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CONFERENCE ABSTRACTS

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Health and medicines information

Implementation of a student pharmacist-led community health awareness program to enhance health access in an Arab-American immigrant community

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Background: Immigration of Arabs to the United States has increased in recent decades due to political instability and the pursuit of improved economic and healthcare opportunities. Arab Americans are one of the fastest-growing immigrant populations and experience disproportionate rates of cardiometabolic conditions including hypertension, diabetes, and obesity. Barriers such as limited healthcare access, language differences, and variable health literacy contribute to lower disease awareness and management.

Pharmacists and student pharmacists are well-positioned to improve health awareness and access to preventive services through community outreach. To address these needs, the Middle Eastern Pharmacist Association (MePA) developed the Community Health Awareness Program (CHAP), a student-supported initiative providing culturally sensitive health screenings, education, and referrals to Arab American communities. Screenings are conducted in community centers, faith-based institutions, and local markets in the Chicago area.

To understand factors influencing chronic disease management, CHAP incorporated the Single Item Literacy Screener (SILS) in 2024 to assess health literacy. Plans were also initiated to integrate the Morisky Medication Adherence Scale (MMAS-4) to evaluate medication adherence. This study examined the relationship between health literacy and blood pressure control among CHAP participants.

Method: A retrospective cohort analysis was conducted using data from CHAP screenings between June and December 2024. Screenings were performed by trained student pharmacist volunteers under pharmacist supervision. A standardized questionnaire collected demographic, medical, and social history. Health literacy was assessed using SILS. Blood pressure was measured with validated devices and classified according to American Heart Association guidelines: ≤130/80 mmHg for individuals with hypertension and ≤120/80 mmHg for those without hypertension.

Participants received counseling on cardiovascular risk factors and lifestyle modification. Educational materials were provided, and individuals requiring further evaluation were referred to low-cost or free clinics. Fisher's exact tests evaluated associations between variables with an alpha of 0.05.

Results: Across ten screening events, 191 individuals (mean age 51.5 years; 58.1% male) were screened. Seventy-one participants (37.2%) reported a history of hypertension. Those with known hypertension were more likely to have uncontrolled blood pressure compared to those without (75% vs 54%, p=0.004). Males were also more likely to have uncontrolled blood pressure than females (p=0.02).

Health literacy alone was not associated with achieving blood pressure control (p=1). However, among participants reporting high health literacy, those with a history of hypertension were significantly more likely to have readings above goal compared to those without hypertension (p=0.001). This pattern was not observed among participants with low health literacy (p=0.76).

Conclusion: Community-based screening initiatives led by pharmacists and student pharmacists expand access to preventive health services in underserved populations while promoting culturally responsive care. Programs such as CHAP identify individuals with uncontrolled chronic conditions, assess health literacy, provide targeted education, and

connect patients with follow-up care. Incorporating health literacy and medication adherence assessments may allow pharmacists to develop more effective interventions to improve cardiometabolic outcomes among Arab American populations.

Assessing healthcare professionals' access to medicines information

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Background: Drug Information sources available in Malta include the British National Formulary (BNF), the Maltese Medicines Handbook and the Malta Medicines Authority (MMA) database.(1) Each of these sources has limitations, highlighting the need for an integrated information system that provides readily accessible information on medicinal products available on the Maltese market for healthcare professionals

Method: The MMA database was downloaded from the MMA website and the duplicates were removed. Using Microsoft Excel, each item was assigned a random number electronically and a sample was generated. The first 800 items were selected from the 4065 items and assessed with respect to the availability of information in the BNF. The BNF 85 edition (2023, 85 edition) was used. The last step included an expert consultation to discuss data integration and digital frameworks regarding medicine information.

Results: Out of the 800 items, 679 items (85%) were found in the BNF, whilst 121 items (15%) were not found in the BNF. The 121 items that were listed in the MMA database but were not found in the BNF were further analysed according to the therapeutic class. Drugs acting on the Cardiovascular System were the most frequent drugs not found in the BNF (27 drugs), while drugs acting on the Respiratory (14 drugs) and the Central Nervous System (12 drugs) followed. The 679 medicinal products that were in the MMA database and were found in the BNF were further analysed according to the strength and formulation of the product. 10 items were found with the API only, 11 items were found with the API and strength only, 65 items were found with the API and formulation only and the remaining items amounting to 593 items were found with the API, strength and formulation. The consultation indicated that a multidisciplinary team of at least three experts would be required: a software developer to build the system, an AI/machine-learning specialist to maintain data relevance, and a pharmaceutical expert to validate the information. The recommended conceptual model relies on developing knowledge graphs to capture the information required for an online drug information platform that provides timely, locally relevant information.

Conclusion: This study highlights gaps between the MMA database and BNF listings. Such discrepancies may affect healthcare professionals' access to complete and locally relevant medicines information. The findings support further research into healthcare professionals' expectations, as well as the development of proposals for an online medicines information system that leverages the use of artificial intelligence. Established digital frameworks, such as medicX-KG(2), demonstrate how regulatory and clinical data can be effectively integrated.

