. In Palestine, evidence linking antenatal antibiotic prescribing patterns with local resistance profiles in primary care is limited. Purpose: To quantify UTI diagnostic pathways (including urine culture uptake and culture-confirmed UTI), characterise uropathogens and MDR, and evaluate the appropriateness of antibiotic prescribing in pregnancy against guideline recommendations.

**Method:** Prospective cohort study of pregnant women attending primary healthcare clinics in Nablus (N=485). UTI diagnosis routes were documented (urine analysis, dipstick, symptom-only). Urine cultures and antimicrobial susceptibility testing were analysed for participants who completed culture testing. Prescribing appropriateness was assessed using three domains: (1) alignment with guideline-recommended therapy for the clinical presentation, (2) appropriate dose, and (3) appropriate treatment duration.

**Results:** Among 485 pregnant women, urine culture was performed in 185 (38.1%); 206 (42.5%) had UTI symptoms but declined culture. Culture-confirmed UTI was identified in 115 women (23.7% of the cohort; 62.2% of those cultured). Of confirmed cases, 62.6% were gram-negative and 37.4% gram-positive; 8.7% were asymptomatic bacteriuria and 91.3% symptomatic infection. Escherichia coli predominated among gram-negative isolates (61.1%) and Staphylococcus aureus among gram-positive isolates (60.5%). MDR was detected in 55.7% of isolates. Antibiotics were prescribed to 269/485 (55.5%); cefuroxime and cefixime were most used. Nitrofurantoin was prescribed in 17/485 (3.5%) (17/269; 6.3% of those treated), indicating low use of a commonly recommended first-line option for lower UTI in pregnancy. Resistance was highest to commonly used agents, including ampicillin (80%) and cefixime (57.1%). Appropriateness assessment showed gaps in prescribing quality: 41.4% of oral prescriptions met dose-and-duration criteria, and 46.5% met duration criteria. only 3.5% received the preferred first-line agent, indicating that about 97% of prescriptions did not align with first-line recommendations.

**Conclusion:** This study highlights a clear antimicrobial stewardship gap in antenatal primary care, characterised by low use of urine culture, a high prevalence of multidrug-resistant uropathogens, and prescribing patterns that underuse pregnancy-appropriate first-line options while relying heavily on cephalosporins, including "Watch" antibiotics. Strengthening diagnostic pathways through routine local antibiograms and improved culture uptake, alongside structured outpatient antimicrobial stewardship focusing on antibiotic choice, dose, duration and de-escalation, should be prioritised in future work.

## A systematic review of pharmacists' impact on smoking cessation

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**Background:** Tobacco smoking remains a leading preventable cause of morbidity and mortality. Smoking cessation improves life expectancy, yet success rates remain low. Behavioural and pharmacological therapies improve cessation success. As such, pharmacists are well positioned to support smoking cessation; however, evidence on pharmacist-led interventions remains limited, highlighting the need for an updated synthesis of the literature.

Purpose: This systematic review aimed to assess the effectiveness of pharmacist-led interventions for tobacco smoking cessation.

**Method:** Using the Cochrane Handbook for Systematic Reviews of Interventions, this systematic review is reported according to PRISMA 2020 guidelines. Randomized and non-randomized controlled studies evaluating pharmacist-led smoking cessation interventions were included. Eligible interventions included pharmacological therapies and pharmacist-led behavioral interventions. MEDLINE, Embase, CINAHL, and the Cochrane Library were searched without time restrictions, along with grey literature and clinical trial registries. Two reviewers independently screened each study, extracted data, and assessed risk of bias using RoB 2.

**Results:** A total of 3,172 articles were identified. After removal of 224 duplicates, 2,984 titles and abstracts were screened, leaving 111 articles for full-text review. Twenty-five studies were included for extraction, representing 13,203 patients.
Among them, 17 were randomized controlled trials, 7 cluster randomized trials, 2 before-and-after studies, and 1 non-randomized trial. Interventions most commonly occurred in community pharmacies (12 studies), followed by hospitals (7), medical clinics (4), and rehabilitation centers (1). In three studies, a dedicated smoking cessation pharmacist directly contacted patients.
Geographically, 9 studies were conducted in North America (Canada, United States), and 5 in Europe (4 in the United Kingdom, 1 in Spain). Other countries with multiple included studies were Australia (4) and Japan (3), while the remaining studies were conducted in Qatar, Nigeria, Thailand, and China. The duration of follow-up ranged from 4 to 52 weeks, with a median and mean of 26 weeks.
The most common intervention was individual counselling, present in 23 of 25 studies. Other non-pharmacological interventions included educational materials (5 studies), mobile phone–based interventions (2), and group counselling (1), with some studies combining components. Pharmacists acted as prescribers in 7 studies, and smoking cessation medications were used in 18 studies.
Relative risk estimates showed fewer smokers in pharmacist intervention groups at most follow-up points: 12 weeks RR 0.90 (95% CI 0.86–0.95; n=2,398); 24–36 weeks RR 0.93 (95% CI 0.90–0.96; n=2,054); 36–52 weeks RR 0.90 (95% CI 0.84–0.96; n=550); and 1 year RR 0.92 (95% CI 0.88–0.97; n=1,685). No statistically significant difference was observed before 12 weeks (RR 1.00; 95% CI 0.98–1.02; n=8,202) or between 12 and 24 weeks (RR 0.94; 95% CI 0.87–1.01; n=474).

**Conclusion:** In our systematic review, pharmacist-led interventions significantly increased smoking abstinence at most time points. Most studies used individual counselling, often combined with pharmacological treatment, highlighting the pharmacist's role at the intersection of behavioral support and medication management. Given the ongoing global burden of tobacco-related mortality, pharmacist involvement in smoking cessation interventions represents a promising strategy to improve patient outcomes.

## Can I help you? – A qualitative exploration of the drivers of onsite pharmacist integration into aged care teams

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**Background:** The Aged Care Onsite Pharmacist program was introduced in Australia in 2024 to improve the quality use of medicines in residential aged care. This novel role is professionally isolated from other pharmacists and requires pharmacists to practice within pre-existing teams in a complex, dynamic environment. Factors associated with successful integration of pharmacists into these teams have not been previously described.

Purpose: To explore stakeholders' perspectives of factors that support integration of pharmacists into aged care teams.

**Method:** Semi-structured focus groups and interviews were undertaken with pharmacists, aged care staff, residents, and informal caregivers. Audio and video data were collected via Zoom™ software and transcribed verbatim. Two researchers undertook inductive thematic analysis to identify key themes across datasets.

**Results:** Twenty-four participants contributed across one interview and eleven focus groups. Three major themes, each with two sub-themes, were identified: 1) Being seen, 2) Building trust, and 3) Understanding the environment. Each theme was underpinned by a singular overarching theme: proactivity. Pharmacists who proactively engage with stakeholders found that they were most successfully integrated. Theme 1: 'Being seen' describes the need for pharmacists to be available and perceived as useful by stakeholders through physical presence and availability (Sub-theme 1.1), and creating an identity (sub-theme 1.2). This identity was often formed by challenging initial perceptions of a pharmacist as a custodian of medicines to a more collaborative role. Theme 2: 'Building trust' describes the need for pharmacists to foster trust from stakeholders in their capabilities and value through collaboration in real time (sub-theme 2.1) and demonstrating value (sub-theme 2.2). In-person interactions facilitated communication and demonstrated the value of a pharmacist as a trusted colleague. Finally, Theme 3: 'Understanding the environment' describes the need to understand the complex structures in aged care homes, including: social and contextual norms (sub-theme 3.1), and procedures, routines and roles (sub-theme 3.2) that varied from other health settings.

This research complements existing understandings of interprofessional collaboration and teamwork within aged care and other health settings. Themes were connected through the need for pharmacists to proactively integrate. Initial visibility, through involvement in activities such as clinical rounds and multidisciplinary meetings, supported collaboration and a perception of the pharmacist as valuable. This challenged initial perceptions of the pharmacist as 'policing' medicines, facilitating progressive involvement and subsequent integration.

**Conclusion:** Proactive behaviours that enhance visibility, accelerate trust formation, and cultivate understanding of the environment are perceived to be central to the integration of pharmacists into aged care teams. The identified themes provide useful context for organisations and individuals to optimise early and successful integration. Residential aged care services should structure onboarding processes to prioritise early visibility, clarify roles and organisational needs and foster in-person collaboration. Pharmacists should demonstrate proactivity in collaborating with and being seen by others, and demonstrate an authentic interest in all staff, residents and families.

## Here to help – healthcare professionals' perspectives of pharmacist roles in residential aged care: A systematic review and meta-synthesis

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**Background:** Aged care systems internationally are under increasing pressures due to economic and resource challenges, the climate crisis, and an ageing population. The optimisation of interdisciplinary healthcare teams may relieve some of these pressures. Success of interdisciplinary teams is dependent upon clear and respected roles, shared goals, successful communication strategies and structures, and measurable processes and outcomes. Pharmacists are increasingly involved in interdisciplinary teams, but it is not yet known how their roles are perceived by these existing teams.

Aim: This systematic review and meta-synthesis aimed to identify what is known about the perceptions of healthcare professionals regarding pharmacist roles, including barriers and enablers, in caring for older persons in residential aged care.

**Method:** A systematic search of literature published between 2000 and 2025 was undertaken across Embase, Medline, CINAHL and Web of Science. Primary studies addressing the research aim were eligible for inclusion. Two researchers independently reviewed and reached consensus agreement for all studies. Both researchers then undertook a thematic synthesis of qualitative data to identify analytic themes through mutual agreement and discussion with the wider research team.

**Results:** After removing duplicates, 1878 unique papers were identified and 39 were included for data extraction and analysis. Three overarching themes were identified with associated sub-themes. Theme 1: Pharmacist roles in aged care are supported through various mechanisms. Sub-themes include; 1.1: building rapport and trust with the team, 1.2: education and experience, 1.3: access to information, 1.4: particular attributes, 1.5: organisational buy-in, 1.6: favourable models of care, and 1.7: role clarity. Theme 2: Pharmacists perform key roles that are valued by healthcare staff. Sub-themes include; 2.1: knowledge and communication brokers, 2.2: filling existing gaps in care, and 2.3: optimising quality use of medicines. These roles are valued due to health professionals' recognition of the pharmacists' medicines expertise. Theme 3: Healthcare professionals perceive three key outcomes of pharmacist input. Sub-themes include; 3.1: enhanced confidence of staff,

3.2: improved workforce capacity and capability, and 3.3: improved person-centred care of older adults. Most presciently, pharmacist roles that leverage, prioritise, and support existing multidisciplinary collaboration within healthcare teams are most valued.

**Conclusion:** Pharmacists are considered a valued member of the multidisciplinary team in residential aged care homes, with distinct roles. This paper has identified the perceived enablers of the roles, the activities valued by health professionals, and the outcomes of such roles. Policymakers and organisations may consider these findings to optimise interprofessional collaboration when implementing pharmacist services. This may further reduce stress on aged care services, and assist in optimising the person-centred care of older persons.

## Perception survey on leadership development among Singapore's pharmacists

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**Background:** The Pharmacy Leadership Development Strategy (PLDS) aims to develop healthcare leaders within and beyond pharmacy who can provide holistic perspectives in decision-making and lead health ecosystems. The PLDS presents a Leadership Development Journey, starting with Self-Leadership before advancing to Leading Others, guided by a "Why-How-What" framework. A Leadership Development Perception Survey was conducted alongside the PLDS launch in October 2024 to establish baseline insights.

**Method:** An online survey covering leadership perceptions, developmental opportunities, and advancement barriers was conducted among pharmacists across healthcare settings. Data collection included Likert scales, multiple-choice questions, and open-ended responses. Analysis involved descriptive statistics and thematic analysis.

**Results:** 270 pharmacists from various practice settings and leadership levels, participated in the survey. These pharmacists predominantly worked in acute care hospitals and polyclinics and most of them self-identified as emerging leaders (i.e. taking a leadership position for the 1st time). 62% indicated strong motivation to develop themselves in leadership. Those with lacked motivation did not correspond to a particular career stage suggesting that factors beyond experience influenced attitudes towards self-motivation and leadership development.

While 70% received leadership development training, concerns about its adequacy persisted. Mentoring and coaching emerged as the most valued and prevalent development methods, though resource limitations constrained their availability. These opportunities effectively developed internal leadership capabilities, but outward-focused competencies received less attention, highlighting the need for more diverse development approaches. Barriers to pharmacy leadership development were identified at multiple levels: individual (lack of prioritisation), organisational (operational demands superseding development needs), and systemic (resource constraints) etc.

**Conclusion:** Survey results suggested for a more structured approach for pharmacists in leadership development across healthcare institutions. These findings can help leaders identify gaps and understand how the PLDS's stepwise approach and strategies can foster self-leadership and create new development opportunities. A follow-up survey will measure the PLDS's impact against current baseline data.

## An assessment of the alignment of the national health insurance scheme's medicines list with the essential medicines list of the ministry of health

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**Background:** The National Health Insurance Authority (NHIA) manages the National Health Insurance Scheme (NHIS), Medicines List (ML), which outlines reimbursable medicines. To promote rational medicine use, equitable access, and efficient resource allocation, NHIS policy requires medicines on the NHIS ML to be drawn from the Ministry of Health's (MOH) Essential Medicines List (EML), which is informed by treatment pathways outlined in the Standard Treatment Guidelines (STG). This review assessed the degree of alignment between the NHIS ML and the national EML, focusing on therapeutic class representation and implications for equity, access, and progress toward Universal Health Coverage (UHC).

**Method:** A descriptive-analytical review was conducted using the 2025 NHIS Medicines List and the 2017 MOH EML and STG. The two lists were compared to determine alignment across five therapeutic classes: antihypertensives, antidiabetics, anticancer, anti-infective, and respiratory medicines. These were selected based on their contribution to NHIS expenditure and public health relevance. Alignment was assessed by calculating the proportion of medicines on the NHIS ML that also appeared on the EML, with results

summarized using percentages and analytical interpretation to explain observed variations.

**Results:** The review demonstrated a high degree of concordance between the 2017 MOH EML and the 2025 NHIS ML across the therapeutic classes assessed, indicating substantial alignment between national health priorities and reimbursement policies. Findings also reflected the general policy principle of keeping the NHIS ML as a subset of the EML based on financial sustainability considerations. Overall, 98% of anti-infective medicines, 88% of respiratory medicines, and 77% of anticancer medicines on the MOH EML were found to be on the NHIS ML. Alignment was lower for antihypertensive and antidiabetic medicines (74% and 70%, respectively), reflecting the broader range of therapeutic alternatives recommended in the STG.
Most medicines not included on the NHIS ML were captured in the STG as alternative treatment options, suggesting that their exclusion reflects reimbursement prioritization based on cost-effectiveness and value for money rather than gaps in clinical guidance. However, Enalapril and Tiotropium the sole recommended pharmacological options for the management of hypertension in children and adolescents and chronic bronchitis, respectively were absent from the NHIS ML, highlighting potential gaps in coverage for these specific indications.
A policy divergence was observed where certain oncology medicines, including trastuzumab, paclitaxel, and docetaxel, appear on the 2025 NHIS ML but not on the 2017 EML. This likely reflects the time gap between revisions, during which newer oncology therapies have gained wider clinical acceptance.

**Conclusion:** The findings indicate that the NHIS ML is largely aligned with the MOH EML, particularly for medicines addressing high-burden infectious and non-communicable diseases, while selectively limiting coverage for high-cost alternatives within therapeutic classes. This reflects strategic purchasing aimed at prioritizing cost-effective therapies while maintaining adherence to national treatment guidelines. However, the omission of certain sole treatment options highlights areas where coverage gaps may need to be addressed to strengthen equitable access. It is recommended that the EML and STG are reviewed periodically to ensure their alignment with the observed responsive reimbursement framework.

## Adaptive pharmacopolitical intelligence quotient in late-stage capitalism

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**Background:** The crucial role of political awareness in public health and pharmaceutical policymaking cannot be overemphasized. The evolving conscious involvement in the non-partisan political-economic and ethical contestations, cooperation, competition, compromises, and power struggles over who, how, when, and how much of scarce medical resources (and at what cost) are distributed to ensure equitable population well-being, on the one hand, and financial incentive structures, on the other, is what we refer to as ‘adaptive pharmacopolitical intelligence’. As in Rudolf Virchow's famous maxim: "Medicine is a social science, and politics nothing but medicine at a larger scale." The empirical gap is: which pharmacopolitical conversations are we avoiding, and which ideologies and model-based rational thinking fail to recognize that industry, legislators, and patients are not seeking the same outcomes except in theory?

**Method:** To address the complexity of industry and policymaking, this study answers the question: How much do patients know about the complex political inner workings of industry and policymaking circles, and how does that affect pharmaceutical outcomes? Building on scholarly sources and grey literature, metatheoretical analysis is used to refine understandings of how populations (patients) engage or disengage politically with pharmaceutical ecosystems, which they are vital components of, and the different outcomes they produce. More prominently, this paper introduces a conceptual urgency: the Adaptive Pharmacopolitical Intelligence Quotient (AdPharmap-IQ), which, unlike other measures of intelligence, requires populations to acknowledge that they understand little about the opaque inner workings of the pharmaceutical and policy landscapes, marked by powerful political interests and unresolved contestations.

**Results:** Adaptive intelligence embedded in critical thinking involves a constant search to reexamine model-based rational thinking and to judiciously use scarce resources for long-term survival (sustainability) through pharmacy, traditional alternatives, and non-pharmaceutical interventions. Non-market strategies, corporate political power, and other forms of political manoeuvring are used to optimize profitable outcomes and leverage in the pharmaceutical industry, and that is a normal corporate pursuit of intelligence (without ethical considerations). AdPharmap-IQ predicts the degree of awareness and pragmatic action individuals take to engage in self-governance and in participatory public/global health governance of medicines, in particular, and public health in general.

**Conclusion:** There is a strong link between AdPharmap-IQ, individual agency, and improved pharmaceutical and health outcomes. This is because in late-stage capitalism, characterized by the retreat of the state, budget cuts, and austerity measures amid stagnant growth and spiralling inflation, it is imperative that individuals and communities become active agents with a high AdPharmap-IQ because we are in an era of responsibilization in which 'to each his own' is the coded message worth deciphering about pharmaceutical equity. Based on the above conclusions, the paper supplies a

set of testable propositions for future research on why people are reminded to properly dispose of unused medicines, eat healthily, exercise, sleep well, and reduce stress, yet hardly asked to engage in health-promoting politics to influence outcomes.

## Shared decision-making on medical cannabis for arthritis: development of a pharmacist–patient decision aid

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**Background:** Older adults living with arthritis increasingly consider medical cannabis for its perceived therapeutic effect on symptom relief. Decisions about its use are complex and preference-sensitive because of limited evidence. Pharmacists are frequently consulted about potential benefits and risks; however, structured decision aids (DAs) to facilitate pharmacist–patient discussions and shared decision-making remain limited. This study aimed to develop a theory-driven, evidence-informed and user-centred DA prototype to facilitate pharmacist–patient discussions and support informed, values-aligned decisions regarding medical cannabis use for arthritis symptom management.

**Method:** A multi-phase development process was undertaken between October 2022 and December 2025, guided by the Ottawa Decision Support Framework (ODSF) and the International Patient Decision Aid Standards (IPDAS). Phase I involved conducting a scoping review to identify the development basis of DAs in rheumatology. Phase II explored decisional needs through two qualitative descriptive studies with older adults and clinicians (including pharmacists) employing reflexive thematic analysis. Phase III focused on iterative drafting of the DA based on findings of phases I and II and refinement based on user input.

**Results:** Phase I: Thirty-six tools were identified where development was frequently based on IPDAS (53%,n=19) and the ODSF (16%,n=6). Decision tools varied in format (eg, paper-based, web-based, interactive) and timing of use (before, during, or after consultations). Phase II: Patients (n=12) and clinicians (n=12) participated in virtually conducted semi-structured interviews. Clinicians (n=12) included pharmacists (33%, n=4), family physicians (25%, n=3), rheumatologists (25%, n=3), and registered nurses (17%, n=2). Qualitative analysis identified interrelated cognitive, professional and sociocultural determinants shaping clinician–patient discussions about medical cannabis. Key themes included evolving uncertainty regarding the effectiveness and safety of medical cannabis, clinicians' concerns about perceived therapeutic endorsement and professional role legitimacy, and stigma influencing openness in treatment conversations. Participants' accounts further highlighted tensions between patients' desire for informed guidance and clinicians' hesitancy in navigating evolving evidence. Phase III: The DA was designed as an encounter DA, with evidence described as weak, indicating a need to structure collaborative conversations during consultations, even in light of uncertain evidence. The prototype underwent two iterations based on feedback from intended users (n=6), encompassing clinicians, researchers, and older adults living with arthritis. The prototype, designed for pharmacist-led use during patient encounters, integrates balanced educational content, values clarification exercises, and explicit acknowledgement of evidence limitations in accessible language tailored to older adults.

**Conclusion:** Participants identified pharmacists as well-positioned to support discussions about medical cannabis because of their accessibility and expertise in medicine management. A theory-driven, user-centred development process enabled the creation of a decision aid designed to facilitate structured pharmacist–patient conversations in the context of clinical uncertainty. By facilitating respectful, balanced dialogue between patients and pharmacists, the developed DA can support harm-reduction–oriented discussions and help patients make informed, values-congruent decisions. As cannabis use becomes more widespread in different jurisdictions, this approach may offer a practical framework for strengthening pharmacist involvement in shared decision-making.