Toxicity assessment of mangosteen (Garcinia mangostana) pericarp: A comprehensive systematic review and meta-analysis

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Background:

Method:

Results:

Conclusion:

Mangosteen (Garcinia mangostana L.) pericarp is a widely used herbal remedy in Southeast Asia, valued for its antioxidant, anti-inflammatory, and therapeutic properties. Despite its increasing use in nutraceuticals and supplements, safety concerns remain due to inconsistent toxicity data. This study aimed to systematically review and synthesize available evidence from toxicity studies on G. mangostana pericarp, and to determine its lethal dose (LD50) and no-observed-adverse-effect level (NOAEL).

A systematic review and meta-analysis (SRMA) was conducted in accordance with PRISMA guidelines. Relevant studies published from 2000 to 2023 were retrieved from PubMed, ScienceDirect, Google Scholar, and EBSCO. Eligible in vivo and in vitro studies were assessed for quality using ARRIVE 2.0 and RoB 2 tools. Data extraction focused on phytochemical constituents, extraction methods, animal models, administration routes, and reported toxicological outcomes. Pooled analysis estimated LD50 and NOAEL values. Twenty-five studies were included, of which five met criteria for meta-analysis. Most extracts were ethanol-based and rich in xanthones, particularly α-mangostin. The LD50 values ranged from >15,480 mg/kg to ≤6,000 mg/kg body weight,

while NOAEL values ranged from <100 to ≤2,000 mg/kg. At moderate doses, no significant toxicity was observed in growth, hematology, or histopathology. High-dose exposures produced mild, reversible changes in hepatic and renal markers. Limited human evidence supported favorable tolerability. Overall, G. mangostana pericarp demonstrates a broad safety margin and appears safe at commonly tested doses. However, further long-term, controlled clinical trials are necessary to confirm safety and establish standardized dosage guidelines.

Cardiometabolic comorbidities and comedication use in MASLD: Insights from the EXCEL Trial to support pharmacist-led risk identification

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Background: Metabolic dysfunction-associated steatotic liver disease (MASLD) is a multifactorial disease that is often associated with numerous comorbidities such as type 2 diabetes mellitus, dyslipidaemia, hypertension, and obesity. The presence of these comorbidities often requires patients to use multiple concurrent medications. Pharmacists play a key role in identifying at-risk patients during routine pharmacy visits. They also assess rationale drug usage, minimise drug-related risks, and educate patients on lifestyle modifications or therapy management of MASLD. Furthermore, pharmacist-led advice in digestive disorders has been shown to improve patient-reported outcomes. Here, we present insights from the EXCEL trial that could assist pharmacists in risk identification and MASLD management.

Purpose: To characterise cardiometabolic comorbidities and patterns of concomitant medication use among MASLD patients in the EXCEL trial and explore implications for pharmacist-led risk identification.

Method: EXCEL was a Phase 4, multicentre, double-blind, randomised, placebo-controlled, parallel-group trial conducted at 15 centres. Patients with MASLD and preexisting cardiometabolic conditions were randomly assigned to 2 groups: essential phospholipids plus standard of care (EPL arm) and placebo plus standard of care (placebo arm). Eligible patients received either EPL (1800 mg/day) or placebo, along with standard of care, for 6 months, and follow-up was conducted 3 months after completing treatment. The prevalence of comorbidities and concomitant medications used in the randomised-intended-to-treat set was assessed. The occurrence of these cardiometabolic comorbidities and the concomitant medications, categorised by class, were analysed in detail.

Results: A total of (N=193) patients were enrolled in the study and were considered as the intended-to-treat- set. The EPL arm consisted of (n=97) patients, and the placebo arm consisted of (n=96) patients. Obesity was the most common comorbidity, reported in 80.4% of the EPL group and 85.4% of the placebo group. Hyperlipidaemia occurred in 59.8% (EPL arm) and 59.4% (placebo arm), while glycated haemoglobin (HbA1c; ≥8.0%) was observed in 17.5% and 10.4% of EPL and placebo participants. A total of 603 concomitant medications were recorded in the EPL arm and 573 in the placebo arm; however, a greater proportion of placebo-treated patients used ≥1 concomitant medication vs. EPL arm (94.8% vs 89.7%). Cardiovascular drugs were most frequent (EPL arm: 73.2%; placebo arm: 76.0%), followed by alimentary/metabolic agents (EPL arm: 62.9%; placebo arm: 59.4%). Renin-angiotensin agents (52.6% in the EPL arm vs 53.1% in the placebo arm), lipid modifiers (50.5% in the EPL arm vs 49.0% in the placebo arm), and diabetes drugs (EPL arm: 37.1% vs placebo arm: 36.5%) were the leading subclasses. EPL treatment significantly reduced steatosis as early as 3 months, with the effect sustained through 9 months (i.e., 3 months post-treatment). Due to the multifactorial nature of the disease, polypharmacy-related issues may arise. In addition, at Month 6, EPLs significantly improved quality of life by reducing fatigue and lowering HbA1c levels.

Conclusion: The findings from this study support pharmacists in early MASLD risk identification, medical optimisation in multimorbid patients, and patient counselling as well as lifestyle support in community pharmacy settings.

NSAID use patterns and pharmaceutical care gaps in outpatients with joint pain: A cross-sectional study

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Background: Arthralgia (joint pain) is a symptom that occurs in the joint area and can be the result of pathological processes in the joint itself and structures surrounding it. The current data on the prevalence of joint related chronic diseases like osteoarthritis indicates that joint pain has become one of the main causes of disability, especially among people aged 40-65 and over 65. In 2020, the WHO estimated that 595 million people worldwide suffer from osteoarthritis

with a majority experiencing arthralgia. According to statistics, NonSteroidal Anti-Inflammatory Drugs (NSAIDs) are the most commonly prescribed medicines by healthcare professionals to treat joint pain and are some of the most consumed medicines globally used by an estimated 30 Million people daily.

Recent studies have shown that prolonged NSAID use are associated with significant side effects including Gastro-intestinal issues, cardiovascular events (heart attack, stroke) and increased risk of kidney damage.

Aim: The aim of this research was to evaluate the patterns of NSAID use, assess their safe and effective use, and identify pharmaceutical care gaps among outpatients with joint pain.

Method: A cross-sectional survey was conducted among 60 consecutive outpatients presenting with articular pain syndrome at the Ternopil City Municipal Hospital No.3. Data collected included sociodemographic, general clinical data and pharmacotherapeutic analysis. The pain syndrome was assessed using a Visual Analog Scale (VAS). In all patients, data on the pharmacotherapy received (type of NSAIDs, method of drug selection and features of use, duration of administration, clinical efficacy and side effects, use of additional drugs) were systematised. The study results were processed using a statistical Microsoft Excel software package. Continuous variables were expressed as mean ± standard deviations, as well as the percentage frequency of the phenomenon were calculated.

Results: Respondents (n = 60) had mean age 49.47 ± 2.60 years and moderate pain (VAS 5.18 ± 0.32). Knee pain was most common (70%); 30% were overweight and 37% reported activity restriction. Oral tablet NSAIDs (mainly non-selective COX inhibitors such as diclofenac, ibuprofen and naproxen) were used by 46.7%; topical preparations by 13.3%; combinations (oral + topical) by 20%. Most patients (76.7%) reported good symptomatic benefit, yet 16.7% increased dose without consultation and 26.7% concurrently used multiple NSAIDs. Only 13.3% were counselled about the use of NSAIDs from a pharmacist; 63.3% reported they had not been informed about possible adverse effects. Relevant comorbidities like hypertension were frequent among most participants (63.3%), known risk factors for NSAID-related complications. Additionally, 12 patients used clopidogrel and 7 used systemic glucocorticoids in combination with systemic NSAIDs which is a known drug interaction that could increase risk of NSAID complications.

Conclusion: Patients with arthralgia commonly used oral NSAIDs and often lack counselling about risks; risky behaviours (dose escalation, poly-NSAID use) and frequent comorbidity increase potential harm. Greater pharmacist- and physician-led education, prioritisation of topical NSAIDs where appropriate and systematic counselling about Drug-Drug Interactions and adverse effects could improve safe NSAID use. Integrating structured pharmaceutical care protocols into outpatient settings may significantly reduce NSAID-related harm.

Bridging the gender gap in cardiovascular research: Protective effects of resveratrol in a female animal model

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Background: Ovariectomy (OVX) induces estrogen deficiency and promotes a pro-inflammatory and pro-fibrotic cardiovascular environment that increases susceptibility to adverse remodeling after myocardial infarction (MI). Although resveratrol has been reported to exert anti-inflammatory and cardioprotective effects, its impact on post-infarction remodeling under estrogen-deficient conditions remains incompletely understood. The present study evaluated the effects of resveratrol on cardiac and pulmonary remodeling in ovariectomized rats subjected to myocardial infarction by permanent ligation of the left anterior descending coronary artery (LADL).

Method: OVX and sham-operated female rats were distributed into experimental groups with or without resveratrol treatment. Structural alterations, collagen deposition, and inflammatory profiles were assessed through histological analysis, morphometric measurements, and correlation analysis using heat maps.

Results: Myocardial infarction in ovariectomized rats resulted in marked structural disorganization, increased cardiac and pulmonary fibrosis, and a predominance of pro-inflammatory mediators. Resveratrol treatment attenuated collagen deposition, partially preserved tissue architecture, and shifted the inflammatory profile toward a less pro-fibrotic pattern. Heat map analysis revealed that resveratrol reduced the strength of correlations between inflammatory markers and fibrotic remodeling, particularly in estrogen-deficient animals.

Conclusion: In conclusion, resveratrol mitigates adverse cardiac and pulmonary remodeling after myocardial infarction in ovariectomized rats. These findings suggest that resveratrol may modulate inflammation-driven fibrosis under estrogen-deficient conditions by increasing IFN-gamma, highlighting its potential as an adjuvant strategy to limit post-infarction remodeling in females.

Development and effectiveness evaluation of a smart mobile tool for improving medication adherence in patients with chronic diseases

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Background: Medication non-adherence remains a significant global public health challenge. The World Health Organization (WHO) has reported that long-term medication adherence among patients with chronic diseases in developed countries is only about 50%. Poor adherence is strongly associated with adverse clinical outcomes, including suboptimal blood pressure control, increased hospitalization, and higher mortality. Contributing factors include forgetfulness, complex polypharmacy regimens, and insufficient family support; even well-trained caregivers may commit unintentional errors due to fatigue and workload. This study aimed to develop a patient-centered medication reminder mobile application (App) to reduce human error by transforming fragmented memory into a structured medication management system. The primary objective was to provide timely alerts and establish a Personal Health Dashboard integrating physiological data—such as blood pressure, glucose, and oxygen saturation—to enhance treatment effectiveness and reduce healthcare costs.