## Insights from the pharmacy workplace and well-being (PWWR) Reporting System

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**Background:** Following the American Pharmacists Association (APhA) Board of Trustees' commitment to addressing pharmacy workforce well-being and resilience, APhA convened the 2019 Enhancing the Well-being and Resilience of the Pharmacist Workforce national consensus conference. As one of several results of that conference, the Pharmacy Workplace and Well-being Reporting (PWWR) system launched in October of 2021 in collaboration with the National Alliance of State Pharmacy Associations (NASPA). PWWR was established to provide the pharmacy workforce with a safe, structured, and constructive outlet to share positive and negative workplace experiences.

Purpose: The purpose is to summarize the reported positive and negative workplace experiences, discuss learnings, and outline actions APhA has taken from the PWWR system.

**Method:** One of the primary benefits of PWWR has been a partnership with the Alliance for Patient Medication Safety (APMS). APMS is a federally recognized Patient Safety Organization (PSO) that helped develop the reporting system, store data, analyze the anonymous reports, and publish nonidentifiable data, trends, and findings. The system prioritized anonymity and emphasized that PWWR is not a survey, but a safe reporting service protected under the Patient Safety and Quality Improvement Act of 2005. A quantitative and qualitative analysis of the results and open-ended responses was conducted by APMS and APhA staff. Prevalent positive and negative theme responses by pharmacists, student pharmacists, and pharmacy personnel were identified. Reports have been distributed on APhA's website and have been presented and discussed at many state and national conferences.

**Results:** PWWR collected 2,515 individual reports spanning October 2021 to January 2026. Although the positive experiences reported represented a small total of the overall reports, they provided insight into best practices in pharmacy settings. The positive experiences revealed opportunities to improve communication with physicians, decrease burdens of workflow issues, and utilize technology to decrease medication errors. Pharmacy staff reported that when their daily work was supported and they were able to work collaboratively to resolve issues, their well-being improved more. In addition, reports emphasized that positive workplace experiences often arise from small, meaningful moments, rather than large systemic changes. Negative experiences represented the overwhelming majority of reports and revealed challenges related to staffing, workload volume mismatched to available staffing/shift hours, poor working conditions, medication errors, harassment, and discrimination, including verbal, emotional, sexual, or physical harm. These negative experiences were tied to stress, burnout, weakened personal relationships, and decreased happiness.

**Conclusion:** Since 2021, PWWR summaries have supported the well-being of the pharmacy workforce by elevating challenges and highlighting positive experiences so the profession can continue to improve workplace well-being and patient safety. The insights drawn from PWWR, driven by quantitative trends and extensive narratives, have and will continue to inform national well-being advocacy initiatives, open dialogue with employers, and inform researchers/educators on workforce issues. The United States pharmacy workforce will continue to face workplace issues, but PWWR's impact will hopefully provide a foundation for continued advancement and policy development within the scope of pharmacy well-being.

## Advancing community-centred health governance: the national forum on local health and the Coimbra declaration for local health priorities 2030

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**Background:** Strengthening community-centred health systems and local health governance has become a global priority to improve population health and reduce inequalities. International organisations such as the WHO and the OECD highlight the importance of integrated primary care, action on social determinants of health and participatory governance.

In Portugal, recent reforms of the National Health Service, including the expansion of integrated Local Health Units and the decentralisation of responsibilities to municipalities, have created new opportunities for community-based health planning and cooperation. Within this context, the National Forum on Local Health will be organised to promote dialogue between stakeholders and to support the development of shared priorities and joint commitment towards stronger local health governance, research and action. The initiative stands on the Coimbra Declaration – Local Health Priorities for 2030, a multi-stakeholder policy statement outlining local health priorities and governance principles for community-based health planning in Portugal up to 2030.

Purpose: This project aimed to explore how a multi-stakeholder dialogue platform can support the identification of shared priorities for community-centred health governance and integrated care, leading to the joint signing of the Coimbra Declaration.

**Method:** The National Forum on Local Health was organised as a national policy dialogue involving representatives from municipalities, healthcare services, health professions, academic institutions and civil society organisations. The forum included panel discussions, thematic policy dialogues focusing on local health governance, sustainable development, equity, community-based care, and data-driven local health policies. Previous work done by APJF was used to identify key policy priorities emerging from stakeholder discussions, such as the "White Book" initiative and the Platform of Young Healthcare Professionals. These priorities informed the development of the Coimbra Declaration.

**Results:** The expected results include outputs collected from local authorities, healthcare organisations, professional associations, academia and community organisations. This will allow to demonstrate the need to strengthen municipal health governance structures (including Municipal Health

Councils) and building Municipal Health Strategies driven by collaborative and co-owned platforms of professionals, decision-makers, researchers and citizens. The Coimbra Declaration established shared priorities for local health policy until 2030, including the development of evidence-based municipal health strategies with measurable targets, stronger multiprofessional integration and continuity of care, action on social determinants of health through cross-sector collaboration, and policies supporting active and healthy ageing. Participants also emphasised the importance of sustainable financing, workforce development and digital transformation to support local health strategies.

**Conclusion:** The National Forum on Local Health demonstrates how structured multi-stakeholder dialogue can support the development of shared priorities for community-centered health systems. The Coimbra Declaration provides a framework to strengthen local health governance, promoting community participation and aligning municipal health strategies with national and international health priorities. Such initiatives may contribute to positioning pharmacists and other community-based health professionals as partners in integrated local health systems. Future work should focus on monitoring the implementation of local health strategies and evaluating the impact of collaborative governance models on health outcomes and health system performance.

## Early career workforce development in pharmacy: the Portuguese Map of Professional Pathways

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**Background:** The pharmaceutical profession offers diverse career opportunities across sectors such as community and hospital pharmacy, industry, regulation, and research. However, young pharmacists (<35 years) and pharmacy students often struggle to understand the full range of career pathways and the competencies required for each area.

Concerns have emerged regarding the profession's attractiveness and shifting expectations among early-career pharmacists. Simultaneously, discussions on revising pharmaceutical education highlight the need to better align training with evolving professional demands. Many young professionals report gaps in key competencies when entering their chosen fields, which can affect their integration and development.

Understanding how career perspectives, professional attractiveness, and competency needs are evolving is essential to better align education, training, and workforce strategies with current practice realities. Improved knowledge of career pathways can support career planning, workforce development, and more targeted initiatives by professional organisations.

In Portugal, the Portuguese Association of Young Pharmacists (APJF) seeks to support early-career pharmacists and those in transition. To address current knowledge gaps, it plans to establish a Young Pharmacists Career Observatory and develop a national Map of Professional Pathways in pharmacy.

Purpose
This project aims to map and characterise the professional pathways of young pharmacists in Portugal, identifying emerging areas of work and competencies, as well as factors influencing career choices. It seeks to generate evidence that aligns education, expectations, and labour market needs within the pharmaceutical sector.

**Method:** A national observational study will be conducted using an online survey targeting young pharmacists and students in Portugal. The survey will be disseminated through professional networks, academic institutions, and youth organisations.

The questionnaire will collect data on demographics, education, employment sector, career transitions, aspirations, and perceived training needs. It will also explore factors influencing career decisions and perceptions of opportunities within the sector. For students, career expectations and motivations for choosing pharmaceutical sciences will be assessed.

Quantitative data will be analysed using descriptive statistics to identify trends in career pathways and sector distribution. Qualitative responses will be analysed thematically to explore motivations, barriers, and expectations regarding professional development.

**Results:** The study is expected to provide a comprehensive overview of early-career pathways among young pharmacists in Portugal, highlighting the diversity of sectors and professional trajectories. It will likely identify areas of high interest, emerging career trends, and key factors influencing career decisions among both professionals and students.

The resulting Map of Professional Pathways will offer a structured overview of career opportunities and trajectories within the pharmaceutical sector. It may also inform curriculum development in undergraduate education and enable comparisons with data from other countries through collaboration with professional associations.

**Conclusion:** The Map of Professional Pathways will provide valuable insights into the career development of early-career pharmacists. By identifying trends and mapping opportunities, it aims to support informed career decisions and contribute to evidence-based improvements in education and professional development.

In the long term, the findings may support workforce planning and guide professional organisations in strengthening career development strategies and opportunities within the pharmaceutical sector.

## Screening for poverty and related social determinants by community pharmacists: Findings from the SPARK RPh Public Engagement Project in one Canadian province

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**Background:** Many provincial/territorial health systems in Canada lack the individual-level social needs data necessary to support targeted interventions. The SPARK Tool—a validated health equity questionnaire—can be used by providers to systematically collect social needs data, enhance care delivery, and improve health outcomes. The public-facing role of community pharmacists presents a unique opportunity to identify social needs at the patient and community levels, and to link patients with community resources. However, the role of pharmacists in social needs screening remains insufficiently defined in Canada. This public engagement project explored diverse perspectives on the role of community pharmacists in screening for social determinants of health (SDH) and identified needs, gaps, and opportunities related to implementation of the SPARK Tool by pharmacists in Newfoundland and Labrador (NL).

**Method:** Guided by the framework for deliberative dialogues described by McMaster Health Forum (2021) and the Canadian Institutes of Health Research Integrated Knowledge Translation Framework (2012), five engagement sessions were held with four interest-holder groups (citizens, pharmacy students, pharmacists, and community organizations) in NL between September 2024 to April 2025. Purposive sampling was used to recruit a total of 11 citizens, 9 students, 5 pharmacists, and representatives from 3 community organizations. A plain-language evidence brief was circulated in advance of each virtual discussion. Sessions were recorded and transcribed verbatim. CoLoop was used to assist with data coding, organization, and reduction. Qualitative data analysis followed the Rigorous and Accelerated Data Reduction (RADaR) method, with concepts and themes developed using an inductive approach. The project was exempt from review by the NL Health Research Ethics Board, as it was deemed a quality improvement initiative.

**Results:** A significant need for action on SDH within the community setting was identified by all participants. However, it was acknowledged that social needs are dynamic and fluid, and community pharmacists alone cannot shoulder responsibility for SDH screening and referrals within the health system. A holistic, multidisciplinary approach that leverages existing infrastructure, such as the provincial personal health record (MyHeathNL) and the United Way Centraide Canada 211 NL service, is required. Five themes were identified across engagement sessions, each with implications for practice and policy: (i) the value of accessibility in multiple forms; (ii) collaboration and mutuality in patient-centred care; (iii) the importance and varied benefits of private consultation spaces; (iv) respect, autonomy, and identity in patient-centred care; and (v) the critical role of effective communication in SDH screening and social care. Barriers and enablers to the pharmacist's role in SDH screening and social care will also be discussed.

**Conclusion:** Generally, citizens, students, pharmacists, and community partners recognised the value of leveraging the unique frontline position of community pharmacists to support SDH data collection and interventions. However, strategies to overcome anticipated barriers must be explored before widespread implementation of the SPARK Tool in community pharmacies.

## Comparing community pharmacists' intentions to provide medication therapy management in Thailand and Indonesia: An application of the theory of planned behaviour

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**Background:** Medication Therapy Management (MTM) is an important pharmacy service aimed at optimising patient outcomes; however, its adoption by community pharmacists varies across regions. Understanding the factors influencing pharmacists' intentions to provide MTM services is essential for advancing clinical pharmacy practice. The Theory of Planned Behavior (TPB) provides a useful framework for examining these determinants.

**Method:** A cross-sectional survey was conducted among community pharmacists practising in Thailand and Indonesia. A structured questionnaire collected demographic characteristics, actual and perceived knowledge of MTM services, and constructs derived from the Theory of Planned Behavior, including attitudes, subjective norms, and perceived behavioural control. Actual knowledge was assessed using statements related to the definition, goals, and core components of MTM. Perceived knowledge and TPB constructs were measured using Likert-scale questions. Respondents were also asked about their readiness to provide MTM services and the MTM activities they intended to perform. Descriptive statistics were used to summarise the data and comparisons were made between pharmacists in Thailand (n=67) and Indonesia (n=67).

**Results:** Respondents from both countries were comparable in age and gender distribution. Differences were observed in practice settings, with Thai pharmacists more frequently working in standalone pharmacies and Indonesian pharmacists more commonly employed in chain pharmacies. Most respondents demonstrated high actual knowledge of MTM concepts, although familiarity with MTM services was higher among Indonesian pharmacists (52.2%) than Thai pharmacists (35.8%). Perceived knowledge scores were also higher among Indonesian pharmacists (mean = 4.00) compared with Thai pharmacists (mean = 3.47). Pharmacists in both countries generally agreed that MTM services play an important professional role in improving patient outcomes, although concerns related to workload, time requirements, and reimbursement were also reported. Differences were more evident in subjective norms. Indonesian pharmacists reported stronger perceived support from patients, physicians, pharmacy owners, and professional organisations. These differences were reflected in pharmacists' readiness to provide MTM services. A higher proportion of Indonesian pharmacists reported willingness to implement MTM services (88.1%) compared with Thai pharmacists (56.7%). Differences were also observed in intended MTM activities: Thai pharmacists were more likely to perform intervention and referral (63.6%), while Indonesian pharmacists showed greater intention to maintain personal medication records (62.7%).

**Conclusion:** Community pharmacists in Thailand and Indonesia recognised the potential value of MTM services; however, their readiness to implement these services differed. Indonesian pharmacists reported greater familiarity with MTM and stronger perceived support from stakeholders, which corresponded with a higher intention to provide MTM services. Pharmacists in both countries also reported practical barriers related to workload, documentation requirements, and reimbursement. These findings suggest that strategies to promote MTM implementation should be tailored to the specific context of each country. In Indonesia, efforts may focus on strengthening stakeholder collaboration and expanding the integration of MTM services within community pharmacy practice. In Thailand, policy and organisational support, such as reimbursement mechanisms, workflow adjustments, and improved documentation systems, may help reduce practical barriers and facilitate wider adoption of MTM services.

## Social determinants and demographic disparities in Newfoundland and Labrador, Canada identified by community pharmacists using the SPARK Tool

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**Background:** Social determinants of health (SDH) influence medication use, healthcare utilisation, and health outcomes. Pharmacists' training and frequent patient interactions position them as trusted and accessible providers of primary healthcare services who can engage in screening for social needs, connect patients with community-based social supports, and spark conversations about SDH. This presentation reports early findings from the implementation of the SPARK Tool—a validated and tested health equity screening instrument—to screen for social needs as part of direct patient care in Newfoundland and Labrador (NL), Canada. Social determinants and demographic disparities identified by pharmacists at four community pharmacy sites are described.

**Method:** This work forms part of a multi-phase, patient oriented comparative mixed methods case study. In phase one, 1–2 pharmacist site champions from diverse community pharmacy sites implemented the SPARK Tool, which includes 7 demographic and 10 social needs questions. Pharmacists incorporated SDH screening into direct patient care encounters (e.g., medication reviews, deprescribing consultations, vaccination) over a planned 6-month period at each site, with implementation occurring between June 2025 and March 2026. Pharmacists provided their patients with information about community supports and facilitated social care referrals, when appropriate. Approval for this study was granted by the NL Health Research Ethics Board (HREB

Reference # 2025.040). Data from each patient encounter were submitted via Qualtrics and descriptive analyses were performed. Data collection and analysis remain ongoing for the overall project.

**Results:** To date, 4 of 5 pharmacy sites have completed their 6-month implementation period, during which 116 of 125 patients (92.8%) agreed to take part in SDH screening; 67.2% were from rural areas. Most participants were aged 55 years or older (65.5%), identified as women (64.7%), and described themselves as White (94.0%). Nearly half (44.8%) reported at least one severe/persistent physical or mental condition, with severe mobility challenges reported most frequently (23.3%). Social needs were prevalent: 43.1% of patients reported at least one unmet need. Limited educational attainment was a notable finding, with 28 patients (23%) not completing high school, disproportionately affecting rural patients (24 of 28). Food insecurity and difficulty obtaining medicines or medical supplies were the most frequently reported social needs (23.3% and 18.1%, respectively), with greater hardship observed among individuals from rural areas as well as those aged 35–44 and 45–54 years old. Difficulty paying utility bills showed similar age related disparities. Fewer than 15% indicated limited social supports, with minimal geographic variation observed.

**Conclusion:** Early findings indicate that community pharmacists in NL are well positioned to identify social and demographic disparities using the SPARK Tool. High acceptance of SDH screening and the substantial proportion of unmet social needs underscore the importance of integrating social care activities into pharmacy practice. Ongoing data collection will clarify rural–urban and age-related patterns and help inform pharmacist-led interventions aimed at enhancing social supports for patients in NL.

## Cost-utility of aumolertinib versus osimertinib in EGFR-mutant advanced non-small cell lung cancer in China: An indirect comparison

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**Background:** A direct economic comparison between aumolertinib and osimertinib is not available for first-line treatment of epidermal growth factor receptor (EGFR)-mutant advanced non-small cell lung cancer (NSCLC). This limits evidence-based treatment selection and reimbursement decision-making in China, where both medicines are clinically relevant options. In addition, the economic value of treatment may differ across clinically important subgroups, including Asian patients, patients with central nervous system (CNS) metastases, and patients with different EGFR mutation subtypes. The present study assessed the cost utility of aumolertinib versus osimertinib from the perspective of the Chinese healthcare system and explored whether results varied across predefined subgroups. This question is particularly relevant where several third-generation EGFR tyrosine kinase inhibitors are available but direct comparative evidence remains limited.

**Method:** A partitioned survival model was developed with three health states: progression-free disease, progressed disease and death. The model used 28-day cycles over a 10-year time horizon. Costs and health outcomes were discounted at an annual rate of 5%. Direct medical costs were included. As no head-to-head randomised controlled trial was available, an indirect comparison was conducted using data from the AENEAS and FLAURA trials. The base-case analysis compared the overall trial populations. The relative treatment effect for progression-free survival (PFS) was estimated using simulated treatment comparison, while overall survival (OS) was assumed to be equal between treatments. Subgroup analyses were conducted for Asian patients, patients with CNS metastases, and EGFR mutation subtypes, including exon 19 deletion (Ex19del) and L858R, using Bucher-adjusted PFS estimates where appropriate. The main outcome was incremental net monetary benefit (iNMB). Incremental cost-effectiveness ratio and sensitivity analyses were also evaluated. Probabilistic sensitivity analysis was undertaken to examine parameter uncertainty.

**Results:** In the base-case analysis, aumolertinib increased quality-adjusted life years by 0.019 and increased costs by Chinese Yuan (CNY) 14,037 compared with osimertinib. The resulting iNMB was CNY -8,533, indicating no clear economic advantage for aumolertinib in the overall population. In subgroup analyses, the iNMB was CNY 12,009 in Asian patients, CNY 21,446 in patients with CNS metastases, and CNY 3,171 in the Ex19del subgroup. In contrast, the iNMB was CNY -29,985 in the L858R subgroup. These findings suggest that economic outcomes differed across clinically relevant patient groups. Probabilistic sensitivity analysis showed wide uncertainty intervals across all analyses, indicating substantial decision uncertainty.

**Conclusion:** From the perspective of the Chinese healthcare system, the cost utility of aumolertinib versus osimertinib appeared to vary across populations with EGFR-mutant advanced NSCLC. No clear economic advantage was observed in the overall population, whereas results differed across clinically relevant subgroups. These findings should be interpreted cautiously because they were based on indirect comparison, subgroup modelling, and a structural assumption of equal OS between treatments. The study suggests that subgroup-specific economic evaluation may be important when assessing first-line EGFR tyrosine kinase inhibitors in advanced NSCLC.

## Redefining pharmaceutical care through corporate wellness: A scalable pharmacist-led model for reducing non-communicable disease risk in the working-age population in Ghana

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**Background:** Non-communicable diseases (NCDs) represent a growing public health challenge in Ghana and across sub-Saharan Africa. In Ghana, NCDs account for approximately 43 percent of all deaths, with hypertension emerging as a leading risk factor among adults aged 25 to 60 years. National estimates indicate that hypertension affects roughly one-third of the adult population, yet awareness and early detection remain low, particularly in urban environments. Despite their accessibility and clinical training, pharmacists in Ghana largely operate within product-centred dispensing roles in facility-based settings. This limits their potential contribution to preventive care, early detection and long-term management of chronic disease risk. Workplaces provide structured environments with defined populations and predictable engagement patterns, offering opportunities for systematic health monitoring. Corporate health platforms therefore represent practical settings for integrating preventive services into daily routines. Pharmacist-led interventions within such systems may facilitate early identification of cardiometabolic risk factors while promoting behavioural change among working-age adults. This study evaluated the effectiveness and feasibility of a pharmacist-led corporate wellness model designed to identify undiagnosed NCD risk and deliver preventive interventions within corporate organisations in Accra, Ghana.

**Method:** A prospective mixed-method pilot implementation was conducted across three private-sector organisations in Accra involving 186 employees aged 25 to 60 years. Participating organisations enrolled under a subscription-based corporate wellness agreement enabling periodic pharmacist-led on-site health services. Baseline screening included blood pressure measurement, body mass index assessment and fasting or random blood glucose testing. Participants also completed a structured lifestyle risk questionnaire adapted from the World Health Organization Stepwise Approach to NCD Surveillance (WHO STEPwise). Employees were stratified into low-, moderate- and high-risk cardiometabolic categories. Pharmacist-led interventions included medication therapy review, nutrition and lifestyle education sessions delivered with a registered dietitian, and stress management workshops. Moderate-risk participants received monthly telepharmacy follow-up consultations, while high-risk individuals were referred to physicians through a structured referral pathway. Follow-up assessments were conducted after three months.