Method: The project was developed through an interdisciplinary collaboration between medical professionals and university teams. The App underwent iterative development and comprehensive security testing. Core features include: (1) Automated Data Entry—QR code scanning of prescriptions to auto-populate medication data, minimize manual input errors, and detect duplicate medications; (2) Multi-dimensional Monitoring—integration of Bluetooth-enabled physiological devices or manual input to track vital signs such as heart rate and blood oxygen levels; (3) Customized Management—flexible scheduling based on lifestyle, photo-based drug identification, management of health supplements, and refill reminders for chronic prescriptions; and (4) Security and Integration—successful completion of mobile application security assessments, ensuring local data storage for privacy protection, along with direct links to hospital online registration systems to facilitate medical consultations.

Results: Since its launch, the App has achieved approximately 10,000 downloads. A questionnaire survey of users who had used the App for more than one month demonstrated high satisfaction levels: 85.4% for on-time medication reminders and 82.0% for medication safety assistance, suggesting improvements in key issues related to forgetfulness and medication safety. Additionally, 83.2% of users reported that the interface was intuitive and could be operated independently, and the overall recommendation rate reached 90.6%. However, only 39.4% of users reported sharing their data with physicians. User feedback indicated that many patients were unaware of the importance of sharing medication records during clinical visits or did not recognize digital logs as valid medical references for identifying drug interactions and duplicate therapies.

Conclusion: Smart technology can effectively bridge gaps in daily self-management by shifting medication reminders from passive alerts to proactive health monitoring. Future development in the coming decades should focus on integrating artificial intelligence (AI) to predict adherence patterns and deliver proactive interventions, such as real-time education and psychological support via AI chatbots. Establishing a robust ethical framework is essential to prevent algorithmic bias and safeguard patient rights. Ultimately, technology serves as a critical bridge between healthcare teams and patients, making medication management more reliable, precise, and supportive.

Anti-doping activity by sports pharmacists in the faculty of health and sports science at Juntendo University

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Background: In Japan, sports pharmacists provide appropriate information to protect athletes from doping risks. Sports pharmacists are qualified by Japan Anti-Doping Agency (JADA). JADA encourages them to actively involve themselves in anti-doping. The student athletes, who aim to be elite athletes, belong to the Faculty of Health and Sports Science at our university. However, they do not have sufficient opportunities to consult about the use of medications or supplements. Lack of knowledge may lead to doping violations. Based on this background, we began sports pharmacist-led consultation service in April 2025, either face to face or online.

Method: The participants in this study were students and staff of the Faculty of Health and Sports Science at Juntendo University. Face to face counselling was held during the health check-up period over two days at the same time and place for convenience. Online service was announced by promotional posters on campus. The data were collected

between April and December 2025. This study was approved by the Institutional Ethics Committee of the Faculty of Health and Sports Science at Juntendo University.

Results: In all, 20 consultations were conducted, with 13 cases face to face and 7 cases online. Among sports, the largest number of 9 athletes belonged to track and field. The medications and supplements were as follows: 15 cases of prescription medicines, 4 cases over-the-counter (OTC) medicines, and 24 cases dietary supplements. It was proven that two cases, one of prescription and the other of OTC medicine, contained prohibited substances under the 2025 Prohibited List International Standard based on the World Anti-Doping Code prohibited substances (WADA prohibited list). In both cases, student athletes were unaware of the prohibited substances. Case 1 included glucocorticoids which have been prohibited in competition when administered via oral, intravenous, intramuscular, local injection, or rectal routes (WADA, 2025). Case 2 involved cobalt sulphate which enhances erythropoiesis and increases erythrocyte levels. We surveyed the situation and confirmed that they took the medicine inadvertently and advised them to take a medicine that did not include prohibited substances instead. We encountered another case in which herbal medicine was used for acne treatment. As herbal medicines contain multiple herbal ingredients, they may contain prohibited substances. From this perspective, we advised the athlete that he should not take this medicine and replace it with other vitamins. The answers to the questionnaire about this service were obtained from nine respondents (45%). They found that the sports pharmacists' advice was helpful for them. Using this service, most of them selected sports pharmacist as anti-doping advisors.

Conclusion: The sports pharmacist-led consultation service identified cases in which student athletes took prohibited substances and prevented them from doping risks. Continuing this activity could contribute to increased awareness and knowledge of anti-doping at our university.

Comparative analysis of post-marketing safety information and regulatory decision-making in the United States and European Union

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Background: Dermatological drugs, cosmetic products, and cosmeceuticals constitute rapidly expanding sectors with significant public health and safety implications. While the United States (US) and the European Union (EU) share foundational scientific principles for product development, their regulatory frameworks for post-marketing surveillance and risk management exhibit structural divergences. These differences influence the processes by which post-marketing safety information is collected, evaluated, and integrated into regulatory decision-making, significantly impacting population-level health protection across these product categories. This study aims to: i) provide a comparative overview of post-marketing safety information systems and their integration into regulatory decision-making within the US and EU; ii) the objective is to examine specific implications for consumer safety, iii) assess the potential for regulatory coordination, and iv) consider to explore avenues for enhancing the effective communication of safety findings to healthcare professionals and the public.