**Results:** Of the 186 employees screened, 72 individuals (38.7 percent) presented with elevated blood pressure levels and 29 employees (15.6 percent) were newly identified cases of previously undiagnosed hypertension. Overall, 81 employees (43.5 percent) were classified as moderate to high cardiometabolic risk. Three-month follow-up assessments were completed for 124 participants. Mean systolic blood pressure decreased from 146.2 mmHg to 134.8 mmHg and mean diastolic blood pressure declined from 92.1 mmHg to 85.6 mmHg. Mean body mass index decreased from 29.1 kg/m² to 28.4 kg/m². Among moderate-risk participants, mean fasting blood glucose declined from 6.4 mmol/L to 5.8 mmol/L. Behavioural improvements were reported, with 68 percent adopting healthier dietary practices and 61 percent increasing physical activity.

**Conclusion:** Embedding pharmacists within corporate wellness systems demonstrates a practical shift in pharmaceutical care toward population-level prevention. The model achieved substantial detection of undiagnosed hypertension and measurable improvements in cardiometabolic indicators among working-age adults. Pharmacist-led corporate health platforms may offer a scalable and sustainable approach for reducing NCD burden while strengthening the role of pharmacists in preventive healthcare.

## Beyond PEPFAR: Pathways to sustainable HIV responses in Sub-Saharan Africa

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**Background:** For over two decades, the United States President's Emergency Plan for AIDS Relief (PEPFAR) has been the primary funding source for human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) programmes worldwide. Since its establishment in 2003, the initiative has invested about $120 billion globally, supporting antiretroviral therapy (ART) for over 20 million people and significantly reducing HIV-related morbidity and mortality, particularly in Sub-Saharan Africa (SSA). Beyond improving clinical outcomes, PEPFAR has strengthened health systems by supporting laboratory infrastructure, workforce development, and governance reforms across many countries in the region. However, recent funding suspensions and reductions announced in 2025 have raised significant concerns regarding the continuity and sustainability of HIV programmes that have long relied on external donor support.

Projections indicate that continued disruptions to HIV services could result in approximately 2.9 million additional HIV-related deaths and more than 10 million new infections globally by 2030, with SSA likely to bear a disproportionate share of this burden. Understanding how SSA countries are responding and identifying viable pathways toward sustainable HIV programmes has become an urgent policy priority. This review synthesises current evidence on the impacts of recent PEPFAR funding cuts, national and regional responses, and emerging strategies for strengthening the long-term sustainability of HIV programmes in SSA.

**Method:** A narrative review approach was adopted to synthesise available evidence on the sustainability of HIV programmes in SSA due to the recent PEPFAR funding reductions. Relevant literature was identified through systematic searches of Google Scholar, PubMed, Scopus, and African Journals Online (AJOL) for publications between 2016 and 2026. Search terms included “PEPFAR,” “HIV/AIDS programmes,” “donor transition,” “health financing,” “sustainability,” and “Sub-Saharan Africa." In addition to peer-reviewed studies, reports and policy documents from international organisations, including UNAIDS, the World Health Organisation, the Global Fund, and other multilateral agencies, were reviewed to capture emerging programmatic and policy responses. The findings were synthesised thematically across three key domains: programme disruptions associated with funding reductions, national and regional response strategies, and emerging pathways toward sustainable, domestically led HIV programmes.

**Results:** The sudden reduction in external support has resulted in measurable stock-level shortfalls of antiretrovirals and compromised treatment continuity. This disruption is compounded by widespread layoffs of healthcare personnel, disruptions to the supply chain, and failures. Diagnostic capacity is similarly impaired, and prevention and harm reduction programmes, including condom distribution and pre-exposure prophylaxis (PrEP), have been severely affected. In response, countries have started seeking alternative donors and implemented emergency domestic financing, such as national health insurance schemes and targeted tax allocations. Furthermore, previously isolated PEPFAR programmes are being integrated into broader primary healthcare systems, and trained health workers are being reprioritised within national systems.

**Conclusion:** Sub-Saharan African countries are demonstrating active resilience and strategic agency in response to PEPFAR funding cuts. Yet, current domestic resource mobilisation remains insufficient to fully offset the immediate financial loss. Strengthening long-term sustainability will, therefore, require expanded domestic investment, diversified financing mechanisms, regional collaboration, and continued international partnerships to safeguard the gains made in the global HIV response.

## Establishing Collaborative Governance for Pharmacist-Led Immunisation Education in South Korea: Implementation and Global Recognition

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**Background:** As the role of vaccination in disease prevention grows, South Korea implemented a pharmacist-led immunisation training programme in 2023. Since then, nationwide efforts have focused on expanding this training to prepare pharmacists capable of enhancing its contribution to public health outcomes.
Objective: This report is to share the process of building collaborative governance among professional organisations to lay a solid foundation for advancing the pharmacist-led immunisation education in South Korea.

**Method:** To implement an advanced education model tailored to the Korean healthcare environment, the Korean Pharmaceutical Association (KPA) established a mutual collaborative agreement with the American Pharmacists Association (APhA) during the 2025 FIP congress. In addition, continuous meetings were held with key stakeholders, including colleges of pharmacy and relevant academic societies. By synthesising diverse opinions, a comprehensive and official Coalition was needed.

**Results:** The Coalition was formed among the KPA, Ewha Womans University College of Pharmacy, Korean Academy of Community Care, Korean Society of Health-system Pharmacists, the Korean College of Clinical Pharmacy, and the Korea Pharmacy Health Communication and Community Care. They initiated joint efforts to standardise the curriculum, explore policy support measures, and facilitate practical application in the field. The Coalition provides a powerful platform for further advancing education and step-by-step strategies for the programme’s successful integration. Of note, this systematic framework and innovative collaborative model earned high praise from the international community, including global recognition from the APhA and the American Association of Colleges of Pharmacy (AACP).

**Conclusion:** The establishment of the Coalition and close inter-organisational communication would further serve as key factors for the successful and sustainable integration of pharmacist-based immunisation training in South Korea.

## Medicines shortages: Solutions for empty shelves. One year on

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**Background:** In December 2024, in response to growing concerns about medicines shortages in the UK, the Royal Pharmaceutical Society (RPS) published Medicines Shortages: Solutions for Empty Shelves. The report provides a comprehensive assessment of the causes of medicines shortages, their impact on patients and healthcare professionals, and what more could be done to mitigate and manage them.
To examine collaborative progress made, a 'one year on' report was produced with the aid of an advisory group of key stakeholders. The report provides an overview of progress in line with those recommendations, noting where improvements have occurred, where further work might accelerate progress, and highlighting ongoing areas of concern.
Purpose
•To examine and reflect on progress made against key recommendations 'one year on' from publication of Medicines Shortages: Solutions for Empty Shelves.
•To reconvene an advisory group of key strategic stakeholders, representative across all parts of the medicines supply chain within the United Kingdom (UK).
•To note where improvements have been made and where further collaborative work is needed to strengthen the timely supply of medicines for patients in the UK.

**Method:** •A survey was widely distributed through members of an advisory group, exploring progress made against each of twenty recommendations from the original report.
•The group were asked to detail both progress and barriers against each recommendation. Pharmacy professionals and patient representative group were represented.
•Responses were analysed using qualitative methods and a thematic analysis conducted to help inform the report.

**Results:** Survey responses demonstrated the significant amount of collaborative work had taken place over the preceding year. Alignment to the recommendations and progress made against many was clear, whilst the report itself acted as a catalyst for some of this.
Notable progress made against the recommendations include,
•Publication of a UK-wide strategy for shortages
oA Department of Health and Social Care (DHSC)/NHS England (NHSE) policy paper set out new and ongoing work to improve shortages management and strengthen medicines supply chain resilience
•Support flexibility in existing medicines regulations and to speed up access to medicines
oNHSE, MHRA and Medicines UK have collaborated on a project to encourage manufacturers to relaunch dormant already MHRA-approved licences through a dedicated regulatory pathway and NHS purchasing arrangements.
•Make better use of pharmacists' skills
oDHSC consulted in September 2025 on 'enabling pharmacist flexibilities when dispensing medicines'.

**Conclusion:** One year on from the publication of Medicines Shortages: Solutions for Empty Shelves, patients and health professionals continue to feel the impact of medicines shortages. Pharmacy teams remain at the front line of shortages and risk being diverted away from patient focused roles and services as they continue to be drawn into managing fragile medicines supplies.
At a national level there has been positive progress across some of the recommendations. However, a national strategy must be supported by senior leaders in Government, with a focus on establishing more resilient supply chains and reducing the impact of shortages on patients.

## Pharmaceutical product shortages and its challenges

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**Background:** Pharmaceutical product shortages are a complex and multifactorial challenge that arise when a demand of a medicinal product exceeds the available supply. Shortages may be attributed to manufacturing interruptions and delays, limited production capacity, quality defects, logistics issues such as supply chain vulnerabilities and procurement challenges. Regulatory constraints such as lengthy approval timelines and limited regulatory flexibilities during supply emergency may contribute to delays in market availability leading to shortages. The study aimed to evaluate factors associated with pharmaceutical shortages by identifying key drivers, assessing stakeholder experiences and exploring potential strategies to mitigate and prevent shortages.

**Method:** An evidence-based approach was employed to develop the guidance document for shortage prevention and the action plan for managing active shortages. A scoping literature review was conducted to identify existing

regulatory frameworks and international shortage prevention plans, focusing on plans from Canada, European Medicines' Agency guidance and England's National Health Services (NHS) guidance. These documents were validated in a focus group discussion for relevance, clarity and practical applicability. Questionnaires were also distributed electronically to healthcare professionals (HCPs) and pharmaceutical suppliers to capture stakeholder perspectives on shortages. A thematic synthesis integrating findings from the literature and questionnaire responses was undertaken to identify key themes related to shortage drivers, impacts, and mitigation strategies.

**Results:** A structured guidance document and action plan were developed to address pharmaceutical product shortages. The guidance document was organised into key sections including risk identification, early identification and notification of supply risk, supply chain monitoring, regulatory flexibilities, and stakeholder communication, with an emphasis on proactive shortage prevention. The action plan was designed as a stepwise, operational framework activated during active shortage, outlining clear escalation pathways, coordination mechanisms, and mitigation strategies. A RACI (Responsible, Accountable, Consulted, Informed) matrix was incorporated within the action plan to clearly define stakeholder roles and responsibilities across regulators, suppliers, and healthcare professionals, ensuring coordinated and efficient response. Together, these outputs provide a structured and context-specific approach to both the prevention and management of medicine shortages. Questionnaire findings highlighted that pharmaceutical product shortages are frequently encountered by both HCPs and suppliers and have a significant impact on patient care and an increase workload, treatment delays and the need to switch to alternative therapies. Although awareness of current mitigation strategies varies across stakeholders, there was an agreement that an improved communication, enhanced coordination and a greater adoption of digital tools, including artificial intelligence to support supply chain logistics and shortage prediction and management is required.

**Conclusion:** Shortages remain a significant and multifactorial challenge impacting both patients and supply chains alike. The study highlights the need for s structured, proactive and coordinated approach to both the prevention and management of shortages. Both the guidance and action plan provide a practical and context-specific framework to enhance supply chain resilience.

## Stakeholder input in optimising medication access

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**Background:** Accessibility is being introduced as an additional pillar to the three main pillars in the pharmaceutical scenario: safety, efficacy and quality. Accessibility reflects the ability of an individual to obtain health services in a timely manner, based on their needs. It is crucial once medication is prescribed, accessibility allows more compliance and makes the challenges of compliance to medication for the patient an easier task. The aim of this study was to collect data on the causes of lack of accessibility to medicines in Malta and what the most problematic barrier of accessibility is. The study identifies opportunities for pharmacists in different sectors to support their patient when accessibility is challenging.

**Method:** Discussions with the Medicines Intelligence and Access unit within the Medicines Authority (MMA), which is the Competent Authority, , and a community pharmacist were conducted with the objective of collecting factual data regarding the current availability issues. A questionnaire was formulated based on the main points gathered, directed to pharmacists to obtain their perception on pharmacist practices related to accessibility. The questionnaire was validated by a focus group made up of two regulatory pharmacists in the MMA and three community pharmacists. The questionnaire was distributed electronically and through on-site visits to selected pharmacies via convenience sampling
Interview questions were formulated from questionnaire segments that needed further investigation. Interviews with a hospital pharmacist; community pharmacist; pharmaceutical distributor distributor and advanced pharmacist practitioner at the procurement unit in the government health service were conducted.

**Results:** A total of 102 pharmacists from all sectors in Malta completed the questionnaire. The main barrier identified was out-of-stock medication, followed by unavailability of brands or dosage forms. Shortages were most evident relating to medication used to treat infections.. The most common strategies adopted by the pharmacists were change in brand and change in active ingredient where emphasis was placed on the pharmacists contribution to explain the rationale for any change and to discuss associated advantages and disadvantages, enabling the patient to make an informed decision.

**Conclusion:** Pharmacists play a key role in improving accessibility by offering alternatives, educating patients, and informing regulatory bodies. A co-payment system was proposed to, replace the current tendering system in place within the public health service so as to reduce access barriers

for patients requiring non-formulary medicines. Stricter enforcement of mandatory reporting of out-of-stock private market medicines to the competent authority was recommended so as to enable this information to be communicated to the public and allowing patients to seek alternatives before their supply is depleted. New frameworks need to be supported by clear rules and regulations in order to avoid confusion that comes along with innovation.

## Focus on HIV Prevention: Perspectives from an Innovative Interprofessional Fellowship

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**Background:** HIV prevention remains a critical global public health priority, particularly among populations disproportionately affected by structural inequities. Pre-exposure prophylaxis (PrEP) has emerged as a highly effective biomedical strategy; however, access, awareness, and implementation remain inconsistent. This work reflects on my experiences within the Dr. Dawn K. Smith HIV Prevention Fellowship and explores how interprofessional education (IPE) and collaborative practice models can enhance PrEP uptake and HIV prevention efforts. Grounded in principles of health equity and informed by the legacy of Dr. Dawn K. Smith, whose work significantly advanced PrEP development and implementation, this study emphasises the urgent need to expand the HIV prevention workforce beyond traditionally specialised providers.

**Method:** This qualitative, reflective analysis synthesises experiential learning, programme participation, and applied interprofessional frameworks encountered during the fellowship. The approach integrates key models including the Pharmacists' Patient Care Process, Healthy People 2030 social determinants of health framework, and IPEC Core Competencies for interprofessional collaborative practice. Additionally, an implementation-informed development model—comprising innovation adaptation, stakeholder engagement, consensus building, competency integration, and programme implementation was utilised to conceptualise scalable HIV prevention interventions.

**Results:** Findings highlight that interprofessional training of non-HIV-specialised healthcare professionals significantly expands the reach of PrEP education and service delivery. Participants demonstrated increased confidence in addressing HIV prevention, improved understanding of social determinants influencing patient access, and enhanced ability to collaborate across disciplines. The fellowship experience functioned as a "barrier breaker," addressing common challenges such as stigma, limited provider awareness, and fragmented care delivery systems (poster page 5). Moreover, structured interprofessional engagement facilitated more culturally responsive and patient-centred approaches, particularly for marginalised communities disproportionately impacted by HIV.

**Conclusion:** HIV prevention is both achievable and scalable when approached through intentional interprofessional collaboration. Expanding PrEP education and access requires investment in workforce development that includes pharmacists and other non-specialist providers. This work underscores the importance of designing structured IPE programmes that prioritise consensus-building, equity, and implementation feasibility. Ultimately, collaborative practice models not only enhance clinical outcomes but also advance health equity by improving access to life-saving preventive services. Working together across disciplines ensures that HIV prevention becomes more accessible, equitable, and sustainable for all populations.

## Sex disparities of pharmacist chambers' board members in Turkey: Last four terms retrospective analysis

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**Background:** Turkish Pharmacists' Association (TPA) is celebrating its 70th anniversary this year and currently consist of 59 Pharmacist Chambers and 55,920 pharmacists (61.2% women). Elections for board membership of both Pharmacist Chambers' and TPA were held every two years. The aim of this study was to assess sex disparities of Pharmacist Chambers' Board Members in Türkiye.

**Method:** This retrospective analysis included all members of the pharmacy chambers' board (including the executive, auditing and honorary boards) last four terms. The number of Pharmacist Chambers were increased from 53 in 2019 to 59 in 2025. Demographic data were anonymously collected from the websites of the Pharmacist Chambers and the electronic records of the Turkish Pharmacists' Association. A secondary analysis of sex disparities according to the socio-economic status (SES) of the pharmacy chamber region was conducted for the 2025 term (n=855). The SES of the

pharmacist chambers' regions was determined based on the 2025 report from the Republic of Türkiye Ministry of Industry and Technology by classifying them into six groups.

**Results:** Of the 1,621 board members who elected the Pharmacist Chambers' Board at least one term over last four terms, 39.2% (635) were women. At the time of their first election, there was a significant difference in the median age of man and women board members (41.0 (25th-75th percentile: 35.0-48.0) years vs. 43.0 (25th-75th percentile: 36.0-50.0) years, respectively; p=0.004). Over the past four terms, the percentage of women board members was ranged between 37.7% and 39.3%, while the percentage of women presidents of executive boards was ranged between 13.6% and 17.9%. There was no significant difference in the number of terms in which man and women board members were elected (p>0.05). There was a significant difference between rates of man and women board members according to SES of the pharmacist chambers' regions (p<0.001; ranged from 18.9% to 44.2% among six groups).

**Conclusion:** Women were not well-represented in all pharmacist chamber boards in Türkiye. Line with the International Pharmaceutical Federation's (FIP) development goals (#10), national strategies should be developed and implemented to address inequalities of equity and diversity in the board membership of pharmacy chambers in Türkiye.

## Using integrative health approaches with traditional medicine practice: Last autonomous indigenous tribe - the Kalinago

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**Background:** Traditional medicine refers to the indigenous knowledge, skills, & practices used to maintain and improve physical & mental health. Herbal remedies are the most common type of traditional medicine. Approximately 88% of countries, including Dominica, utilize traditional medicine. The WHO states, "Appropriately integrated [Traditional Medicine] can improve health outcomes by increasing the availability of services, especially at the primary health care level, & recognizes traditional medicines' many benefits."

Integrative healing supports traditional medicine by incorporating defined safety & efficacy procedures, integrating with allopathic medicine. Information on using traditional medication, such as indigenous bush teas, in integrative healing in Dominica is limited. An urgent need exists to document the Kalinago's perspectives on healing, as the last autonomous indigenous community with tribal land, & much of the traditional medicine knowledge lies with the community's elders. Plant diversity & therapy types are diverse. "Mainstreaming TCIM into primary healthcare systems can bridge access gaps, making healthcare more inclusive, culturally sensitive, & equitable." Education on bush teas & allopathic medicines to bridge access gaps is developed through public-private partnerships to enhance collaborative knowledge preservation.

**Method:** A list of frequently used plants & locations in Dominica, along with aspects of Kalinago healing, was compiled. This resource, a limited-edition print, has largely been lost due to a catastrophic Category 5 hurricane. Detailed reviews of the drug information literature on the plants in the book will be conducted, & a standard template for presenting the information in a structured manner will be developed. Investigators will work together to design educational interventions/resources incorporating further Kaliango knowledge of traditional healing & bush medicine to enhance the preservation & use of integrative healing.

**Results:** A preliminary list of traditional medicines was combined with drug information resources & indigenous knowledge to enhance integrative healing practices. A standard template was designed to improve the ability to use information based on expert knowledge & a previous, limited print resource.

**Conclusion:** A preliminary list of traditional medicines was combined with drug information resources & indigenous knowledge to enhance integrative healing practices. A standard template was designed to improve the ability to use information based on expert knowledge & a previous, limited print resource.

## Development of a Canadian Historical Pharmacy Dictionary

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**Background:** Preserving and promoting historical knowledge is essential for protecting the pharmaceutical heritage. Faculties of pharmacy can play an important role in documenting and interpreting the evolution of pharmacy practice. For more than two decades, the Unité de recherche en pratique pharmaceutique (URPP) has been involved in initiatives aimed at preserving and promoting this heritage. The team manages a collection of pharmaceutical artifacts, maintains a virtual museum, and contributes to the design and presentation of an annual pharmacy-related exhibition. As part of these activities, we explored the development of an online historical pharmacy dictionary. Objective: To describe the design, implementation, and

evolution of the Grand dictionnaire canadien de l'histoire de la pharmacie.

**Method:** Descriptive study. Based on preliminary work, similar initiatives in both print and electronic formats were identified. Experts in didactics were consulted during the development process. A standardized operating procedure was established, including the following steps: (1) defining categories of terms (common terms, proper names such as influential individuals, organizations or journals, medication names, and historical events); (2) selecting terms; (3) conducting documentary research; (4) preparing a synthesis sheet; (5) using generative artificial intelligence (ChatGPT, Plus subscription, current version) to draft a definition based on the synthesis sheet; (6) designing and launching the website; and (7) publishing the entries. The work is carried out with pharmacy trainees within the URPP.

**Results:** The Canadian Historical Pharmacy Dictionary was launched online in December 2024 ((http://gdchp.ca). It is currently available in French, with a bilingual version planned for the future. Microsoft Teams (Microsoft, Seattle, WA, USA) was selected to host and manage the project. A dashboard allows the team to track terms and monitor progress. Each term is associated with a dedicated folder containing the sources consulted and the dated synthesis sheet. The website includes six sections (About, Team, Methods, Alphabetical Index, Our Work, Contact) and terminological entries. Each entry contains a definition, historical context, references, and the names and contribution dates of contributors. Currently, three entries also include video interviews with individuals who have direct experience related to the term in pharmacy practice and more interviews are planned. Generative artificial intelligence is used to produce an initial definition, which is subsequently reviewed and validated by a member of the research team. This approach allows the rapid generation of consistent and standardized entries based on the detailed synthesis sheets. To date, 109 entries have been published and more than 150 are currently in review or in preparation. To further engage the pharmacy community, the research team plans to establish an advisory committee to guide the future development. Additional work is underway to define procedures for recording and sharing video materials on the platform.

**Conclusion:** : To our knowledge, this project represents the first online Canadian historical pharmacy dictionary. The procedures facilitate the maintenance of the entries. The participation of pharmacy trainees ensures the longevity of this project. The platform may serve as a resource for pharmacy education programs and as a tool for promoting pharmaceutical heritage within the broader pharmacy community.

## Development of a web platform highlighting the roles and impacts of pharmacists: Overview 2010–2026

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**Background:** Pharmacy practice has evolved considerably over recent decades. These changes are associated with multiple factors, including legal frameworks, evolving training programs, population health needs, technological advances, and professional initiatives. Studies evaluating the roles and impacts of pharmacists can influence policymakers and practitioners. We developed an online platform compiling findings from the scientific literature. The objective was to describe the development and evolution of the online platform Impact Pharmacy and to summarize the studies about the roles and impact of pharmacists.

**Method:** Descriptive study. Using our archives, we constructed a chronological overview describing the development of the platform. Data contained in the platform was exported as of March 17, 2026 and descriptive statistics were compiled.

**Results:** Preliminary work conducted in our center in the early 2000s highlighted the value of consolidating evidence on the roles and impacts of pharmacists, particularly in the context of decentralized clinical pharmacy services. Building on this work, the first iteration of the open-access web platform was developed and launched in 2013 (http://impactpharmacie.org). A manual literature search was conducted for each theme to select articles describing the roles and impacts of pharmacists. Both descriptive and controlled studies were included. A structured summary was created for each included article, based on standardized operating procedures and predefined variables. Pharmacy trainees from undergraduate and graduate programs collaborated with senior member from our team. The platform was updated annually. Starting in 2021, the article selection process was changed to use a machine learning model trained on the first iteration of the platform, with an additional check by two independent reviewers: https://impactpharmacy.net. The inclusion criteria were refined to include only controlled trials. Between 2021 and 2026, 18,693 articles were evaluated and 974 (5%) were added to the platform. The inter-reviewer kappa was 0.787. Since 2024, generative artificial intelligence (ChatGPT, Plus subscription) has been used to accelerate the completion of structured summaries. The platform was also updated to reflect changes in the predefined variables. As of March 2026, the platform included 3,794 study summaries describing the roles and impacts of pharmacists published from 1990 to the present. Study designs were cross-sectional

(43%,1,637/3,794), retrospective (41%, 1,552/3,794), and prospective (16%,589/3,794). Most studies originated from the United States (44%,1,622/3,794), multi-country (10%, 369/3,794), Canada (6%, 234/3,794), France (5%, 195/3,250), and others. Studies were conducted in hospital settings (45%, 1,706/3,794), community pharmacies (17%, 659/3,794), ambulatory (17%, 628/3,794), or a mix (21%, 801/3,794). A minority of studies included a control group (40%, 1,510/3,794), randomization (22%, 835/3,794), or blinding (8%, 288/3,794). The studies comprised 18,014 indicators, eithers outcomes (53%, 9,463/18,014) or descriptive indicators (47%, 8,551/18,014). The platform is widely consulted and is used as a teaching tool for critical appraisal of the literature in the PharmD program.

**Conclusion:** The Impact Pharmacy platform provides a structured and accessible repository of evidence describing the roles and impacts of pharmacists. It supports the dissemination of pharmaceutical expertise, facilitates knowledge translation and education . Future updates planned include the automatization of the data upload to allow for real-time access to the latest research.

## Managed entry agreements and the clinical value of newly reimbursed medicines in Finland

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**Background:** Over the past decades, the pharmaceutical market has undergone significant structural and clinical changes that have reshaped outpatient medicine use. Costs of outpatient care medicines have increased substantially, largely driven by the introduction of new, higher-priced pharmaceutical products. Managed entry agreements (MEAs) have become an increasingly common tool for payers and manufacturers to navigate uncertainties related to clinical effectiveness, the rising costs, and the rapid market entry of new health technologies. Although MEAs originally intended to link reimbursement more closely to real-world performance and provide patients with faster access to medicines with still-uncertain evidence, it appears that the agreements — particularly those based on financial criteria — function primarily as cost-containment mechanisms rather than genuine outcome-based contracts.

This study describes newly reimbursed outpatient medicines covered by MEAs in Finland. We examine the characteristics of these medicines and assess whether these newly introduced medicines provide measurable clinical added value compared with previously available therapeutic options.

**Method:** Newly reimbursed medicines were identified from the nationwide register of outpatient medicine dispensations reimbursed under the National Health Insurance Scheme and maintained by the Social Insurance Institution of Finland (Kela). Information on which medicines were subject to MEAs was obtained from publicly available documents issued by the Pharmaceutical Pricing Board. Using published assessments from The French National Authority for Health (Haute Autorité de santé (HAS)) each medicine was assigned a 'clinical added value' rating. Additionally, clinical added value was approximated by evaluating whether the medicine was the first in its therapeutic group to receive reimbursement.

**Results:** Between 2017 and 2024, a total of 156 new medicines were included into the public reimbursement scheme in Finland. MEAs have been made for approximately half of them. Almost half of these medicines with MEAs belonged to therapeutic classes comprising antineoplastic and immunomodulating agents, which are used, for example, in the treatment of cancer. Also, nearly half of these medicines held an orphan designation granted by the European Medicines Agency. Only a small number of newly reimbursed medicines — even those under a MEAs — were first-in-class in their mechanism of action or offered a clinically meaningful additional benefit.

**Conclusion:** Each year, approximately half of the new medicines accepted into the reimbursement system fall under a managed entry agreement. The added therapeutic value of these new medicines appears relatively modest, and a substantial proportion does not seem to address an unmet medical need, despite their high price. However, it is possible that they still contribute to increased competition within their therapeutic classes. The agreements are long in duration and often renewed repeatedly until the market situation changes — for example, when market exclusivity expires. These results highlight the need for continued evaluation of MEAs to ensure that reimbursement decisions align with meaningful therapeutic improvements and support sustainable pharmaceutical expenditure.

## Pharmacist-led substitution as a tool for cost containment: Finnish nationwide register study

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**Background:** Biologic medicines account for a substantial share of pharmaceutical expenditures, and their use continues to grow. Finland is taking on extensive measures to support the uptake of less expensive biologic medicines: steering of prescribing was introduced in 2023 and the pharmacist-led substitution of all biologic medicines but short-acting insulins is introduced in stages during 2024–2026. These policy measures, combined with the increased availability of biosimilars, aim to stimulate price competition

and reduce reimbursement costs. Finland is the first European market to introduce measures to this extent, and also a trailblazer globally.

The aim of this study is to examine the costs of biologic medicines with available biosimilars before and after the implementation of policy measures.

**Method:** Method of the study is a retrospective register study is conducted by using the statistics of the Social Insurance Institution of Finland (KELA). In this study, the costs in 2025 are compared with those in 2022, which is the most recent baseline year before policy measures were implemented. The analysis includes biologic medicines for which a biosimilar is available.

**Results:** National policy measures—namely prescriber guidance and the pharmacist-led substitution with the reference price system—have resulted in substantial savings. In our first analyses, we observe that reimbursement costs for biologic outpatient medicines with available biosimilars are projected to be €42 million lower in 2025 than in 2022, with total spending amounting to €171 million in 2025. Pharmacy-level substitution occurred at varying rates across medicines. For adalimumab, reimbursement costs fell by over €36 million during the observation period despite an increase in user numbers. Some costs, however, have increased, for example due to the shift in the focus of care from hospital settings to outpatient care.

**Conclusion:** Finland's policy package — prescriber guidance, reference pricing, and pharmacist-led substitution — effectively promotes biosimilar uptake and reduces spending on biologic medicines. The magnitude of savings depended on biosimilar entry, competitive pricing dynamics, and the medicine-specific uptake of substitution and lowest-price prescribing. Despite variation in substitution rates and some increases driven by shifts in care settings, the overall impact is substantial: competition activated by biosimilars delivers significant reductions in reimbursement costs. These findings highlight the value of comprehensive, system-wide measures for controlling biologic medicine expenditures.

## Impact of reimbursement decision on antihypertensive medication use – A nationwide register-based study from Finland

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**Background:** Patient's level of copayment influences medication use. In the Finnish system, in addition to basic reimbursement, there are higher, special reimbursement entitlements (SRE) for chronic and severe diseases, e.g. hypertension, making medicine purchases more affordable. Although antihypertensive therapy is essential for preventing cardiovascular events, limited evidence exists on how rejection of SRE affects medication use patterns at the population level. Understanding these dynamics is increasingly important, as hypertension is one of the most common long-term conditions requiring continuous pharmacotherapy, and even small financial barriers may impact adherence, treatment intensity, or medicine choices. Moreover, SRE decisions are based on clinical documentation, making them a unique point of intersection between diagnostic practices, administrative procedures, and real-world medicine use. Improved knowledge of how these decisions shape patient behaviour can help refine reimbursement policies and support equitable access to effective therapies. The aim of this study is to examine differences in antihypertensive medication use and associated costs between individuals whose SRE application for hypertension was approved and those whose application was rejected.

**Method:** A nationwide register-based study was conducted using reimbursed medicine purchase data and SRE data from the Social Insurance Institution of Finland. The study included adults (≥18 years) applying for SRE for hypertension during 2016–2024. Antihypertensive medications, reimbursable under SRE code 205, were grouped into five Anatomical Therapeutic Chemical (ATC) categories (C03, C07, C08, C09, C02). Medication use was assessed for 12 months before and after each applicant's first SRE decision. Outcomes included (1) number of antihypertensive medications, (2) ATC-class–specific utilization patterns, and (3) annual drug costs.

**Results:** A total of 32,987 individuals applied for SRE, and 27% received a rejection. The 67 antihypertensive active pharmaceutical ingredients (APIs) included showed consistent distribution across ATC categories regardless of SRE decision. The mean number of antihypertensive medications decreased slightly in both groups following the SRE decision (1.89 to 1.85 vs. 2.30 to 2.19), with a marginally greater reduction among approved applicants. In contrast, total medication expenditures rose in both groups but increased more slowly among those with a rejected decision (24%) compared with approved applicants (33%).

**Conclusion:** Findings suggest that reimbursement decisions influence the economic burden of hypertension treatment more than the overall structure of medications used. The greater increase in treatment expenditures among approved applicants likely reflects broader use of combination therapies and higher-priced medicines, aligning with prior evidence that reduced patient co-payment can facilitate uptake of more intensive or costlier therapies. Conversely, rejected decisions may reflect factors related to the diagnostic process rather than substantive differences in treatment needs. These results also point to the potential downstream effects of reimbursement policies on long-term treatment trajectories. Strengthening the alignment between clinical documentation practices and reimbursement criteria may help ensure more consistent and equitable access to antihypertensive therapy.

## Strengthening ethical guidance in contemporary practice: redeveloping Australia's Code of Ethics for pharmacists

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**Background:** The Code of Ethics for Pharmacists (the Code) is a fundamental framework that defines the values of the pharmacy profession and the expected standards of ethical behaviour for all pharmacists in Australia. Since its last revision in 2017, the profession has evolved significantly, with pharmacists now delivering expanded services including vaccination, prescribing, and working across an increasingly broad range of care environments. At the same time, societal expectations have shifted, shaped by greater cultural diversity, rapid technological progression, and increasing healthcare complexity driven by an ageing population.

Aim: Review, revise, and further the Code to provide greater clarity on emerging ethical issues and align it with contemporary pharmacy practice in Australia.

**Method:** A multi phased review of the Code was undertaken. This was initiated by establishing a project advisory group comprising pharmacist stakeholders, academics with expertise in ethics, multiple consumers, government representatives, and practising pharmacists.

The multi-phased approach included a literature review, environmental scan, consumer surveys and engagement, pharmacist surveys, and extensive targeted stakeholder consultation involving professional bodies, regulators, educators, and consumer representatives. Workshops reviewing individual ethical principles within the current Code were also undertaken.

Outputs from this review were themed and grouped by ethical principles. Insights from these outputs informed the revision of the Code. Case studies were developed to evaluate the application of the draft revised code to contemporary pharmacy practice and to identify deficiencies in the code during the revision process.

**Results:** The review found that the existing ethical principles and the Code's structure continue to be relevant, leading to the development of a revised draft Code. The multi-phased review process identified a need for a greater focus on pharmacist wellbeing, practitioner autonomy and responsibility, as well as clearer delineation of ethical obligations and professional practice standards.

Each of the review's outputs identified unique insights not provided by other outputs, such as consumer, individual practitioner, stakeholder and subject-matter expert perspectives.

Themes of the outputs included the need to balance competing demands for finite resources and potential conflicts of interest in the pharmacy profession with the provision of timely, person-centred care. These themes emerged in the context of: expanded scope of practice; expansion of digital health and artificial intelligence; practitioner wellbeing and professional boundaries; and collaboration in multidisciplinary teams.

**Conclusion:** The draft revised Code maintained its existing structure whilst broadening its focus to reflect the expanding scope of pharmacists in Australia. The addition of obligations related to collaboration, integrity, and pharmacist wellbeing reflects shifting professional and societal attitudes towards health workforce resilience and accountability. Following public consultation, work will focus on analysing consultation feedback ahead of the launch of the revised Code in mid-2026.

## Culturally responsive mentorship to advance equity in pharmacy: outcomes from the inaugural BPPC mentorship programme in Canada

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**Background:** Black pharmacy professionals in Canada continue to encounter systemic barriers to licensure, career progression, and professional belonging. In response, the Black Pharmacy Professionals of Canada (BPPC) launched its inaugural Mentorship Programme in February 2025 to provide culturally responsive mentorship, strengthen leadership capacity, and build a sustainable professional community. As stated in the programme report, The initiative aimed to "support pharmacy professionals across Canada through culturally responsive mentorship, professional development, and community-building." This abstract presents the evaluation findings from the first cohort.

**Method:** A mixed-methods evaluation was conducted over six months. Data sources included:
- Anonymous online surveys administered at programme entry, mid-point, and completion
- Six structured individual interviews with mentors and mentees
- Descriptive analysis of quantitative data
- Thematic analysis of qualitative responses

Thirty mentor-mentee pairs participated. The programme

combined monthly one-to-one mentorship with nine themed group sessions covering career planning, leadership, advocacy, innovation, and navigating the Canadian pharmacy landscape.

**Results:** Programme satisfaction was high: all mentors and mentees reported being satisfied or very satisfied. Professional development outcomes included:
• Expansion of professional networks (60 per cent)
• Refinement of career plans (50 per cent)
• Improved performance in current roles or studies (40 per cent)
• Engagement in new roles, internships, or fellowships (30 per cent)
Additional achievements included passing The Canada Pharmacy qualifying examinations, initiating new projects, and securing employment. One mentor noted: “My mentee not only secured a location to complete her internship but was offered and signed a two-year contract.”

Confidence gains were substantial. Post-programme, 60 per cent of mentees felt confident and 30 per cent very confident navigating their careers, compared with only 15 per cent confident at baseline. Community connectedness improved markedly. Sixty per cent of mentees felt connected or very connected to the Black pharmacy community, compared with 31 per cent reporting no connection before the programme.

Leadership and advocacy capacity strengthened: 60 percent of mentees felt confident or very confident engaging in advocacy, and 60 percent felt prepared to take on leadership roles.

**Conclusion:** The inaugural BPPC Mentorship Programme demonstrated that culturally responsive mentorship can meaningfully enhance confidence, professional development, leadership readiness, and community belonging among Black pharmacy professionals. Strengths included strong mentor commitment, effective matching, and a structured blended model. Future iterations should expand mentor diversity, develop structured resources, and integrate dedicated mentorship platforms to support scalability. The programme offers a transferable and replicable model for equity-focused mentorship that can inform global strategies to strengthen diversity, inclusion, and leadership within the pharmacy workforce.

## Effects of U.S. pharmacy closures on pharmacists and Patients: A focus group

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**Background:** Community pharmacies in the USA have been closing at a relatively high rate due to limited payments, staffing challenges and strategic decisions. In some communities, closure of a pharmacy can have a large impact on patient accessibility to medications and pharmacist services. While limited research has addressed effects of pharmacy closures on patients, even less has been done to understand how pharmacy closures are affecting pharmacy staff members. Given this gap, the purpose of this study was to learn about how pharmacy staffs and their patients are being affected by pharmacy closures. Purpose: Objectives were to conduct a focus group of pharmacists: 1) To learn how pharmacy closures are affecting patient access to medications and pharmacy services and 2) To gain insights on how pharmacy closures are influencing pharmacists and pharmacy staffs.

**Method:** A virtual focus group of 7 pharmacists was conducted, using a sample of respondents to the 2024 National Pharmacist Workforce Study who reported practicing in a geographic area with recent pharmacy closures and had agreed to participate in a focus group. A focus group guide was developed that addressed how patient access to medications and pharmacy services in the community were changing, how pharmacy closures were influencing the staffs at remaining pharmacies, needs for those pharmacies and suggestions about ways to improve the pharmacy closure and access situation. During the focus group, a recording and transcript were created by Zoom software. The transcript was coded independently by two coders using deductive content analysis approach, with later meetings to reconcile differences. Themes and associated quotes were identified.

**Results:** The focus group lasted about 90 minutes. Four pharmacists were staff, two were administrators and one was a consultant. An issue that emerged was that pharmacy closures add effort for patients to get their medications, such as traveling further, which can reduce medication adherence. Also, patients are experiencing lowered access because pharmacy hours tend to be reduced as staffing shortages emerge. Staffing problems were common and increased pharmacy staff stress and workload, reduced staff well-being and limited time for patient care. When asked about resources they needed, pharmacists

suggested improving payments for dispensing to cover the pharmacies' costs – pointing to underpayment by insurers as a key driver of community pharmacy closures. Regulation of pharmacy practice also came up, where one pharmacist stated a loosening of requirements helped the supply of pharmacy technicians. Another need was for a more unified voice for pharmacists to inform policymakers.

**Conclusion:** Patients in communities with pharmacy closures face reduced pharmacy access and experience added burden to obtain medications, which could result in reduced medication adherence. Due to fewer staff, pharmacists have less time to counsel patients, raising medication safety concerns. Pharmacy associations are encouraged to work together to give a unified voice for pharmacists in need. Continued progress needed to regulate insurers' unfair practices such as underpayment and closed pharmacy service networks. There was concern that relief will come too late for more pharmacists and their patients.

## Supporting antimicrobial stewardship through a digital guideline platform: global reach and practice impact of the Prescribing Companion

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**Background:** Limited access to up-to-date, trustworthy antimicrobial treatment guidance at the point of care remains a major barrier to effective antimicrobial stewardship (AMS) in many low- and middle-income countries (LMICs). Health workers often rely on scarce printed guidelines, static PDF documents, or fragmented online sources that can be difficult to access during clinical care, particularly in low-connectivity settings. To address this issue, the Commonwealth Pharmacists Association developed the Prescribing Companion, a free digital platform accessible via mobile and web that provides offline-ready access to nationally endorsed and international antimicrobial treatment guidelines and antimicrobial stewardship resources across human and animal health sectors.

Objective: To evaluate the global reach and engagement of the Prescribing Companion and explore how healthcare professionals use the platform to support antimicrobial stewardship in LMICs.

**Method:** A mixed-methods evaluation was conducted. Quantitative data from Google Analytics (November 2022 to March 2026) were analysed to assess global reach and user engagement. Qualitative data were collected through 29 semi-structured interviews with Prescribing Companion users in Uganda, Zimbabwe, Timor-Leste, and Nepal. Participants included pharmacists, clinicians, and other healthcare professionals working in hospital and primary care settings. Interviews explored how the app was used in clinical practice and its perceived influence on prescribing and antimicrobial stewardship activities. Interview data were analysed using thematic analysis.

**Results:** The Prescribing Companion has reached more than 130,000 users across 200 countries and territories, with nationally endorsed guidelines hosted for 17 countries. During the study period, the platform recorded 1,636,023 interactions and more than 126,000 engaged sessions. Average session duration was 2 minutes 58 seconds, suggesting active consultation during clinical practice. Qualitative findings indicate that the app is valued as a rapid and trusted source of antimicrobial guidance at the point of care. Users described it as enabling faster access to guidance than printed guidelines or static digital documents, particularly through its search function. Trust in the credibility and national relevance of the content supported adoption. Use was typically situational rather than continuous, triggered by clinical uncertainty, complex cases, or the need to verify treatment decisions. Participants described consulting the app to confirm antibiotic selection, dosing, or duration during patient care, ward rounds, and antimicrobial stewardship activities. Participants also reported that the app supported antimicrobial stewardship roles. Pharmacists described using it as an authoritative reference when discussing prescriptions with prescribers, enabling them to question or verify antibiotic choices within hierarchical clinical environments. Interviewees described observable influences on practice, including selecting guideline-recommended antibiotics, reducing multiple antibiotic use in favour of single-agent therapy, shortening treatment duration, and avoiding unnecessary prescribing. The app also helped identify appropriate alternatives during medicine stock-outs or limited diagnostic capacity.

**Conclusion:** The Prescribing Companion demonstrates substantial global reach and sustained engagement across diverse settings. Qualitative findings suggest that it is integrated into clinical workflows as a trusted decision-support tool supporting guideline-aligned prescribing, strengthening stewardship roles, and improving confidence in antibiotic decision-making. These findings suggest that digital, offline-ready tools such as the Prescribing Companion offer a scalable approach to strengthening antimicrobial stewardship in resource-constrained health systems.