Method: We examined regulatory frameworks, pharmacovigilance systems, and decision-making mechanisms pertinent to post-marketing safety in both US and EU jurisdictions by analysing publicly available legal texts, regulatory guidance documents, and detailed descriptions of existing surveillance systems. This systematic review precisely delineates specific safety data flows, identifies key risk management tools employed, and maps the intricate regulatory action pathways from initial safety signal detection to final regulatory intervention.

Results: In the European Union, post-marketing safety oversight is supported by centralised systems. These prominently feature EudraVigilance, mandatory Risk Management Plans, and Periodic Safety Update Reports, meticulously coordinated by the European Medicines Agency and individual national competent authorities. Conversely, the United States system primarily relies on more spontaneous reporting mechanisms, including the FDA Adverse Event Reporting System, MedWatch, and Risk Evaluation and Mitigation Strategies for selected regulated products. These divergences are evident in reporting obligations, the stringency of risk management planning requirements, and the explicit mechanisms linking raw safety data to immediate and concrete regulatory action.

Conclusion: This approach facilitates a clear understanding of how each system is structured to identify, assess, and mitigate risks associated with dermatological products, cosmetics, and cosmeceuticals, thus allowing for structural comparison and interpretation. Both the US and EU jurisdictions are committed to ensuring product safety through their established post-marketing surveillance systems. However, the observed divergences in their fundamental regulatory structures and information flow pathways are demonstrably significant, profoundly influencing how emergent safety data are translated into regulatory decisions and public health interventions. Although recent legislative reforms, such as the Modernisation of Cosmetics Regulation Act, have demonstrably strengthened oversight for cosmetics and, by extension, many cosmeceuticals, persistent and notable

differences continue to exist. This analysis highlights the critical importance of a comprehensive comparative understanding of these systems. Such understanding is instrumental for informing future discussions on global regulatory alignment, ultimately enhancing public health outcomes and fostering the effective role of pharmacists in meticulously interpreting and communicating post-marketing safety information to all relevant stakeholders. Acknowledging the limitations of relying solely on publicly available documentation, future research could explore the practical impact of these structural differences on patient outcomes and further investigate optimal strategies for integrating pharmacists into the global safety communication chain.

Student pharmacists' perceptions of using a chatbot as an interactive information tool for residency interview preparation

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Background: Generative artificial intelligence (GenAI) chatbots are increasingly used as digital information tools capable of generating responses, synthesising information, and providing structured feedback. While students may use chatbots to generate answers to interview questions, this approach may limit reflection and authenticity of responses. An alternative approach is to use chatbots as simulated interviewers that allow learners to reflect on their own responses while receiving structured feedback. This model positions artificial intelligence as an interactive information tool that supports reflective learning and professional communication development. This pilot aimed to evaluate student pharmacists' perceptions of using a chatbot as an interactive information tool for mock residency interview preparation and the perceived usefulness of chatbot-generated feedback.

Method: This prospective mixed-methods educational evaluation used a single-arm design. Fourth-year (P4) student pharmacists at the University of Arizona participated in a simulated pharmacy residency mock interview conducted by a generative AI chatbot using a standardized prompt designed to mimic common residency interview questions. Participants responded verbally using speech-to-text dictation to simulate a real interview environment. The chatbot functioned as an interactive information system, prompting responses and generating structured written feedback highlighting strengths and areas for improvement. Participants completed a post-activity questionnaire evaluating perceptions of the feedback, including clarity, specificity, actionability, appropriateness of tone, and usefulness for interview preparation using Likert-scale items. Additional questions assessed overall experience and willingness to use chatbot-based interview preparation in the future. Quantitative responses were analysed using descriptive statistics, and open-ended responses were reviewed to identify common themes regarding helpful aspects of the feedback and suggested improvements.

Results: Ten P4 student pharmacists completed the activity. High levels of agreement (agree/strongly agree) were observed across measures evaluating chatbot-generated feedback. All participants (100%, n=10) reported that the feedback was clear and understandable. Eighty to ninety percent of participants (n=8–9) agreed that the chatbot provided specific and actionable feedback, effectively identified strengths in their responses, and offered useful suggestions for improvement. Overall experience ratings indicated that 80% of participants (n=8) rated the chatbot interview experience as good or excellent. Qualitative responses highlighted reinforcement of structured response strategies (e.g., the STAR method), feedback on storytelling and clarity of responses, and reflection on how answers may be perceived by interviewers as particularly helpful. Suggested improvements included providing example responses, offering program-specific interview scenarios, and linking feedback more directly to individual answers.

Conclusion: Student pharmacists reported positive perceptions of using a chatbot as an interactive information tool for mock residency interview preparation and found chatbot-generated feedback clear and useful. Chatbot-led mock interviews may represent a scalable digital information resource to support professional communication training and interview preparation in pharmacy education, particularly in programmes or regions where access to faculty-led mock interviews may be limited. As this exploratory study was conducted with a small sample of students from a single college of pharmacy in the United States, further research across diverse educational settings is warranted to evaluate the effectiveness of chatbot-assisted interview preparation on student interview performance and confidence.