## Exploring the expansion of the commonwealth partnerships for antimicrobial stewardship (CwPAMS) programme: A sustainability study

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**Background:** The Commonwealth Partnerships for Antimicrobial Stewardship (CwPAMS) programme has demonstrated significant strides in enhancing antimicrobial stewardship (AMS) and healthcare system strengthening across sub-Saharan Africa. Building on these achievements will be essential to ensure sustainability and scale-up. To support this, the Commonwealth Pharmacists Association (CPA) conducted a sustainability study to identify key gaps and opportunities in AMS implementation across CwPAMS delivery countries, to inform scalable, long-term approaches to tackling antimicrobial resistance (AMR) in low- and middle-income countries (LMICs).

Objective: To identify sustainability gaps and opportunities within the CwPAMS programme and generate country-specific recommendations to address AMR that promote ownership, sustainability and health system strengthening, drawing on current evidence and stakeholder perspectives.

**Method:** To inform strategic decisions on sustainability and scale, a mixed-methods scoping study was undertaken, consisting of a literature and evidence review, review of CwPAMS programme documents (including Health Partnership reports, AMS assessment tools and National Action Plans), stakeholder mapping and consultations and economic analysis. A systematic framework for analysis was developed, aligned with World Health Organization health systems strengthening frameworks to identify the structural determinants of sustainability. Findings were triangulated to generate forward-looking recommendations for sustainable AMS implementation in LMICs, focusing on promoting health system strengthening and supporting country ownership. A Sustainability Advisory Group was engaged throughout to ensure methodological rigour, contextual relevance, and alignment with programme priorities.

**Results:** Seven focus group discussions were conducted with key stakeholders, and over 100 programme documents and reports were analysed. Triangulated findings identified 8 critical success factors for sustainability, most notably: local ownership and co-creation; institutionalisation within governance structures; data-driven decision-making; and distributed workforce capacity. Despite these advances, key gaps persist. Workforce capacity, coverage and scale-up remain inconsistent; integration of AMS into broader health priorities is limited; and laboratory and surveillance systems require further strengthening. These constraints hinder transition from externally supported initiatives to fully embedded national systems.

**Conclusion:** Sustaining and scaling CwPAMS is fundamentally a health systems challenge rather than a time-limited programme outcome. The programme has catalysed transition towards nationally owned AMS systems by building capacity, strengthening leadership, and demonstrating scalable models. However, long-term impact depends on embedding AMS within routine health system functions through domestic investment, institutional accountability, and continued capacity development.

CwPAMS offers a transferable model for AMR programmes in LMICs, highlighting that sustainable impact requires system-wide integration, multi-level coordination, and sustained political commitment. Future efforts should focus on consolidating these gains to ensure AMS becomes an enduring component of resilient health systems.

## A pilot study examining the feasibility, acceptability, appropriateness, and usability of MedManageSCI: A web-based toolkit to support medication self-management among adults with spinal cord injury/dysfunction

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**Background:** Adults with spinal cord injury/dysfunction (SCI/D) experience numerous secondary conditions that require medications to treat and/or manage. As a result, adults with SCI/D often experience polypharmacy and have to manage complex medication regimens. MedManageSCI is a medication self-management toolkit co-developed with and for adults with SCI/D. This toolkit aims to equip individuals with the knowledge, skills, and tools to effectively self-manage their medications. However, implementation and preliminary effectiveness outcomes have not been evaluated.

Purpose: The objectives of this study were to assess the

implementation outcomes of feasibility, acceptability, appropriateness, and usability of MedManageSCI and examine the preliminary effectiveness of the toolkit on the secondary outcomes of beliefs about medications, medication management capacity, and medication self-efficacy.

**Method:** An explanatory sequential mixed methods pilot study was conducted. Participants included adults with SCI/D from across Canada. Participants completed a baseline survey (pre-toolkit) prior to interacting with the toolkit to collect their demographics and the secondary outcomes. Upon completion, participants were directed to the MedManageSCI website. After one week, participants completed the post-toolkit survey to collect the implementation and secondary outcomes. A subset of participants who completed the post-toolkit survey participated in a virtual interview to further explore their experiences with MedManageSCI. The quantitative and qualitative data were analyzed separately and then integrated using data display matrices.

**Results:** Forty-nine participants completed the pre-toolkit survey, 40 completed the post-toolkit survey, and 21 completed the interview. Participants rated MedManageSCI as highly feasible, acceptable, appropriate, and useable, with mean scores of 4.28 (SD=0.71), 4.17 (SD=0.83), 4.13 (SD=0.84), and 4.06 (SD=0.59), respectively, on a five-point scale. Across these implementation outcomes, 11 sub-categories were identified from the qualitative data. Feasibility categories related to the practical application of information and resources, the accessibility and availability of MedManageSCI, and the self-guided nature of the toolkit. Acceptability categories reflected the visual appeal and design preferences, balance of written and visual information, and informational depth. Appropriateness categories included the applicability at different timepoints and perceived utility despite varying needs. Usability categories related to the inclusion of evidence-based information, the ease of use, and intentions for future engagement and knowledge sharing.

**Conclusion:** Participants provided key insights into the potential implementation of MedManageSCI, highlighting the potential applicability of the toolkit based on an individual's life stage, time since injury, and unique medication needs. This study provides valuable data to support a larger-scale trial, especially among newly injured individuals with SCI/D.

## Behavioural change in medicine use among elementary school students following an educational intervention

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**Background:** The rational use of medicine is a cornerstone of public health. Given that factors such as a lack of structured education facilitate self-medication, it is crucial to integrate this topic into schools. Such training can be utilized to achieve behavioral change under the Transtheoretical Model, allowing children to move from a lack of awareness to conscious decision-making. Interventions using play-based materials reinforce this process, ensuring that minors understand the risks and adopt responsible health habits in the long term.

Objective: To evaluate the behavioral change regarding medicine use in elementary school students in the State of Hidalgo, using the Transtheoretical Model of Behavior Change before and after an educational intervention.

**Method:** Student behavioral change was systematically evaluated at three key points during the study:

Initial Diagnosis: A validated and adapted instrument was applied to identify the specific stage of the Transtheoretical Model of Behavior Change the students were in. This diagnosis assessed baseline behavior across four dimensions: therapeutic objective, use, expiration, and disposal of medications.

Implementation of the Intervention: The intervention was conducted with 30 children over 14 sessions of 50 minutes each. Sessions were scheduled and authorized by school authorities, with informed consent from parents and informed assent from the children. The sessions were guided by technical data sheets. Participant observation, note-taking, and field diaries were utilized, along with evaluations through play-based activities at the end of each session based on the specific objectives.

Final Evaluation: The validated and adapted instrument was reapplied to identify the stage of behavior change students reached upon completing the educational intervention, allowing for an evaluation of their behavioral evolution regarding medication use.

**Results:** Both groups began the first four sessions in Precontemplation (18.7%, as determined by the questionnaire) and Contemplation (18.3%). Group A evolved from Preparation in session 5 (19.6%) to Action in session 9

(19.9%) and Maintenance in session 11 (21.4%). Group B progressed from Preparation (20.4%) to Action (19.6%), similar to Group A, reaching Maintenance in session 13 (21.4%). Both groups concluded with a regression to the Action stage (21.4% and 20.9%, respectively) by session 14, based on the percentages obtained from the validated questionnaire.

**Conclusion:** The educational intervention demonstrated a change in elementary school students behavior regarding medicine use. It highlighted the need for programs that modify childhood behaviors learned at home such as self-medication or incorrect disposal of medicines through scientific publications on the execution of systematic educational interventions grounded in epistemological and methodological frameworks.

## Drug distribution in Nigeria; the journey from chaos to sanity

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**Background:** The drug distribution system in Nigeria has been described as chaotic and unregulated. A regulated and efficient drug distribution system is an essential component of a functional health system which ensures that safe and effective drugs are available to patients and are not available for abuse and misuse. The place of effective and efficient drug supply in health care delivery is invaluable. Nigeria, with an estimated population of 220 million people is a fast-growing economy in Africa but faced with poor health parameters with rising insecurity leading to poor economic indices. A streamlined drug distribution system is in no doubt very vital in health care delivery sustainability and curbing the current rising insecurity.

**Method:** This study was carried out by the review of literature on the subject and eyewitness accounts of the author.

**Results:** Drug distribution in Nigeria consists of open drug markets, Patent and proprietary medicine vendors, Community pharmacies, private and public hospitals, Importers, etc. Handling of drugs is very poor, across all these groups, storage conditions facilitate degradation and deterioration of the active ingredients. The holders of patent and proprietary medicine vendors licenses are persons with little or no formal education or training but dispense, and treat all manner of illness. They rely predominantly on experiences gained on the job over the years through apprenticeship. They are legally authorized to sell only drugs contained in the Approved medicines list for PPMVs but do not comply to these regulations and sell all types of drugs including controlled substances. There are many illegal drug shops operating and thriving, some of them clustering in large numbers in a particular location to form open drug markets, these shops serve as the channel for spurious products and dangerous drugs for criminal elements, which fuels insecurity and violent crimes. The chaotic distribution system has now getting the attention the of government who have now taken huge steps to reverse the situation, by enacting new laws and providing support for regulatory agencies like PCN

**Conclusion:** The Government of Nigeria has initiated reforms that will reverse the ugly situation and take back control of its drug distribution system which will lead to improved healthcare services and better security. The country is now has the political will from its leadership in ensuring that the drug distribution system is sanitized, while the citizens are now aware of the dangers associated with the current chaotic system and its effects on the health and wellbeing of the people. Partners local and international have more than before committed significant resources to assist regulatory agencies to combat the chaotic and unregulated drug distribution system in Nigeria. Open drug markets are being shut down, while thousands of illegal drug shops are closed down by PCN.

## United States (US) minority pharmacists' contribution to global health equity: A descriptive analysis of medical missions across the African Diaspora

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**Background:** To characterize the role of pharmacists in medical missions and describe the clinical services delivered across the diaspora while identifying key opportunities for strengthening sustainable pharmacy global engagement. Background

Per the AFRO/WHO organization, chronic disease (non-communicable disease [NCD]) accounts for 71% of all deaths globally. Cardiovascular disease is the top NCD. NCDs disproportionately affect people in low- and middle-income countries. Over three-fourths of global NCD deaths (31.4 million) occur in these nations, many of which are in Africa or the Caribbean.

Many non-governmental organizations (NGOs) and non-profit groups invest time and resources to bring medical professionals to these regions to improve health outcomes. Historically, minority pharmacists have had limited exposure to participating in multidisciplinary medical outreach teams, also known as medical missions. Yet pharmacists play a key role in supporting the healthcare team by overseeing medication dispensing, providing medication education, and training other medical professionals in medication safety.

**Method:** A descriptive analysis of pharmacy services provided by US-based clinical pharmacists over multiple medical missions conducted from 2009 to 2024 (fifteen years). Pharmacists were interviewed and completed a survey to collect data on their experiences in medical missions across various countries. Pharmacists collaborated with physicians, nurses, and local healthcare workers across selected countries in Africa and the Caribbean to deliver short-term, community-centric health clinics.

**Results:** Among the pharmacists surveyed, they collectively conducted medical missions in over ten countries over a 15-year period and provided care to an estimated 4500-5000 patients. Chronic diseases such as hypertension, diabetes, and untreated chronic conditions, like arthritis, represent the most common clinical presentations. Pharmacists dispensed essential medications, delivered culturally tailored patient education, and focused on medication adherence and lifestyle modification. In addition, pharmacists collaborated with local healthcare providers in support of clinical decision-making and facilitated training on medication safety and chronic disease management. Observational findings highlighted limited access to pharmacists in rural settings but also noted a strong community receptive to minority pharmacists from the diaspora.

**Conclusion:** Medical teams collaborating with pharmacists to deliver care to underserved populations expand the scope of services offered during short-term community health clinics. Engagement of health professionals from the African diaspora, such as pharmacists, may strengthen cultural alignment, trust, and patient engagement within underserved communities. Subsequent initiatives could focus on building sustainable relationships with local health systems and expanding pharmacists' roles in global health workforce development.

## Empowering communities against NCDs

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**Background:** Non-communicable diseases (NCDs) are a leading cause of mortality and morbidity worldwide, imposing a substantial socio-economic burden. Social pharmacy, by integrating patient-centered care, health education, and medication management, has the potential to mitigate these challenges and enhance population health outcomes.

**Method:** A mixed-methods approach was applied, including community-based interventions and patient counseling programs led by social pharmacists. Data were collected on patient knowledge, behavioral changes, medication adherence, and community health indicators related to hypertension, diabetes, cardiovascular diseases, and obesity.

**Results:** Analysis demonstrated that pharmacist-led interventions significantly improved patient awareness, adherence to treatment, and adoption of healthier lifestyles. Communities with active social pharmacy engagement showed measurable reductions in NCD risk factors, highlighting the effectiveness of these interventions at the population level.

**Conclusion:** Social pharmacy is a pivotal tool in global NCD prevention and management. Empowering pharmacists to act as advocates and educators within communities can reduce chronic disease burden, promote sustainable health behaviors, and contribute to improved public health outcomes worldwide.

## From simulation to practice: An AI-enhanced clinical platform for experiential learning and confidence in pharmacy learners and practitioners

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**Background:** Experiential learning through authentic clinical practice forms pharmacy education's cornerstone, yet faculty capacity constraints, placement shortages, and intensifying licensure demands persistently undermine learners' real-world readiness. Virtual simulation platforms offer scalability, but few harness adaptive artificial intelligence (AI) to personalise learning pathways across pharmacy's full learner continuum—from Doctor of Pharmacy (PharmD) students consolidating foundational competencies to registered pharmacists (RPhs) pursuing lifelong development. StudyRadar bridges this critical gap through AI-enhanced clinical scenarios mirroring authentic pharmacy practice while delivering individualised, level-appropriate feedback calibrated to learners' year of study or professional experience. Following a favourable determination from Alberta's ARECCI (A Project Ethics Community Consensus Initiative) Ethics Screening Tool confirming minimal research risk, this study evaluates StudyRadar's capacity to foster experiential learning, enhance clinical confidence, and support continuing professional development (CPD) across three distinct groups: Canadian PharmD students/recent graduates, International Pharmacy Graduates (IPGs) pursuing Canadian licensure, and practising RPhs reflecting on training-to-practice transitions.

**Method:** A cross-sectional, multi-arm online survey adopted pragmatic mixed-methods design targeting individuals who completed at least two StudyRadar scenarios (one interactive, one non-interactive Pharmacy Examining Board of Canada [PEBC]-style cases) prior to evaluation. Validated Likert-scale items—adapted from MyDispense simulation framework (Cronbach's $\alpha > 0.80$ across experiential learning, confidence, and usability domains)—complemented targeted open-ended prompts. Participant arms included: (1) Canadian PharmD students or graduates within two years; (2) IPGs preparing for or recently completing Canadian licensure; and (3) actively licensed RPhs. Twenty participants (seven PharmD students/graduates, seven IPGs, six RPhs) completed evaluation following ARECCI ethics clearance. Quantitative analysis employed analysis of variance (ANOVA) for inter-group comparisons and paired t-tests for pre-post confidence shifts; qualitative responses underwent inductive thematic analysis following Braun and Clarke's established six-phase approach.

**Results:** StudyRadar demonstrated robust experiential learning value (mean = 4.3/5), with 90% affirming scenarios meaningfully connected theoretical knowledge to practice contexts. Confidence improvements proved statistically significant across clinical reasoning (mean change $\Delta = 1.2$, $p < 0.01$), communication proficiency ($\Delta = 1.1$, $p < 0.01$), and practice readiness ($\Delta = 1.4$, $p < 0.01$). Scenario authenticity averaged 4.4/5; AI-driven personalisation—adaptive feedback matched to learner level—received highest endorsement (4.7/5). IPGs reported largest confidence gains ($F = 4.12$, $p = 0.031$ versus other arms). RPhs universally endorsed retrospective training utility (100%: "would have smoothed classroom-to-practice transition") alongside strong CPD applicability (83%: "perfect for skills maintenance, expanded scope practice").

**Conclusion:** Despite early enrolment (n = 20), StudyRadar emerges as compelling and innovative human-centred AI platform tangibly strengthening experiential learning, clinical confidence, and professional growth potential across pharmacy's learner spectrum. By democratising personalised high-fidelity simulation amid global placement shortages, StudyRadar equips educators to cultivate resilient practice-ready pharmacists, warranting scaled implementation and longitudinal evaluation.

## Strengthening the pharmacist workforce and service provision through work environment improvements

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**Background:** The National Pharmacist Workforce Study (NPWS) is an on-line survey conducted every 4-5 years to describe the demographic characteristics, work contributions and the quality of work-life of the pharmacist workforce in the United States. In 2024, a mixed method approach was used to fill a gap in the literature about resources that are needed in pharmacy work environments that would allow pharmacists to improve the services they provide to patients and their communities.
The objectives of this study were to describe the: 1. resources needed the most right now, 2. clinical and technological innovations and financial models needed in the future, and 3. emerging career paths for pharmacists that facilitate meeting patient care needs in the future.

**Method:** Participants were recruited from respondents to the 2024 NPWS who reported an interest in participation in a focus group interview. Two, 90-minute focus group interviews were held virtually using an interview guide that included open-ended questions addressing the study objectives. Transcripts were generated via Zoom and field notes were taken during the sessions. Transcripts and field notes were reviewed independently by 5 researchers and then jointly to extract themes and sub-themes. Once the initial independent analysis was carried out, the interpretations were discussed among the study investigators and final themes, sub-themes and exemplar quotes were agreed upon.

**Results:** Participants included 9 pharmacists from a variety of work/practice settings: managed and long-term care, outpatient and in-patient hospital, industry, and specialty and community pharmacy practice. Most pharmacists held positions of staff or manager. Resources that were needed right now included more collaboration between health care providers, better efficiency in workflow and better salaries to attract and retain pharmacist and non-pharmacist personnel. Participants indicated a need to better express scientific findings in understandable ways to non-pharmacists working in other departments. Technological innovations focused on the benefits (taking over mundane work tasks) and concerns (reduction in the number of pharmacist jobs) of artificial intelligence (AI). Clinical innovations included using technology to free up time, nuclear medicine that does both disease diagnosis and treatment and the need for greater professional autonomy that allows pharmacists to provide care anywhere a patient is being treated. Needed financial model innovations included development and/or expansion in payment models for pharmacy services and more incentives for pharmacists to provide, and patients to

participate in, preventative medicine. Financial models of the future should place greater emphasis on community pharmacy as an access point for healthcare to keep these practices economically viable. Emerging career paths included identifying and pursuing jobs that are AI resistant and on career paths that allow for direct patient care regardless of setting. Pharmacists saw more opportunities in remote work, transitions of care from the hospital to the community, nuclear pharmacy, and health economics and outcomes research.

**Conclusion:** The findings suggest actions that strengthen the pharmacist workforce and support their well-being. Future research should replicate this study with different groups of pharmacists to provide additional insights and identify how current resource needs can be met to improve pharmacists' roles.

## Pharmacy practice and regulatory compliance in Nigeria: A cross-sectional assessment of stakeholder operations

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**Background:** Pharmacy practice plays a crucial role in healthcare delivery, particularly in low- and middle-income countries where health systems are under-resourced. The evolution of pharmacy into a patient-centered profession requires adherence to regulatory and professional standards. However, regulatory compliance in Nigeria often falls short of global expectations. This study, therefore, aimed to assess the current state of pharmacy practice and regulatory compliance among pharmacists in Southwest Nigeria and to identify factors significantly associated with compliance. This is with a view to providing evidence-based recommendations that will strengthen the profession and enhance the safe and rational use of medicines.

**Method:** A cross-sectional survey was conducted among 349 pharmacists, involved in retail, wholesale and distribution, manufacturing and importation in Southwest Nigeria, using stratified and convenience sampling methods. Data were collected using a structured and pretested questionnaire that assessed the presence of superintendent pharmacists, licensing status, practice activities, ethical sales, and control in the pharmacist's absence. Data were analysed using descriptive statistical methods such as frequencies, percentages, means, and standard deviations. A Regulatory Compliance Index (RCI) was constructed for each area of pharmacy practice based on requirements of regulatory bodies, while logistic regression analyses were performed to identify predictors of regulatory compliance, and p-value set at < 0.05.

**Results:** A total of 327 pharmacists participated in the survey, given a response rate was 93.7%. Most of the respondents were males (59.6%), with a mean age of 44.8 years, and 62.1% held bachelor of pharmacy degree while 81.0% were retail pharmacists. Superintendent pharmacists are present in 93.3% of pharmacies, and 77.3% possessed current license to practice from the Pharmacy Council of Nigeria (PCN). Regarding regulatory oversight, only 38.2% reported recent regulatory inspections. When pharmacists were absent in retail practice, control of sales of ethical products is primarily managed by staff calling the pharmacist before proceeding with sales (66.0%). Others included oversight by pharmacy technicians (21.1%), closing the ethical section (20.8%), or allowing sales attendants to handle sales (12.8%). Practice in wholesale and distribution outlets (N = 24) includes hospital supply (75.0%) and retail practice (25.0%), while a few engage in importation (4.2%). Importation or manufacturing outlets (N = 38) also practice distribution (86.8%), wholesaling (31.6%,), exportation (18.4%), and retailing (13.2%).

The overall regulatory compliance score was 73.3 ± 12.0% (median: 75%, IQR: 63.6 – 81.2). Wholesale/distribution outlets demonstrated the highest and most consistent compliance to regulatory standards, as indicated by their highest mean score (79.4 ± 9.7%), followed by retail outlets (72.9 ± 11.8%) and importation/ manufacturing outlets (72.5 ± 14.1%). Regulatory compliance was significantly associated with the state of pharmacy practice and license status ($p<0.001$).

**Conclusion:** While pharmacy practice in Nigeria demonstrates strengths in some key areas, regulatory compliance in pharmacy practice remains suboptimal. Strengthening regulatory oversight, improving inspection systems, enforcing boundaries of pharmacy practice, and enhancing professional accountability are essential for ensuring compliance and safeguarding public health. Also, pharmacists must take greater responsibility for maintaining professional standards.

## Monitoring China's national volume-based procurement with in-range effect measures: Comparative and compositional ITS analyses of two fluoropyrimidines

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**Background:** China's National Volume-Based Procurement (NVBP) policy is designed to reduce drug prices through a volume-for-price exchange mechanism. For anticancer drugs, policy makers require empirical evidence to address three key questions: whether winning products achieve significant price reductions, whether total expenditure declines after procurement volumes shift, and which market segments lose

share as a result of the policy. Answers to these questions are essential for refining monitoring frameworks and guiding future policy iterations.

**Method:** A national quarterly procurement dataset for capecitabine and S-1 was analysed, covering the periods from 2018 to 2024. The intervention points were set at the fourth quarter of 2020 for capecitabine and the second quarter of 2020 for S-1, aligning with their inclusion in NVBP. Primary endpoints included the daily cost per defined daily dose (DDDc) for bid-winning products, total expenditure, and the market share of bid-winning products, measured in defined daily doses (DDDs). Interrupted time series (ITS) models were fitted using outcome-appropriate scales: log transformation for costs and expenditure, and logit transformation for market shares, with Newey-West robust standard errors to account for autocorrelation. Complementary city-level panel analyses were conducted for both drugs, categorising products as bid-winning, non-winning (other generic products), or originator. A log-ratio ITS approach and a three-part share model were applied to ensure that estimated segment shares summed to one, thereby enabling a clear decomposition of substitution patterns across market segments. Descriptive ITS summaries were also generated for clinically similar alternative drugs to assess potential spillover effects beyond the individual molecule markets.

**Results:** In the national aggregate analysis, bid-winning DDDc fell immediately at policy implementation by 58.7% for capecitabine and 50.3% for S-1. Total expenditure declined by 55.7% and 53.7% respectively during the post-policy period, yielding cumulative estimated savings of US$1.31 billion for capecitabine and US$0.96 billion for S-1. The market share of bid-winning products increased by 42.5 percentage points for capecitabine and 25.6 percentage points for S-1. In the city-level panel for capecitabine, bid-winning DDDc fell by 58.5%, compared with reductions of 40.9% for non-winning products and 14.8% for originator products. The 42.6-percentage-point gain in bid-winning share was primarily driven by reductions in originator share (−26.8 percentage points) and non-winning share (−15.8 percentage points). For S-1, bid-winning DDDc declined by 67.2%, and the 41.2-percentage-point increase in bid-winning share was almost entirely attributable to a contraction in non-winning products (down 39.9 percentage points). Descriptive ITS summaries for clinically similar alternatives indicated that substitution was largely confined to products within the same molecule market, with limited spillover to other therapeutic categories.

**Conclusion:** The NVBP policy achieved substantial reductions in unit costs for selected fluoropyrimidine drugs, successfully redirected procurement volumes towards bid-winning products, and resulted in meaningful decreases in total expenditure. The application of comparative and compositional ITS methods, including log-ratio and three-part share models, provided a transparent decomposition of market reallocation. This analytical framework offers a practical approach for routine policy monitoring in settings where a clean untreated control group is not available, supporting evidence-based refinement of national drug procurement strategies.

## Geographic distribution and inequities in COPD patient counts across Brazilian states

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**Background:** Chronic obstructive pulmonary disease (COPD) represents a significant public health challenge in Brazil, yet its distribution is uneven across the country due to regional differences in healthcare access, diagnostic capacity and epidemiological reporting. Understanding these disparities is essential for supporting effective policy decisions and ensuring more equitable provision of respiratory care. This study aimed to assess the geographic distribution of COPD-related patient counts across the 27 Brazilian states and to identify inequities that may reflect underdiagnosis, limited access to diagnostic tools or uneven availability of therapeutic resources. The dataset used for this analysis combines asthma and COPD within a single category, meaning the results reflect a broader burden of respiratory conditions rather than COPD alone, which is acknowledged as an inherent methodological limitation.

**Method:** A state-level dataset reporting absolute patient counts labelled as asthma or COPD, together with population estimates for each state, was analysed. To account for differences in population size, patient rates per 100,000 inhabitants were calculated. To evaluate inequality, concentration metrics were applied, including cumulative shares for the five and ten highest-burden states. The Gini coefficient was also calculated to provide a quantitative measure of disparity in population-adjusted patient rates. Regional averages were generated to compare the burden across the South, Southeast, North, Northeast and Central-West regions. All analyses were descriptive and interpreted in light of the dataset's aggregation of two respiratory conditions.

**Results:** A total of 574,234 patients were identified nationwide. São Paulo accounted for nearly half of the total, representing 47.11% of all cases, with 270,529 patients. The five states with the highest patient counts—São Paulo, Rio Grande do Sul, Paraná, Minas Gerais and Santa Catarina—together comprised 77.00% of the national total, while the ten highest-burden states accounted for 89.02%. Substantial variation was also observed in population-adjusted rates. São Paulo presented approximately 587 patients per 100,000 inhabitants, followed by Rio Grande do Sul with around 453 and Paraná with roughly 390. In contrast, northern states displayed extremely low rates, notably Roraima with close to 1 per 100,000 and Amapá with approximately 61 per 100,000. Regional averages highlighted pronounced contrasts: the

South reached approximately 415 per 100,000, the Southeast around 382, the North roughly 88 and the Northeast approximately 104 per 100,000. The Gini coefficient for state-level patient rates was calculated at 0.417, indicating considerable inequality even after normalisation by population.

**Conclusion:** The distribution of respiratory-related patient counts in Brazil is markedly unequal. The South and Southeast show both the highest absolute counts and the highest population-adjusted rates, whereas the North and Northeast present strikingly low figures, suggesting underdiagnosis, limited availability of spirometry and restricted access to respiratory care. Addressing these disparities will require targeted measures, including expanding diagnostic capacity, improving integration between primary care and respiratory services and ensuring greater availability of inhaled therapies. Future research should seek to distinguish COPD-specific data, apply demographic adjustments and incorporate clinical outcomes to support more equitable and evidence-based health policy development.

## Telepharmacy for asthma and COPD in the Brazilian Unified Health System: implementation and preliminary outcomes of the TeleFarmas service

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**Background:** Asthma and chronic obstructive pulmonary disease (COPD) are highly prevalent chronic respiratory conditions responsible for significant morbidity, mortality and healthcare utilisation worldwide. In the Brazilian Unified Health System (Sistema Único de Saúde, SUS), optimising disease control requires integrated pharmaceutical care focused on adherence, correct inhaler technique and effective self-management. However, access to specialised pharmaceutical support remains limited for patients in remote, rural or socioeconomically vulnerable settings. Telepharmacy represents a promising strategy to expand equitable access by enabling person-centred pharmaceutical interventions delivered remotely. Within this context, the TeleFarmas service was developed to provide structured, pharmacist-led teleconsultations to SUS users receiving specialised asthma and COPD therapies. This abstract describes the implementation, care model and preliminary clinical and process outcomes of TeleFarmas in Rio Grande do Sul, Brazil.

**Method:** This implementation report covers TeleFarmas delivery between 2022 and 2025 for SUS users receiving specialised asthma and COPD medicines. Service entry followed structured triage of dispensing records to identify patients requiring pharmaceutical support. The care model centred on three sequential video consultations supported by annual follow-up and continuous open-channel messaging. Consultation 1 emphasised rapport-building and comprehensive assessment of disease control, treatment adherence and inhaler technique, leading to an individualised care plan. Consultation 2 reinforced interventions and explored non-pharmacological aspects such as environmental and occupational triggers, mental-health concerns, smoking behaviour and navigation through the therapeutic itinerary. Consultation 3 reassessed disease control, evaluated progress, planned ongoing self-management and defined discharge criteria. Validated assessment tools included the Asthma Control Test (ACT/ACT-c), the COPD Assessment Test (CAT), the Control of Allergic Rhinitis and Asthma Test (CARAT), an adapted Beliefs about Medicines Questionnaire (BMQ) for adherence evaluation, and inhaler and nasal spray technique checklists based on the Test of Adherence to Inhalers (TAI). All data were documented in an electronic health record and analysed descriptively to assess both clinical and operational indicators.

**Results:** A total of 1,151 teleconsultations were delivered to 379 users, with consultations lasting an average of 39 minutes. Initial assessments revealed substantial technique-related challenges, with incorrect inhaler use identified in 72% of users with asthma and inadequate nasal-spray technique observed in 93–97% of users. By the third consultation, correct inhaler use increased to 79%, while nasal-spray correctness improved to 27–32%. Uncontrolled asthma declined from 27% at baseline to 16% post-intervention. Among users with severe or very severe COPD (n = 50), disease severity remained high, underscoring the complexity of advanced COPD management. Adherence to recommended pharmaceutical and behavioural interventions reached 95%, and all users received tailored non-pharmacological support addressing environmental triggers, anxiety, treatment-access barriers and other determinants relevant to respiratory disease management.

**Conclusion:** The TeleFarmas service demonstrated that a structured, pharmacist-led telepharmacy approach integrated into the SUS telehealth ecosystem is both feasible and effective. The model improved inhaler technique, enhanced disease control and supported holistic patient care encompassing psychosocial, environmental and behavioural determinants. Scaling telepharmacy services within primary care could expand equity, strengthen continuity of care and improve health outcomes for people living with asthma and COPD.

## What influences different choices for insomnia treatments? A qualitative study with older adults and people living with dementia

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**Background:** Insomnia is common in older adults and people living with dementia. Medications used to treat insomnia, including benzodiazepines and z-drugs, have been classified as potentially inappropriate medications (PIMs) in older adults due to the potential for harm outweighing the potential for benefit. Thus, insomnia guidelines do not recommend them as first-line treatment. Despite this, insomnia treatments rarely align with guidelines, potentially resulting in patient harm. It is unclear what influences older adults to choose between different insomnia treatments. Understanding patient preferences may lead to improved treatment.
The primary aim of this research was to identify themes that influence insomnia treatments among older adults and people living with dementia. The secondary aim was to collect factors (as identified by participants) to inform a discrete choice experiment.

**Method:** We conducted semi-structured interviews with the three distinct patient groups: older adults (aged ≥65 years), people living with dementia and their carers. Interviews were conducted over Zoom. Transcripts were thematically analysed using Nvivo. Participants' responses during the interviews were used to identify and prioritise the factors that influence their choice of insomnia treatments. Analysis considered the frequency at which factors were mentioned by participants and which factors were ranked as most important.

**Results:** Twenty people participated in 19 interviews (47.4% aged between 65-74, 36.8% female, one interview contained a person living with dementia and their carer together). The main themes identified included external sources, barriers to treatment, treatment expectations, health beliefs, and treatment type. Additionally, 14 factors were identified, of which side effects (n = 19) and effectiveness (n = 18) were the most frequently mentioned. The risk of side effects was the most commonly prioritised factor (n = 10).

**Conclusion:** Understanding what drives people to choose between different pharmacological and non-pharmacological treatments for insomnia in these vulnerable patient groups is novel. Clinical practice implications of this research for pharmacists include: pharmacists can act as "external sources" of information, and educate patients on the treatment expectations, both beneficial and harmful. This research has informed a discrete choice experiment, which is exploring which factors have the most impact on patient choices between insomnia treatments.

## A nationwide survey of pharmacists' perspectives on career development in Japan

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**Background:** In response to recent developments in team-based healthcare and the increasing sophistication and complexity of pharmacotherapy, there has been a growing need to enhance clinical training in medical institutions and related settings after pharmacists obtain their licenses. In March 2024, the Ministry of Health, Labour and Welfare of Japan issued guidelines for clinical training. However, the instructional framework for pharmacist clinical training and the lifelong career development of pharmacists have not yet been sufficiently examined and remain important challenges. To address these issues, this study aims to clarify pharmacists' desired future roles and career pathways by conducting a nationwide survey of pharmacists currently working in medical institutions, community pharmacies, and other settings regarding their perspectives on career development and clinical training systems.

**Method:** A questionnaire survey was conducted targeting pharmacists nationwide. Responses were collected using Microsoft Forms regarding pharmacists' career prospects 10–20 years into the future and postgraduate clinical training systems (survey period: January 30 to March 15, 2026). This study was conducted as part of a project commissioned by the Ministry of Health, Labour and Welfare of Japan, with approval from the Teikyo University Medical Research Ethics Committee.

**Results:** A total of 11,392 responses were collected from across Japan. Respondents included 5,232 males, 5,944 females, and 216 with unspecified gender. Regarding workplace settings, 7,588 respondents worked in community pharmacies, 2,257 in hospitals, 534 in drugstores, 191 at universities, and 269 were unemployed, among others. When asked about the types of work they would like to be engaged in 10–20 years in the future (multiple responses allowed), the most frequently selected was dispensing and patient counseling (patient-centered services) (n = 7,395), followed by home healthcare and community-based integrated care (n = 3,692), health support and self-medication assistance (n = 3,116), management and administration (n = 2,037), advanced specialized practice as certified/specialist

pharmacists (n = 1,894), and education and research (n = 1,887). When asked what types of learning and training would be most necessary for the future (multiple responses allowed), the most frequently selected was continuous professional development (CPD) (n = 8,994), followed by diverse clinical experience (n = 4,745), acquisition of specialist and certification credentials (n = 4,384), management and administrative skills (n = 3,345), and research and data analysis skills (n = 2,240). Furthermore, 85% of respondents agreed with the view that structured postgraduate clinical training is essential for pharmacists to continue to be trusted by society as healthcare professionals, indicating a strong positive recognition of the need for a postgraduate clinical training system.

**Conclusion:** The findings of this study indicate that pharmacists in Japan hold diverse visions for their future careers, recognize the importance of lifelong learning as healthcare professionals, and support the need for the development of a structured postgraduate clinical training system.

## The economic case for pharmacist-led adult immunisation: How Canada's adult vaccine alliance is advancing pharmacy as essential delivery infrastructure

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**Background:** Adult vaccination rates in Canada fall below national targets, contributing to preventable illness, avoidable hospitalisations, and significant economic burden. With nearly six million Canadians lacking access to a primary care provider — disproportionately in rural and remote communities — adult immunisation remains a high-value, underutilised prevention strategy, particularly for older adults and those living with chronic conditions who face the greatest risk of vaccine-preventable disease and its complications.
Pharmacists are uniquely positioned to close this gap, yet pharmacy-based immunisation programmes remain inconsistently funded across provinces and territories. The Adult Vaccine Alliance (AVA), a multi-sector coalition of immunisation experts, physicians, pharmacists, patient advocates, and industry partners, commissioned an external economic analysis to quantify the return on investment of six National Advisory Committee on Immunisation (NACI)-recommended adult vaccines. This work describes how AVA's evidence advances pharmacy-based vaccine delivery as a national access solution and offers a replicable model for multi-sector coalitions supporting pharmacist-led immunisation globally. Critically, AVA is not a pharmacy organisation — its advocacy reflects a broad coalition making the case on public health and economic grounds.

**Method:** In 2024, IQVIA Canada conducted an economic analysis of six adult vaccines — recombinant zoster vaccine (RZV), respiratory syncytial virus (RSV) vaccine, pneumococcal conjugate vaccine (PCV), human papillomavirus (HPV) vaccine, COVID-19 vaccines, and influenza vaccines — estimating value across three domains: healthcare system savings (inpatient, outpatient, long-term care), productivity gains, and overall return on investment, using national data sources and published parameters. AVA applied these findings across federal and provincial pre-budget submissions and structured government engagement at both levels, embedding community pharmacy as a core delivery channel across all recommendations.

**Results:** The six vaccines generate an estimated CAD 2.5 billion in annual value — CAD 514 million in healthcare savings and CAD 1.9 billion in productivity gains — representing a 341% return on investment. AVA's pre-budget submissions explicitly called for investment in community pharmacy infrastructure and workforce capacity to deliver publicly funded adult vaccines, noting pharmacies are often the only accessible healthcare touchpoint in underserved communities. Engagement spanned health, finance, innovation, and regulatory portfolios at federal provincial and territorial levels, reflecting a whole-of-government approach. The IQVIA analysis has informed Canada's 2025–2030 Interim National Immunisation Strategy and Ontario's Chief Medical Officer of Health 2024 Annual Report, demonstrating real-world policy impact.

**Conclusion:** AVA's experience demonstrates that rigorous economic evidence, deployed through broad multi-sector coalitions, can reframe pharmacist-led immunisation from a regulatory question to a public health and economic imperative. When non-pharmacy organisations advocate for pharmacy access using health system value data, it strengthens the credibility and reach of the argument across government and finance audiences. This model has global relevance: pharmacists are among the most accessible points of preventive care worldwide, and multi-stakeholder coalitions using return-on-investment evidence offer a replicable strategy for advancing pharmacist-led immunisation across diverse health system contexts. AVA's ongoing national expansion provides a live case study in coalition-based immunisation advocacy with direct implications for global pharmacy practice.

## Gender-based workplace challenges in pharmacy: A pilot study in Khyber Pakhtunkhwa, Pakistan

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**Background:** Gender equity and workplace safety are important components of a sustainable and effective healthcare workforce. Female pharmacists constitute an increasing proportion of the pharmacy workforce; however, they may encounter gender-based challenges, including workplace harassment, discrimination, and professional exploitation. These challenges can negatively affect job satisfaction, career progression, mental wellbeing, and retention within the profession. In low- and middle-income settings, such incidents often remain underreported due to sociocultural obstacles, inadequate reporting mechanisms, and fear of professional consequences. Emerging concerns and informal observations from professional and academic settings suggest that these challenges may be more prevalent than presently documented. Despite growing global focus on workplace equity, there remains limited empirical evidence regarding the experiences of female pharmacists and pharmacy students in Pakistan. This study aims to investigate the prevalence, nature, and impact of gender-based workplace challenges among female pharmacists and pharmacy students in Khyber Pakhtunkhwa, Pakistan.

**Method:** A cross-sectional, questionnaire-based pilot study will be undertaken among female pharmacists working in academic, hospital, community, and industrial settings, as well as female pharmacy students enrolled in undergraduate and postgraduate programmes in Khyber Pakhtunkhwa. Data will be collected using an anonymous, self-administered online survey distributed through professional and academic networks.
The survey instrument will include sections on demographic characteristics, workplace or academic environment, experiences of gender-based harassment and discrimination (including verbal, psychological, and professional forms), reporting behaviours, perceived barriers to reporting, and the impact of such experiences on mental wellbeing and career intentions. Moreover, awareness and availability of institutional policies and support systems related to workplace safety will also be assessed. Descriptive statistical analysis will be conducted to determine the prevalence and types of reported experiences. Comparative analysis will be performed between practicing pharmacists and students. Ethical considerations, including voluntary participation, informed consent, and anonymity, will be strictly maintained.

**Results:** Preliminary observations and existing evidence suggest that gender-based workplace challenges are likely to be prevalent among female pharmacists and pharmacy students in the region. It is expected that a proportion of such incidents remain underreported due to fear of professional consequences, limited awareness of reporting mechanisms, and inadequate institutional support.
The study is expected to recognize gaps in workplace and academic policies addressing discrimination and harassment. Comparative insights between students and practicing pharmacists may provide insights into how early exposure to such encounters impacts professional confidence and career trajectories.

**Conclusion:** This study is expected to provide important insights into gender-based workplace challenges within the pharmacy profession in Khyber Pakhtunkhwa, Pakistan are expected from this study. Addressing these issues is vital for nurturing safe, inclusive, and supportive environments for female pharmacists and students.
The findings are expected to inform recommendations for strengthening institutional policies, improving reporting mechanisms, and promoting awareness of workplace rights and professional ethics. The study will also serve as a foundation for larger multi-regional research on gender equity in the pharmacy workforce.

## An analysis of utilization patterns and cost of medicines under Ghana's national health Insurance scheme: Insights for sustainable financing of essential medicines

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**Background:** Medicines expenditure constitutes an estimated average of 38% of total claims payments under Ghana's National Health Insurance Scheme (NHIS). Monitoring utilization patterns and associated costs is critical to sustaining the Scheme's financial viability. Evidence on high-volume and high-cost medicines can support strategic purchasing, pricing, benefit design decisions and ensure value for money in medicines reimbursement.
This review examined utilization trends across five therapeutic classes to assess their impact on NHIS financing and identify policy-relevant opportunities for cost optimization.

**Method:** A retrospective analysis was conducted using 2025 utilization data from the National Health Insurance Authority (NHIA) claims database. Medicines within the dataset were ranked by frequency of claims (volume) and total reimbursement cost (value). The top sixty (60) medicines

appearing in both rankings were identified, and their respective contributions to expenditure were reported.