Characterizing clozapine use in pediatric psychiatry: A retrospective review of clinical practice

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Background: Pediatric patients with schizophrenia and related psychotic disorders often experience severe, treatment-resistant illness associated with chronic impairment and frequent hospitalizations. Fewer than half respond to first- or second-generation antipsychotics. While clozapine is the gold-standard treatment for treatment-resistant schizophrenia in adults, evidence guiding its use in

pediatric populations remains limited. Clozapine is also prescribed off label for aggression, mood instability, and impulse control in youth with autism spectrum disorder (ASD), oppositional defiant disorder (ODD), and other complex behavioural presentations.

Method: A retrospective chart review was conducted. Data were extracted from Med Access Electronic Medical Records, and Sunrise Clinical Manager to capture demographic, clinical, medication, and hospitalization information. Charts were systematically identified, and data extraction was guided by a standardized tool with interrater agreement assessed using Cohen's kappa. Descriptive statistics were used to summarize patient characteristics and clinical outcomes.

Results: Seventy-two patients were identified. The majority of patients were of Indigenous descent (47%), 72% resided in urban locations, and 28% in rural locations. The average age of individuals starting clozapine was 14 years old. The most common diagnoses were psychosis (31%), ODD (30%), ASD (17%), and chronic suicidal ideation (11%). Maintenance clozapine doses ranged from 25 – 500 mg/day.

Conclusion: his study provides real-world evidence regarding clozapine use in pediatric psychiatric practice, supporting evidence-informed care for youth with severe and complex mental illness.

How spaceflight changes medicine exposure: Informing safer medicines use and dosing decisions

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Background: Drug dosing decisions are derived from studies conducted in healthy populations. However, environments that significantly alter human physiology can change drug exposure in clinically meaningful ways. Spaceflight is one such environment. Documented changes include plasma volume contraction, redistribution of blood flow, altered renal perfusion, bone resorption, and circadian disruption. Because in-orbit pharmacokinetic data are limited and sampling opportunities are constrained, a predictive approach is needed to support safe, evidence-based medicines information and dosing decisions, while explicitly quantifying uncertainty.

Purpose: To develop and evaluate an adaptive predictive model capable of simulating drug exposure under spaceflight-relevant physiological states using controlled Earth-based analog data, with the aim of informing safer dosing decisions and medicines use in settings where physiology is altered and direct measurement is limited.

Method: The foundational model uses established whole-body pharmacokinetic structures incorporating organ volumes, tissue partitioning, hepatic intrinsic clearance, renal filtration, and perfusion-limited distribution. Terrestrial parameter priors are derived from validated models previously applied in paediatric, pregnant, obese, and oncology populations. Physiological modifiers are derived from structured space-analog missions that replicate components of spaceflight stress, including confinement, altered fluid distribution, disrupted sleep, and activity-pattern changes. Wearable-derived metrics such as heart rate variability, hydration indices, temperature and activity classification are mapped to cardiac output, organ blood flow fractions, plasma volume estimates, and glomerular filtration rate scalars. Parameter updating uses Bayesian sequential methods, preserving prior knowledge while integrating new physiological observations. The model is implemented with version control and traceable parameter updates so that each recalibration step can be audited and linked to the underlying physiological observations. Adaptive optimisation operates within predefined therapeutic targets and safety boundaries to generate dose adjustments while maintaining uncertainty bounds and clear attribution of exposure changes.

Results: Simulated reductions in effective plasma volume and renal perfusion increase predicted peak concentrations and exposure for renally cleared medicines relative to terrestrial baselines, with the largest effects in scenarios combining dehydration with sustained physiological stress. Activity-state integration modifies tissue perfusion and distribution kinetics, producing time-varying concentrations that depend on intensity and duration of the activity profile. Incorporation of circadian phase produces time-of-day dependent clearance variation consistent with known enzyme rhythmicity, supporting evaluation of dosing-time effects. Model outputs are reported as clinically interpretable exposure metrics, including predicted peak concentration, total systemic exposure, and accumulation risk, alongside uncertainty ranges that can be carried into dose recommendations. A staged validation strategy is applied, beginning with analog environments and progressing toward short-duration spaceflight exposure to test whether predicted physiological drivers explain observed changes in exposure.

Conclusion: An adaptive, explainable predictive model provides a scientifically defensible method for estimating drug exposure under altered physiological states. Although motivated by spaceflight, the methodology has direct application to critically ill patients and diverse populations on Earth, where physiology may change rapidly, baseline assumptions may not hold, and empirical pharmacokinetic data are sparse. By integrating dynamic physiology with precision dosing principles, this work supports safer medicines use, strengthens dose selection, and improves the quality and accountability of medicines information in contexts where direct measurement is not feasible.

Comparative analysis of AI enhancements to rules-based clinical triage chatbot: Convergent mixed-methods study

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Background: Chatbots are increasingly used in health care for symptom checking and care navigation. However, concerns about hallucinations and accuracy limit large language model (LLM) use in clinical settings. This convergent mixed-methods study evaluated three enhancements to an existing rules-based triage chatbot. The purpose is to inform the development of future tools improving patient access and system navigation.