**Results:** Across both volume and value-based rankings, antibiotics, analgesics, supplements, antihypertensives, and antimalarials were the dominant therapeutic classes. The top 60 medicines accounted for 50.6% of total annual reimbursements, with antibiotics dominating at 31.7%, followed by analgesics (11.5%), antihypertensives (8.1%), supplements (6.0%), and antimalarials (4.8%) highlighting utilization and expenditure within a few therapeutic classes. The presence of antibiotics, antihypertensives and antimalarials reflects Ghana's dual burden of communicable and non-communicable disease conditions. Within the antibiotic category, 14 antibiotics appeared among the top 60 medicines. An analysis based on the World Health Organization AWaRe (Access, Watch, Reserve) classification showed that Access antibiotics accounted for 95.4% of total antibiotic expenditure, while Watch antibiotics accounted for 4.6%, with no Reserve antibiotics among the top 60 medicines. This aligns with WHO recommendations that Access antibiotics should contribute at least 60% of antibiotic use to support appropriate first-line treatment and reduce antimicrobial resistance. It was however observed that utilisation was concentrated within the second-generation cephalosporins which accounted for 48% of total antibiotic expenditure, highlighting the need for continued monitoring to ensure rational antibiotic use and reduce the risk of antimicrobial resistance. Analgesics represented the second largest expenditure category (11.5%), reflecting high demand for pain management for both acute and chronic conditions across inpatient and outpatient care. Antihypertensives accounted for 8.1% of total expenditure, indicating the increasing burden of cardiovascular diseases and the growing need for long-term treatment of hypertension. This reflects the ongoing epidemiological shift toward non-communicable diseases in Ghana. Supplements accounted for 6.0% of expenditure, suggesting frequent use of vitamins and haematinics, likely reflecting their use for nutritional deficiencies and anaemia. Although malaria remains a major public health concern, antimalarials contribution of 4.8% of total expenditure is indicative of the impact of pricing arrangements under the national malaria elimination programme (NMEP), where antimalarials are subsidized and reimbursed at structured programme prices.

**Conclusion:** NHIS medicine expenditure is mainly driven by a small group of commonly used medications. This presents clear opportunities for the National Health Insurance Authority to implement strategic purchasing mechanisms such as pooled procurement, price-volume agreements, and targeted price negotiations to improve the cost-effective utilization of the scheme's funds.

## One Voice for U.S. vaccine access: Collaborative efforts of the pharmacy-based vaccine access work group to sustain pharmacy-based immunization services

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**Background:** Recent United States (U.S.) national vaccine policy changes have significantly influenced pharmacy-based immunization services by altering the guidance that historically defined pharmacists' and pharmacy personnel's authority to vaccinate. In many U.S. states, vaccination authority was directly linked to national immunization recommendations, meaning changes to federal advisory processes and guidance affected both which vaccines could be administered and which patient populations could be served in pharmacy settings. Notable policy shifts included changes in advisory committee membership, deviations from established evidence-based recommendation frameworks, and the removal of certain routine vaccine recommendations without the introduction of new supporting scientific evidence. Collectively, these developments introduced variability and uncertainty in pharmacy-based immunization delivery, leading to differences in vaccine access across jurisdictions and underscoring the need for state-level policy responses to maintain continuity of care.

**Method:** In response to these challenges, the American Pharmacists Association established the Pharmacy-based Vaccine Access Work Group, in collaboration with 15 national pharmacy organizations, to provide a coordinated, unified voice focused on preserving and advancing pharmacy-based immunization services, supporting the pharmacy workforce, and promoting consistent vaccine access for patients amid a rapidly evolving policy landscape.

This first-of-its-kind Work Group's purpose is to ensure that national vaccine policy changes do not impede patient access to pharmacy-based immunization services and to promote evidence-informed policies that support equitable, consistent, and sustainable vaccination delivery through the pharmacy workforce.

**Results:** Over the past year, the Pharmacy-Based Vaccine Access Work Group advanced several key pharmacy-focused initiatives to support vaccine access amid a changing policy environment. In August 2025, the Work Group convened the All Pharmacy Townhall: Examining Changes in Vaccine Policy Affecting Practice and the Community, a high-impact multidisciplinary webinar hosted by national pharmacy organizations that explored how evolving vaccine policy and practice are shaping pharmacy-based immunization services and their implications for communities. The session was offered twice live, posted for on-demand viewing, and attracted more than 1,000 live attendees. In October 2025, the Work Group published Guiding Principles for State Policy

on Pharmacy Personnel-Administered Vaccines to address ambiguity in state policymaking related to pharmacy-administered vaccines, with the goal of improving access to essential immunizations and informing sustainable payment structures for pharmacist-provided services; the principles encourage evidence-based, flexible statutory approaches that recognize pharmacists' clinical expertise. In January 2026, the Work Group released a joint statement underscoring the importance of vaccination during the respiratory season, highlighting pharmacists' accessibility for vaccine counseling, encouraging patient–pharmacist engagement in vaccination decisions, and reinforcing the importance of continued no-cost vaccine coverage by payors.

**Conclusion:** The Pharmacy-based Vaccine Access Work Group has demonstrated the value of a unified, collaborative voice for the pharmacy profession by aligning national organizations around shared public health priorities, strengthening advocacy efforts, and promoting consistent, evidence-informed policies that support pharmacy-based immunization services. Through coordinated action, the Work Group has enhanced the profession's ability to respond to policy changes, elevate the role of the pharmacy workforce, and sustain patient access to vaccinations across diverse practice settings.

## The inverse care law has no passport: How systems design, not national wealth, determines medicines access

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**Background:** The inverse care law, first described by Julian Tudor Hart in 1971, posits that those with the most needs have the least access to care. For five decades, this principle has shaped global health discourse on healthcare access, including medicines. However, it has been disproportionately applied to lower-income countries, while higher-income countries are positioned as benchmarks rather than subjects of scrutiny. In reality, inequities in access to medicines persist across both contexts and are shaped more by health system design than national wealth. Pharmacists, as the most accessible health professionals in most systems, sit at the intersection of these inequities daily, navigating formulary gaps, substituting unaffordable medicines, and absorbing the consequences of structural failures that policy frameworks rarely capture. This study compares Nigeria, a lower-middle-income country, and Canada, a high-income country, to examine how similar structural drivers shape medicines access despite wide economic differences.

Purpose: To examine how health system design, rather than national economic wealth, determines equitable access to medicines in Nigeria and Canada

**Method:** A comparative policy and systems analysis was conducted, reviewing medicines coverage mechanisms, financing arrangements, insurance structures, and governance frameworks. Particular attention was given to employer-based insurance, public-private coverage fragmentation, and Canada's 2024 Pharmacare Act. Access was examined across five dimensions: availability, affordability, accessibility, acceptability, and quality. The analysis was further informed by 18 years of cross-system pharmacy practice in both countries.

**Results:** Comparative analysis suggests that medicines access inequity is structurally reproduced across health systems through different mechanisms. In Nigeria, despite its oil-driven economic potential, universal access to essential medicines has not been achieved. The national health insurance scheme, mandatory in principle, covers less than 10% of the population. Fragmented financing, limited formal coverage, and reliance on employer-based schemes create isolated pockets of access, leaving the majority exposed to high out-of-pocket costs. Some large employers establish self-contained systems that deliver near-universal medicines access for employees and dependants, effectively creating "rich bubbles" within a lower-middle-income country.

In contrast, Canada's reputation for universal healthcare conceals a critical absence of universal medicines coverage, producing the inverse pattern, "poor bubbles" within a high-income country. Approximately one in five Canadians lacks medicine coverage, and access varies across provincial formularies and private insurance plans. Despite the 2024 Pharmacare Act, Canada's national initiative to expand medicines access, coverage currently extends to only four provinces and territories, leaving most Canadians reliant on fragmented provincial programmes and employer-sponsored insurance.

In both contexts, access is shaped more by geography, employment status, and income than national wealth, and those with the greatest needs often have the least access. Pharmacists, positioned at the front line, consistently bridge these access gaps in everyday practice.

**Conclusion:** Findings demonstrate that inequitable medicines access transcends national wealth. System design choices, coverage architecture, financing mechanisms, and governance models, determine who gets access and who is left behind. Pharmacists are central to improving medicines access and already perform critical, often invisible equity work. Recognizing, supporting, and formally integrating their role is essential for any serious effort toward equitable medicines access.

## Smartphones without adoption: The digital health intention-behaviour gap among migraine patients in Lebanon

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**Background:** Lebanon's compounding crises, economic collapse, healthcare deterioration, and political instability, have disrupted traditional care pathways and made digital health adoption increasingly urgent for patients with chronic conditions such as migraine. The Technology Acceptance Model (TAM) identifies perceived usefulness and ease of use as primary drivers of adoption, yet their role in crisis-affected populations remains unexplored. This study aimed to assess perceived usefulness (PU), perceived ease of use (PEU), and behavioural intention (BI) to use digital health technologies for migraine management among Lebanese patients, and to identify socioeconomic predictors of acceptance.

**Method:** A cross-sectional study was conducted among 614 migraine patients from across all eight Lebanese governorates. The TAM was operationalised using validated items across four constructs: PU, PEU, BI, and Actual Usage (AU), each rated on a 7-point Likert scale. Smartphone ownership and mobile health access were documented. Pearson correlations, paired t-tests, and one-way ANOVA identified significant associations (α=0.05).

**Results:** Smartphone ownership was high (94.8%, 95%CI 93.0%–96.5%) and 84.0% (95%CI 81.1%–86.9%) reported ability to access healthcare services via mobile applications. Despite this, 50.7% (95%CI 46.7%–54.6%) of patients rarely or never used digital health tools revealing a critical intention-behaviour gap. Mean PU was 3.9/7 (95%CI 3.7–4.0), significantly higher than PEU (3.7/7, 95%CI 3.6–3.9; p=0.010), indicating patients perceive digital tools as more useful than easy to use. Mean BI was 3.6/7 (95%CI 3.5–3.8), strongly predicted by both PU (r=0.77) and PEU (r=0.77; p<0.001). Postgraduate patients showed significantly higher BI than others (3.9 vs 3.5; p=0.039), and patients with household income ≥$2,000/month showed higher BI than those earning less than $500/month (3.9 vs 3.4; p=0.039). Teleconsultation (15.5%), medication reminders (14.2%), and symptom tracking (13.7%) were the most frequently used features.

**Conclusion:** Lebanese migraine patients demonstrate a striking intention-behaviour gap: near-universal smartphone ownership coexists with critically low actual digital health adoption. Perceived usefulness consistently exceeds ease of use, and socioeconomic inequalities stratify digital health intention. Bridging this gap requires targeted digital literacy interventions and crisis-responsive digital health design tailored to resource-constrained populations, a priority role for pharmacists at the frontline of chronic disease management.

## Assessment of medication use practices in school settings: Implications for pharmacy practice advancement

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**Background:** A growing number of young children and adolescents with chronic conditions require medication use in grade school settings for optimal functioning and symptom control, which in turn aid in their participation in academic activities. This includes children with medical complexity who are increasingly surviving into adolescence, given advances in healthcare, including availability of effective medication treatments. Understanding medication use practices in school settings can offer valuable insights to inform improvements in medication use outcomes and support student health and educational attainment. School settings have historically been areas with limited or no pharmacist engagement. Identifying gaps in medication related needs and policies in such settings can offer unique opportunities for pharmacy practice advancement to improve safe and effective medication use for a vulnerable patient population; It also creates a pathway for interprofessional collaboration opportunities, including with school health personnel who have a critical role supporting students with chronic conditions with a need to take medications on school premises.

**Method:** A cross-sectional online survey of school health personnel in a Midwestern state of the United States, designed to assess medication use practices in grade school

settings. The survey questionnaire included sections for background information about participants and school districts as well as medication-use-related practices at the start of the school year; during the school year; and at the end of the school year. The study received ethical approval from the Institutional Review Board of the investigators' institution. Participants were offered a lottery to win one of four available $50 gift cards.

**Results:** A total of 296 participants completed the study. Most were female (97.5%) and White (97.5%). Two thirds were registered nurses (70.5%), followed by licensed practical nurses (9.3%), nurses with advanced training (6.4%). About 50% worked in a rural area and most schools were publicly funded (94.3%). Participants reported challenges stemming from inadequate staffing and high work burden. About 37% participants reported a lack or were unaware of a policy/process for medication safety improvement practices, such as reviewing/learning from medication safety incidents. Communication and task coordination, such as for securing medication related supplies, with parents and providers were also identified as key areas of challenge.

**Conclusion:** The findings underscore unmet needs related to medication use related practices, policies, and resources in grade school settings. They also offer opportunities for pharmacy professionals to establish interprofessional collaborations to create and sustain more resilient medication use systems in school settings.

## Burnout in Australian pharmacists: How have things changed since 2020?

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**Background:** Burnout in pharmacists was reportedly high during the early stages of the COVID-19 pandemic. Whilst the initial demands placed on pharmacists in managing the unprecedented changes and challenges of the pandemic has largely subsided, pharmacists are still facing high demands and inadequate resources. The purpose of this paper is to report burnout and associated factors in Australian pharmacists in the years post COVID-19 and to compare these to data collected in 2020.

**Method:** Pharmacists registered in Australia were recruited via social media platforms (Facebook, Instagram, X and Linkedin) to participate in an online survey examining their level of burnout (as measured by the Maslach Burnout Inventory), as well as demographic characteristics and psychosocial factors affecting their work. This survey data was collected during May-August 2023 and was a repeat of a survey distributed in 2020. Survey responses were analysed descriptively using SPSS and comparisons between the 2023 and 2020 data were calculated using Pearson-Chi Square.

**Results:** A total of 290 responses were available for analysis. The demographics were the same in the 2020 and 2023 cohorts with a majority being female (76.7%), having more than 10 years' experience (56.5%), and working full time (67.4%). In 2023, the rate of burnout had increased to 98.7% from 65.7% in 2020. In 2023 more than half of respondents (59.9%) reported considering leaving the profession, which was also associated with higher rates of burnout ($p<0.05$). In 2023 acute workplace challenges had decreased such as working overtime, changing workplace processes and fear of infection and pharmacists were less likely to report any positive aspects associated with COVID-19. When pharmacists reported exposure to morbidity and mortality, reduced staffing, increased workload, customer incivility and medicines supply issues as significantly impacting their work, they were associated with burnout. Being less busy and having an appreciation for work-life balance was protective against burnout. This data adds to the increasing literature of the ongoing and concerningly high prevalence of burnout in pharmacists and the chronic effects of COVID-19. Moving from the acute workplace changes driven by fear and uncertainty in 2020, to the more chronic long-term impacts of COVID-19 on pharmacists has only added to the burnout burden.

**Conclusion:** Burnout is affecting most Australian pharmacists, and this along with the high number of pharmacists who have left or considered leaving presents a serious threat to the profession

## Translating restorative clinical supervision into peer support: Strengthening the restorative function in pharmacy

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**Background:** With concerningly high rates of burnout and associated attrition among pharmacists, supporting the wellbeing of the profession must be a priority. Although the effectiveness of burnout-minimizing interventions is inconsistent, workplace-led strategies are increasingly recognised as central to meaningful and sustained impact. Organizational interventions such as peer support and restorative clinical supervision (RCS) are established mechanisms for enhancing psychological safety, reflective capacity, and resilience in healthcare workforces. Proctor's model of clinical supervision comprising normative, formative, and restorative elements provides a useful framework for understanding professional support needs. Pharmacy typically provides normative and formative functions well through governance, credentialing, and

education structures. However, the restorative function remains comparatively underdeveloped, despite evidence that restorative approaches can reduce burnout and support wellbeing. While RCS offers a sound restorative framework, its traditional supervisor-supervisee structure can be resource-intensive and challenging to scale in pharmacy settings. Restorative peer support (RPS) was therefore developed as a more accessible, flexible, and sustainable model that provides the restorative intent of RCS while leveraging peer relationships, reducing hierarchy, and enabling cross-site collaboration.

**Method:** A flexible Restorative Peer Support (RPS) program was developed based on the principles of RCS. The program was designed to be adaptable, allowing departments to implement a version of t that was fit-for-purpose, while maintaining core restorative elements. All programs commenced with foundational training covering the program purpose and process, boundaries and expectations, restorative communication skills, developing and sustaining the peer relationship, and self care practices. Following the training departments could implement Peer pairs, group sessions or both. Peer pairs Involved intentional one-to-one matching (either within or across-departments) with pairs participating in monthly one-hour meetings. These pairings created trusted, psychologically safe environments for structured, confidential and reflective conversations. The second, facilitated peer group sessions, provided a collective space for exploring challenges, practising restorative skills, and strengthening team cohesion. In departments using models, members of the same Peer Pair did not attend the same group session, supporting openness and psychological safety.

**Results:** Restorative Peer Support programs have been successfully implemented in multiple locations across Australia. The flexibility of the model enabled departments to tailor the program to local needs, workforce size and team dynamics. For smaller departments cross-department pairing enabled psychologically safe process by avoiding local hierarchy and interpersonal dynamics. Providing participants with consistent foundational training created a shared understanding of the program whilst equipping participants with practical skills for reflective and restorative communication.

**Conclusion:** Embedding restorative peer support using restorative clinical support framework offers a practical, scalable model for strengthening restorative practice in pharmacy. Multi site implementation suggests strong acceptability and potential for broader workforce wellbeing impact. Future work will focus on formal evaluation of outcomes and long-term sustainability.

## Integrating environmental sustainability into hospital pharmacy: A toolkit for leaders

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**Background:** Hospital pharmacies manage energy- and resource-intensive operations and high-value supply chains, positioning pharmacy leaders to drive climate-responsible care. Despite growing international guidance, Canada lacked implementation-ready tools tailored to local governance, procurement, geography, and practice norms. The Canadian Society of Healthcare-systems Pharmacy (CSHP) and CASCADES (Creating a Sustainable Canadian Health System in a Climate Crisis) partnered to co-develop a practical, Canadian-specific sustainability toolkit.

Objective: To design and disseminate a Hospital Pharmacy Sustainability Toolkit which included the CASCADES Integrating Environmental Sustainability into Hospital Pharmacies Playbook, a Sustainable Hospital Pharmacy Scorecard, and a CASCADES–CSHP Introduction to Environmentally Sustainable Hospital Pharmacies Asynchronous Course to help leaders baseline performance, prioritise high-impact actions, and align with institutional sustainability goals.

**Method:** An environmental scan identified national and international recommendations relevant to hospital pharmacy operations, procurement, and clinical services. CSHP's Sustainability Implementation Task Force generated 86 recommendations through structured brainstorming and consensus. In parallel, 12 structured interviews engaged national experts in disaster management, quality improvement, contracting, rural/remote care, water use, and road-mapping/strategy, as well as pharmacy directors and leaders from seven provinces and one territory. Findings were synthesised into a Playbook, Scorecard and introductory course, iteratively reviewed, and produced in partnership by CSHP and CASCADES. Knowledge translation included publication and a national webinar launch in 2025 and presentations to national and provincial leadership forums.

**Results:** Deliverables include: (1) the Playbook translating evidence and expert insight into stepwise recommendations with roles, metrics, and change tips; (2) a Scorecard that enables baselining and staged progression from foundational to advanced practice; and (3) an asynchronous introductory course to support capability building. Early dissemination reached national pharmacy leadership audiences.

**Conclusion:** This Canadian, evidence-informed toolkit equips hospital pharmacy leaders to integrate environmental sustainability into governance, operations, procurement, and clinical pathways. Next steps include evaluating uptake,

barriers/facilitators, and measurable outcomes (e.g., waste diversion, avoided emissions, optimised anesthetic gases), and iteratively updating the toolkit.

## Geographical accessibility to community pharmacies in Japan: A GIS-based analysis of the Kinki Region

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**Background:** Ensuring equitable access to community pharmacies is a global health priority. Although Japan has a relatively high number of pharmacies per capita, regional disparities in pharmacy distribution may create areas with insufficient access, often referred to as pharmacy deserts. This pilot study aimed to explore a methodological framework using Geographic Information Systems (GIS) to visualise pharmacy distribution and assess potential geographical barriers to reaching pharmacies in the Kinki region of Japan.

**Method:** Location data for 10,277 community pharmacies (as of March 2026) were analysed. The data were obtained from the Kinki Regional Bureau of Health and Welfare. Pharmacy locations were geocoded using ArcGIS Pro and linked to population data from the 2020 Japanese Census, including 37,212 small-area population centroids. Accessibility was assessed by calculating the proportion of the population within 800 m, 2 km, and 5 km of the nearest pharmacy. In this preliminary study, accessibility was defined solely by geographic distance.

**Results:** Spatial analysis of 10,277 pharmacies showed that the population-weighted distance to the nearest pharmacy ranged from 0.29 km in Osaka Prefecture to 1.09 km in Wakayama Prefecture. In Osaka, 96.4% of the population lived within 800 m of a pharmacy, compared with 63.4% in Wakayama. Only a small proportion of the residents lived more than 5 km from a pharmacy, ranging from 0.1% in Osaka to 3.2% in Wakayama. These findings indicate clear regional differences in geographical proximity to pharmacies.

**Conclusion:** This analysis demonstrates a GIS-based approach to visualising the distribution of community pharmacies in Japan. However, pharmacy deserts in this analysis were defined only by geographical distance and did not account for other important factors, such as transport, pharmacy opening hours, or availability of clinical services. Future research should incorporate these multidimensional aspects of accessibility to better inform policy and contribute to achieving FIP Development Goal 10 (Equity and Equality).

## Effectiveness of telemedicine interventions on the management of tuberculosis in low-middle income countries (LMICs): A systematic review and meta-analysis

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**Background:** Tuberculosis (TB) remains a major public health challenge in low- and middle-income countries (LMICs), where barriers to treatment adherence and access to care persist. Telemedicine interventions have emerged as potential alternatives or complements to traditional directly observed therapy (DOT) to support TB treatment adherence and monitoring. However, evidence on their effectiveness remains fragmented, especially in low-resource settings, necessitating a comprehensive review to inform policy and practice. This systematic review and meta-analysis evaluated the effectiveness of telemedicine interventions compared with traditional DOT in the management of TB in LMICs.

**Method:** A systematic review and meta-analysis was conducted including 12 studies from 11 LMICs involving a total of 31,353 adults with drug-susceptible TB. Telemedicine interventions assessed in the included studies comprised short message service (SMS) reminders, phone calls, digital adherence technologies such as smart pillboxes and 99DOTS, and video-observed therapy. These interventions were compared with standard DOT. Outcomes evaluated included loss to follow-up, treatment completion, treatment adherence, mortality, treatment failure, and cure rates. The review protocol was registered in PROSPERO (CRD42025644658) and published in the JBI Evidence Synthesis journal.