Method: Three artificial intelligence tools (Dialogflow, ChatGPT, and Gemini) were integrated into a rules-based workflow and tested alongside the baseline. Thirteen testers completed 156 vignette-based interactions and 52 Likert-scale evaluations. Quantitative outcomes included accuracy, conversational turns, time to completion, and tester ratings. Qualitative feedback was thematically analyzed.

Results: The baseline rules-based chatbot was most accurate, while LLM-based configurations performed better for multi-concern vignettes. Phrase-based natural language processing struggled with overlapping terminology. Tester perceptions often diverged from measured accuracy.

Conclusion: Rules-based triage remains most reliable, while safe LLM integration requires addressing accuracy, interpretability, and misalignment with user perceptions.

Associations between headache pain relief and impact on functional outcomes or quality of life: A critical review of clinical evidence

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Background: Migraine and tension-type headaches (TTH) are highly prevalent conditions that substantially impair daily functioning, work productivity, and overall quality-of-life (QoL). Contemporary research increasingly emphasises self-reported functional and QoL outcomes to characterise the broader impact of headache management beyond pain intensity and incident frequency. Despite the availability of various pharmacological, non-pharmacological, and self-care interventions, their assessment remains heterogeneous, and no robust reviews have assessed functional and QoL outcomes across headache types. To support patient-centred and accessible care in pharmacy practice, this review synthesised recent studies reporting both headache-related pain outcomes and functional or QoL measures, exploring how headache relief relate to daily functioning and well-being.

Method: A comprehensive PubMed and Embase search identified English language studies (January 2015-February 2026) involving adults (≥18 years) reporting both headache-related pain outcomes alongside functional and QoL measures related to social, cognitive, emotional and sleep benefits. Eligible study designs included randomised trials, observational studies, and systematic reviews. Studies involving pediatric or non-human populations, non–peer-reviewed sources, or those lacking functional or QoL outcomes were excluded. Data were extracted on study design, intervention type, outcome measures, and associations between pain relief and impact on the functional or QoL outcomes. Evidence was synthesised to identify recurring domains, assessment patterns, and gaps.

Results: Of the 1,223 records screened, 314 studies met the inclusion criteria, spanning migraine, TTH, and other headache types. Most studies (85%) focused on migraine, with fewer addressing other headache types. Over two-thirds evaluated preventive interventions and assessed functional and QoL outcomes with validated instruments such as Headache Impact Test-6 (HIT-6), Migraine Disability Assessment (MIDAS), Migraine-Specific QoL Questionnaire (MSQ), EuroQol-5-Dimensions (EQ-5D) and Short-Form (SF) tools. About one-third evaluated acute treatment that relied on simpler categorical assessments of headache pain-related impairment. Across study designs, reductions in headache intensity or incident frequency were consistently associated with improvements in self-reported functional status and QoL. A diverse range of non pharmacological interventions including, acupuncture, dietary modification, yoga, aromatherapy massage, mind–body therapies, nerve blocks, radiofrequency procedures, and neuromodulation reported reductions in headache burden alongside functional or QoL gains, especially for mood followed by cognitive and sleep benefits. Pharmacological treatments, such as acetylsalicylic acid, caffeine and paracetamol combinations, triptans, and NSAIDs demonstrated similar associations between pain relief and functional improvement. Overall, studies indicated that alleviating headache burden enhanced daily functioning, potentially by reducing cognitive strain and improving concentration, and other functional parameters. However, evidence specifically examining non-prescription self-care pharmacological treatment remained limited despite their widespread real-world use.

Conclusion: Across diverse study types and assessment tools, relief in headache-related pain intensity and frequency was generally associated with improved functioning and QoL. Pharmacological and non-pharmacological strategies demonstrated potential to improve self-reported outcomes, but evidence varied across headache types and interventions, with most studies focusing on migraines and preventive strategies. Limited data on TTH and acute self-care pharmacological options highlight an important gap, given their relevance to patients and community pharmacy practice. Strengthening research on functional or QoL impact of accessible self-care approaches could better inform pharmacist counselling, optimise appropriate use, and enhance patient-centred headache management.

Digital therapeutic standardization to promote international practice integration

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Background: Digital therapeutics (DTx) are software-driven interventions intended to prevent, manage, or treat disease through clinically validated mechanisms of action. While adoption of DTx is accelerating worldwide, the absence of globally harmonized definitions, quality attributes, and evidence expectations has created fragmentation across regulatory, reimbursement, and clinical ecosystems. Jurisdictions vary widely in how DTx are defined, evaluated, and adopted into pharmacy practices, creating barriers to international adoption. United States Pharmacopeia (USP) is an independent, scientific nonprofit organization focused on building trust in the supply of safe, quality medicines. As DTx increasingly intersect with pharmaceutical care, a globally informed framework is needed to support consistent quality and therapeutic credibility.