**Results:** Telemedicine interventions were associated with a lower likelihood of loss to follow-up (OR 0.90; 95% CI 0.81–0.99; $I^2$=78%) and higher treatment completion rates (OR 1.23; 95% CI 1.10–1.38; $I^2$=72%). A substantial increase in treatment adherence was also observed (OR 11.12; 95% CI 6.87–17.99; $I^2$=74%). However, higher odds of death (OR 1.19; 95% CI 1.09–1.31; $I^2$=90%) and treatment failure (OR 1.87; 95% CI 1.38–2.53; $I^2$=10%) were reported among patients receiving telemedicine interventions. No significant difference in cure rates was observed compared with traditional DOT. High heterogeneity across several outcomes likely reflects differences in the type, intensity, and implementation contexts of telemedicine interventions.

**Conclusion:** Telemedicine interventions appear to improve behavioral components of TB treatment, particularly adherence and treatment completion. However, TB clinical outcomes are influenced by multiple factors beyond adherence, including timely diagnosis, drug availability, and broader health system support. These findings suggest that telemedicine should be implemented as part of

comprehensive TB care strategies rather than as a standalone intervention, particularly in resource-constrained settings where contextual factors may influence effectiveness.

## Pilot of an integrated pharmacist in an Australian youth mental health service

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**Background:** The incidence of mental health problems among young people is increasing globally and is also correlated with growing psychotropic medication use among this population. Youth mental health services, such as headspace in Australia, house multidisciplinary teams to support the mental health of young people. To date, there has been limited involvement of pharmacists in these multidisciplinary teams, although qualitative work conducted in Australia has highlighted the perceived benefits and opportunities for pharmacists.

Purpose: To assess the feasibility of integrating a non-dispensing pharmacist within a multidisciplinary youth mental health team. Interim results characterising the nature of the tasks undertaken by the pharmacist during the pilot are presented.

**Method:** A pharmacist with a clinical background in mental health was recruited to work at a single headspace centre in Sydney, Australia, between October 2025 and January 2026. The pharmacist worked approximately 1 day/week over the pilot period. Responsibilities and duties were not preassigned and were instead led by the pharmacist in consultation with the headspace team. To capture the nature of tasks completed, a contemporaneous electronic log of activities was recorded by the pharmacist. Tasks were reviewed and coded by two research team members. Qualitative evaluation of the pilot through semi-structured interviews with key stakeholders (the pharmacist, young people, and headspace staff) is ongoing.

**Results:** The pharmacist logged 82 unique activity entries across 16 days of work during the pilot period. Activities ranged from 10-262 minutes in length (median 42 minutes) and were mostly self-initiated by the pharmacist (n=58, 72%). The 82 activities were coded into nine categories, including: preparing educational resources for staff and young people (n=17), meetings and discussions with other staff (n=16), delivering educational materials to staff (n=9), administrative tasks (n=7), developing clinical and non-clinical resources (n=6), meeting with young people (n=5), and clinical review and case preparation (n=4). Further evaluation of the pilot is ongoing.

**Conclusion:** This study provides preliminary evidence that a pharmacist can be integrated within a multidisciplinary youth mental health team to support the care of young people and support staff educational needs. Further evaluation of the pilot is required to further demonstrate the feasibility of this novel role for pharmacists. A larger-scale study is required to demonstrate the impact and cost-effectiveness of integrated pharmacists in youth mental health services.

## The "Sick Quitter" paradox: A cross-sectional assessment of health-related quality of life among smokers in the Philippines

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**Background:** Tobacco cessation is a vital public health intervention, yet cross-sectional assessments of health-related quality of life (HRQoL) frequently show that former smokers report lower utility scores than current smokers. This "Sick Quitter" effect can lead to a misunderstanding of the immediate impact of cessation on patient-centred outcomes. This study aimed to compare health utility values between current and former smokers and identify the independent clinical and socioeconomic predictors of HRQoL using the EQ-5D-5L.

**Method:** A cross-sectional study was conducted among current and former smokers in an urban area in the Philippines (n=227). HRQoL was measured using the EQ-5D-5L instrument, with utility values calculated via the Philippine-specific value set. A multivariable linear regression model was employed to adjust for age, sex, education, income, smoking intensity (cigarettes per day), and medication count.

**Results:** The study included 227 participants (89 current smokers, 138 former smokers), with a predominantly male population (80.2%). Former smokers were notably older (Mean age: 41) than current smokers (Mean age: 27), although both groups shared an identical mean smoking initiation age of 18. Clinical assessment revealed that former smokers carried a higher chronic disease burden (Mean disease count: 0.44 vs 0.28) and medication count (Mean: 0.34 vs 0.12) compared to current smokers. Descriptive analysis of EQ-5D-5L dimensions showed that "Pain/Discomfort" was the most prevalent domain with reported problems (18.9% of total), followed by the "Mobility" domain (10.1%).

Bivariate analysis initially indicated a statistically significant utility advantage for current smokers (Current smokers: 0.98709; Former smokers: 0.97218; p = 0.017). However, the multivariable regression model (R-square = 0.283) demonstrated that smoking status was not a significant

independent predictor of utility (p = 0.353). Similarly, age, sex, education, and income showed no statistically significant associations with HRQoL (p > 0.05). Instead, the most robust and significant predictor of utility decline was medication count (p < 0.001), with each additional medication associated with a -0.038 decrease in utility.

**Conclusion:** These findings confirm that the observed disparity in HRQoL between current and former smokers is primarily driven by clinical burden rather than smoking status. The "Sick Quitter" effect is evidenced by the fact that medication count, which serves as a proxy for disease severity and treatment burden, is the dominant determinant of health utility. In the field of pharmacy, pharmacists should recognize that a patient's reported quality of life may decline following cessation due to the management of underlying tobacco-related chronic conditions; this highlights the need for integrated cessation and chronic disease counselling within the provision of clinical care. For policy, these data argue for earlier tobacco control interventions before irreversible clinical damage, and its associated medication burden, permanently reduces a smoker's health utility baseline. Furthermore, this study advocates for the provision of smoking cessation services within community pharmacies, a currently underutilized resource in the Philippines, to provide accessible, early-stage support for tobacco users.

## A mixed-methods study of the bridge access program implementation in Puerto Rico: Successes and challenges with insights for future vaccination programs

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**Background:** The Bridge Access Program (BAP) was implemented across the United States, including Puerto Rico, to provide no-cost COVID-19 vaccines to uninsured adults following the end of the federal public health emergency. This study aimed to (1) describe the sociodemographic characteristics of individuals who participated in the program in Puerto Rico, (2) compare these characteristics with those of the general uninsured population, and (3) examine implementation successes and challenges through stakeholder perspectives.

**Method:** We conducted a convergent mixed-methods study. The quantitative component consisted of a cross-sectional secondary analysis of de-identified BAP data for all individuals vaccinated at independent community pharmacies in Puerto Rico (2023–2024). Sociodemographic characteristics were compared with U.S. Census American Community Survey data for the uninsured population. Municipality-level analyses evaluated BAP vaccination case counts and case rates in relation to uninsured population size and Social Vulnerability Index (SVI) using Spearman correlation and nonparametric tests. The qualitative component involved semi-structured interviews with community pharmacists and program facilitators, analyzed using Rapid Qualitative Analysis (RQA) to identify key implementation themes.

**Results:** A total of 81 uninsured individuals received a BAP vaccination in Puerto Rico, representing residents from 21 of 78 municipalities. Although 32 independent community pharmacies registered for the program, only 9 administered at least one vaccine, with more than 90% of vaccinations concentrated in four pharmacies. Participants had a mean age of 55.6 years, and 33.3% were aged ≥65 years, compared to 3.6% in the general uninsured population. Municipality-level analyses showed that BAP vaccination case counts were positively correlated with the size of the uninsured population ($\rho = 0.374$, $p = 0.0008$), while no significant association was observed between vaccination case rates and SVI ($\rho = 0.0085$, $p = 0.179$). Qualitative findings identified four domains shaping implementation: (1) gaps in program understanding and communication, (2) structural and workflow constraints, (3) facilitators of implementation and operational support, and (4) patient experience and perceived impact. Participants reported administrative complexity, technological barriers, and limited outreach as key challenges to program implementation, while strong pharmacist engagement and community trust were noted as facilitators.

**Conclusion:** Overall, BAP implementation in Puerto Rico was limited in scale and highly concentrated across pharmacies and municipalities. Findings suggest that program reach was influenced more by contextual and implementation factors than by technical design limitations. Future vaccination initiatives should prioritize targeted outreach, streamlined administrative processes, and locally tailored implementation strategies to improve equitable access among uninsured populations in underserved and territorial settings.

## Economic impact of community pharmacy triage and referral services: A systematic review

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**Background:** Healthcare systems are facing increasing pressure due to the shortage of general practitioners and the

growing demand for medical care. In this context, community pharmacies represent an essential point of access for the initial management of patients. Triage and referral services provided by pharmacists can help prevent certain medical consultations and improve the efficient use of healthcare resources. By assessing patients' symptoms and directing them to the most appropriate level of care whether self-care, pharmacist advice, or referral to another healthcare professional pharmacists contribute to reducing the burden on primary care services and emergency departments. Despite the growing recognition of these services, their economic impact remains insufficiently documented in the scientific literature.

Objectives: The objective of this study was to evaluate the economic impact of triage and referral services delivered in community pharmacies based on evidence published between 2010 and 2025. In addition to the economic dimension, the study also aimed to examine the associated clinical, organizational, and humanistic outcomes of these services, including patient safety, quality of care, patient satisfaction, and system-level efficiency.

**Method:** A systematic review was conducted in accordance with the PRISMA guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). Three major scientific databases PubMed, Embase, and Scopus were searched to identify original studies assessing the economic impact of triage or referral services in community pharmacy settings. Eligibility criteria were defined using the PICO framework (Population, Intervention, Comparison, Outcomes). Studies were included if they assessed economic outcomes such as cost savings, cost avoidance, or return on investment associated with pharmacy-based triage or referral services. The methodological quality of the selected studies was assessed using the critical appraisal checklists developed by the Joanna Briggs Institute (JBI), ensuring the reliability and robustness of the included evidence.

**Results:** A total of 877 references were initially identified through database searches. After screening titles and abstracts, followed by full-text assessment, 13 studies met the eligibility criteria and were included in the final analysis. Most of the included studies reported a reduction in avoidable medical consultations, particularly visits to general practitioners and emergency departments. Several studies also demonstrated significant cost savings for healthcare systems, with some reporting highly favorable returns on investment associated with pharmacy-based triage services. In addition to economic benefits, these services were generally well accepted by patients and healthcare professionals. They were also found to be rapid, safe, and associated with improvements in clinical outcomes, care organization, and patient satisfaction.

**Conclusion:** Triage and referral services provided in community pharmacies appear to be economically advantageous while maintaining a high quality of care. By optimizing patient pathways and reducing unnecessary medical consultations, these services may contribute to a more efficient and sustainable healthcare system. However, the heterogeneity of study methodologies and the lack of research conducted in low- and middle-income countries highlight the need for further studies. Additional research is required to strengthen the evidence base and support the broader implementation and integration of these services within healthcare systems worldwide.

## Comparative disproportionality analysis of acute pancreatitis reports among glp-1 receptor agonists: a pharmacovigilance study using the Brazilian VigiMed database

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**Background:** Pancreatitis is a serious and potentially life-threatening adverse drug reaction (ADR) that has been reported in association with glucagon-like peptide-1 receptor agonists (GLP-1RAs). However, evidence regarding reporting patterns of acute pancreatitis across GLP-1RAs in routine clinical practice remains limited, particularly in middle-income countries.

Purpose: To assess signals of disproportionate reporting of acute pancreatitis involving GLP-1RAs in the Brazilian pharmacovigilance database (VigiMed).

**Method:** Data were obtained from VigiMed, the Brazilian national spontaneous reporting system coordinated by the Brazilian Health Regulatory Agency (Anvisa). All individual case safety reports (ICSRs) recorded between January 2018 and December 2025 were eligible for inclusion. Reports containing the term "vacina" or "vaccine" in the column referring to the active substance name and rows that were empty in the column referring to the MedDRA preferred term and/or active substance were excluded. Rows in which the relationship between the medication and the event was not classified as "Suspected" were also excluded. Cases of acute pancreatitis were identified when the event was reported and a GLP-1RA was recorded as a suspected medication. The evaluated agents were semaglutide, liraglutide, dulaglutide, and tirzepatide. Disproportionality measures were calculated for each medication using the full database as the reference after pre-processing. Reporting odds ratios (ROR) and proportional reporting ratios (PRR), with corresponding 95%

confidence intervals, were estimated. A signal of disproportionate reporting was defined as ≥3 reports for the drug–event pair, PRR ≥1, and a lower bound of the 95% confidence interval of the ROR >1.

**Results:** After applying the inclusion and exclusion criteria, a total of 273,051 ICSRs were recorded in the VigiMed database during the study period. Among these, 99 reports described acute pancreatitis, of which 28 involved GLP-1RAs as suspected medications. Case distribution was as follows: semaglutide (n = 23), liraglutide (n = 3), dulaglutide (n = 0), and tirzepatide (n = 2). Seventeen cases occurred in female patients. Signals of disproportionate reporting were observed for semaglutide and liraglutide. Semaglutide showed the strongest signal (ROR 35.02, 95% CI 23.89–51.33; PRR 34.89, 95% CI 23.83–51.08), followed by liraglutide (ROR 10.48, 95% CI 3.34–32.87; PRR 10.47, 95% CI 3.34–32.78). No signal was detected for dulaglutide, and tirzepatide did not meet the minimum case-count threshold required for signal detection.

**Conclusion:** The findings suggest that pancreatitis may represent a potential safety signal for semaglutide and liraglutide, warranting further investigation. The higher disproportionality estimates for semaglutide should not be interpreted as evidence of increased clinical risk, as they may reflect differences in drug utilisation, which has substantially higher uptake in the market. Conversely, the absence of signals for dulaglutide and tirzepatide may reflect lower exposure, under-reporting, or their more recent introduction. However, results from disproportionality analyses should be interpreted with caution, as they reflect reporting patterns rather than causal associations.

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## Completeness of individual case safety reports for GLP-1 receptor agonists in the Brazilian VigiMed database: a pharmacovigilance study

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**Background:** Spontaneous adverse drug reaction (ADR) reporting systems are the first-line method for monitoring post-marketing safety information once medicines are on the market. However, these systems have recognised limitations, including under-reporting and incomplete data submission. The completeness of individual case safety reports (ICSRs) may influence the interpretation of pharmacovigilance data and the identification of potential safety signals, particularly for recently introduced medicines such as glucagon-like peptide-1 receptor agonists (GLP-1RAs).

Purpose: To assess the completeness of information provided in ICSRs involving GLP-1RAs in the Brazilian pharmacovigilance database (VigiMed).

**Method:** A pharmacovigilance study was conducted using ICSRs retrieved from the Brazilian national spontaneous reporting system (VigiMed). All ICSRs involving semaglutide, liraglutide, dulaglutide, and tirzepatide submitted to VigiMed between 2018 and 2025 were evaluated. Data completeness was assessed using the VigiGrade completeness score developed by the Uppsala Monitoring Centre of the World Health Organization. This score evaluates the presence of key variables commonly required for pharmacovigilance assessment, including report type, primary reporting source, patient age and sex, therapeutic indication, drug dose, time to onset of the ADR, and clinical outcome. Minor adaptations were made to the original VigiGrade scoring system to reflect the structure of the VigiMed database and to enable grades to be assigned to the time-to-onset dimension. The variables “country of origin” and “narrative information” were excluded due to their limited availability in the database. Consequently, the maximum achievable completeness score was 1.0, and reports with a score ≥0.8 were classified as well documented. Mean completeness scores and standard deviations were calculated for each medication.

**Results:** A total of 2,589 ICSRs involving GLP-1RAs from 2018 to 2024 were recorded in the VigiMed database during the study period. The distribution of reports by suspected drug was as follows: semaglutide (n = 1,548), liraglutide (n = 707), dulaglutide (n = 61), and tirzepatide (n = 273). The mean completeness scores observed for each medication were: semaglutide (0.42 ± 0.20), liraglutide (0.40 ± 0.17), tirzepatide (0.41 ± 0.19), and dulaglutide (0.30 ± 0.14). Patient age, time to onset of the event, and medication dose were among the data elements most frequently missing or incompletely reported.

**Conclusion:** The scores obtained suggest a low level of information density, indicating poorly documented reports. According to VigiGrade, essential data elements for the evaluation of ICSRs include patient demographics (age and sex), suspected drug characteristics (indication and dose), adverse event characteristics (description, time to onset, and outcome), and reporter information. The absence or limited documentation of these elements constrains the generation of safety hypotheses from spontaneous reporting systems. Although additional clinical details (laboratory results, diagnostic procedures, detailed clinical course, comorbidities, and concomitant medications) generally contribute less to completeness scoring systems and do not directly affect

signal detection, their absence may limit the clinical interpretation of suspected ADRs, including the assessment of potential alternative causes and contributing factors.

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## Development of a Prioritization Methodology for Urgently Needed Medicines: Health Canada's National Priority List of Pediatric Drugs

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**Background:** Since the early 2000s, pediatric focused regulations in the United States and European Union have led to substantial gains in clinical studies, evidence based labeling, and child friendly formulations. Canada has made progress but continues to lag behind, leaving major gaps in pediatric drug availability. In response, Health Canada launched the Pediatric Drug Action Plan in 2020, which includes creating a National Priority List of Pediatric Drugs (NPLPD) to address urgent unmet needs.

To support this initiative, Health Canada convened the Pediatric External Reference Group (PERG), composed of a secretariat, Health Canada co chairs, pediatrician co chairs, six additional pediatricians, two pharmacists, and four observers, including representatives from health technology assessment organizations. The PERG was mandated to establish eligibility criteria and prioritize drugs based on high unmet clinical need. During a national 60-day nomination period (March–May 2023), 906 drugs were submitted by pediatricians and pharmacists. After removing incomplete entries and duplicates, 350 drugs were screened, and 119 met eligibility criteria. All eligible drugs were approved for pediatric use in at least one trusted jurisdiction. Health Canada then instructed the PERG to develop a transparent scoring system to identify the 40 highest priority drugs.

Objective: To describe the method developed by the PERG, in collaboration with Goodman Pediatric Formulations Centre (GPFC), for selecting drugs for inclusion on the NPLPD.

**Method:** The process incorporated objective scoring, subspecialists input, and pharmacists input. Pharmacists provided a cross-cutting perspective across all therapeutic areas (TAs), while subspecialists ranked drugs within their respective specialty.

Drug selection followed three steps. First, pharmacists and pediatric subspecialists independently ranked eligible drugs by TA (as described above), with two to four drugs per TA selected based on alignment between both groups. Second, each drug received an objective score (out of 40) using up to 13 scientific, clinical, and regulatory criteria. Third, a final score out of 100 combined the objective score (40%), pharmacist ranking (30%), and subspecialist ranking (30%), with highest-scoring drugs prioritized irrespective of TA. Representativeness was then assessed by comparing selected drugs against all eligible drugs by TA and regulatory category.

**Results:** Thirty-two drugs were included on the basis of being in the top 2 priorities by subjective assessment within their TA by either pharmacist (n=9), subspecialists (n=10) or both (n=13). Eight additional drugs were selected based on their final weighted score. The list of 40 drugs was well balanced and representative of the initial list of 119 both in terms of TAs and regulatory categories, respectively.

**Conclusion:** The development of a national priority list of medicines is not a perfect science. It is in fact, a deeply human process full of nuances. The proposed methodology successfully integrates much of this complexity, incorporating both objective and subjective value with equitable representation across therapeutic areas. This collaborative approach, involving a multi disciplinary group of national experts and a rigorous multi step prioritization process, offers a model for developing other priority lists.

## Pharmacist dispensing of opioid prescriptions under the temporary exemption to the controlled drugs and substances act in Canada

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**Background:** During the coronavirus disease 2019 pandemic, Health Canada issued a temporary exemption to the Controlled Drugs and Substances Act (CDSA). Despite this policy change, there is limited information regarding pharmacists' prescribing of opioids under the temporary exemption.
This study aimed to assess the impact of the CDSA subsection 56(1) temporary exemption on opioid prescribing practices among direct patient care pharmacists during the COVID-19 pandemic, covering the period from February 1, 2018, to April 30, 2022.

**Method:** Descriptive statistics, such as sample mean, sample standard deviation, and sample proportion, along with data visualization tools, were utilized to examine potential changes attributable to CDSA. A linear regression model was first applied to identify changes in the data. Temporal dependence was then evaluated by analyzing autocorrelation plots and testing the residuals' dependence, followed by the implementation of a suitable time series model.

**Results:** The mean number of pharmacist-prescribed opioid claims per week increased from 0.0 in the pre-CDSA policy period to 57.0 in the post-CDSA policy period. Time-series regression analysis demonstrated a mean-level change of 36.29 (95% CI 27.14-48.52, $P < 0.0001$) in overall prescription data. For analgesic and opioid use disorder prescription data, the mean-level changes were 28.95 (95% CI 20.88-40.13, $P < 0.0001$) and 6.74 (95% CI 5.80-7.82, $P < 0.0001$), respectively.

**Conclusion:** The temporary exemption under the CDSA during the COVID-19 pandemic allowed pharmacists in Nova Scotia to prescribe opioids, which supported the continuity of opioid therapy for adults. Additional research is needed to identify the factors contributing to the limited use of CDSA exemptions by pharmacists engaged in direct patient care.