Method: A structured landscape analysis and scoping review approach was used to examine DTx use cases, adoption patterns, and gaps, building on early conceptual framing and stakeholder dialogue. Literature reviews, international analyses, and structured stakeholder engagement were conducted to clarify how quality, evidence, and trust apply when the therapeutic intervention is software. DTx definitions, classification approaches, and evidence evaluation frameworks were systematically reviewed. USP landscape analyses identified approximately 2,800 DTx-relevant publications, including 26 international definitions, 12 commonly used terms, and 34 studies informing categorization approaches. These findings highlighted substantial variability and informed exploratory stakeholder engagement. Qualitative synthesis was used to compare areas of convergence and divergence related to therapeutic intent, clinical validation, regulatory oversight, and integration into healthcare delivery and reimbursement pathways.

Results: The analyses identified substantial global variability in how DTx are defined, labeled, and utilized, with more than two dozen distinct definitions and multiple overlapping terminologies in use. Common elements included software driven therapeutic intent and the need for clinical evidence; however, requirements for validation rigor, regulatory pathways, and reimbursement eligibility differed markedly by jurisdiction. Few frameworks explicitly addressed cultural adaptation, health equity, or lifecycle quality management. This fragmentation creates uncertainty for developers, regulators, payers, and healthcare professionals, particularly in cross border contexts. Multiple DTx topics have been identified as opportunities for global alignment, including definition standardization, labeling, categorization, version control, accessibility, and evaluation frameworks.

Conclusion: Despite rapid global growth, DTx lacks a unified international framework that integrates quality, evidence, regulation, and access considerations. Establishing globally aligned principles facilitates responsible innovation, improved patient trust, and equitable adoption. Findings highlight the need for a multidisciplinary international expert body to advance consensus based standards for DTx within evolving health systems. As an independent standard-setting body, USP can convene diverse stakeholders that produce consensus-driven and scientifically validated standards in a formal, transparent, and globally recognized approach. USP intends to advance this work in collaboration with international stakeholders by convening a DTx Expert Panel consisting of DTx experts across information technology, academia, health systems, and industry to lead the development of DTx standards that provide foundational and supplementary standards for integration into global pharmacy practices.

Advocating for accessible pain relief for older adults in the European Union (EU)

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Background: Pain is a significant public health issue affecting a growing number of older adults across Europe. As populations age, many people spend an increasing proportion of later life managing persistent or recurring pain, which limits mobility, affects mental and physical well-being, and reduces opportunities for social and economic participation. Despite its prevalence, access to effective pain management remains inconsistent, with many older adults facing financial, structural, and informational barriers that restrict their ability to obtain appropriate therapies, management options, and support. Ensuring equitable access to pain management is essential to supporting healthy ageing and upholding the rights and dignity of older people.

In light of this, the study, Advocating for Accessible Pain Relief for Older Adults in the European Union (EU), aimed to examine the person-centered burden of pain in older adults and highlight the importance of accessibility to pain management options in protecting the health, well-being, and rights of older people. This work also aimed to catalyze continued dialogue with stakeholders across sectors towards coordinated efforts that advance more equitable, accessible, and age-responsive pain management.

Method: To inform this work, the study used a two-part data collection approach, guided by strategic oversight from an advisory committee comprising experts in pain, ageing, and health systems. A multinational survey captured the experiences of adults aged 55-95+ living with acute, chronic, or recurring pain across six EU countries. The survey explored the impact of pain on daily activities, mobility, mental health, and reliance on self-care, as well as barriers to accessing treatment and the anticipated consequences of reduced access to pain management options. A roundtable discussion with healthcare professionals, academics, and experts in ageing and pain provided additional context, offering insight into clinical challenges, systemic gaps, and opportunities to improve care.

Results: Taken together, the findings revealed several consistent themes. Pain significantly affects functional ability, quality of life, and participation in social, work, and family roles. Older adults commonly rely on a mix of self-management strategies, informal caregivers, and over-the-counter medications to cope with ongoing symptoms. Across all participating countries, long wait times, limited access to specialists, and financial constraints emerged as major barriers to receiving appropriate care. Gaps in provider training, inconsistent assessment practices, and limited public awareness and education further exacerbate these challenges.

Despite these barriers, the findings also point to important opportunities to strengthen access to pain management for older adults. These include improving patient education and provider training on age-responsive and person-centered pain care; addressing structural and financial barriers through policy and system investment; and advancing interdisciplinary and multi-sectoral approaches that bring together clinical, rehabilitative, psychosocial, and community supports.

Conclusion: With continued collaboration among key stakeholders, these actions can help ensure that pain management is accessible, person-centered, and aligned with the needs and rights of older adults across the EU.

Mobilizing evidence to support a life course approach within National Immunization Technical Advisory Groups

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Background: As populations age, vaccination across the life course is increasingly important to preventing disease, supporting healthy ageing, and strengthening health systems. National Immunization Technical Advisory Groups play a central role in shaping immunization policy, yet limited attention has been given to how these bodies prioritize vaccination for older and at-risk populations. Understanding barriers within NITAG structures and decision-making processes is essential to advancing a life course approach.

Method: Semi-structured interviews were conducted with current and former NITAG members, immunization experts, and civil society representatives across multiple World Health Organization regions. Interviews explored the extent to which a life course approach is reflected in NITAG deliberations, stakeholder engagement, resource allocation, and evidence use. Data were analyzed thematically to identify common challenges and opportunities and to inform a framework for action.

Results: Findings revealed persistent barriers to prioritizing adult immunization within NITAG processes. These included limited expertise in ageing and adult vaccination, insufficient resources and data to support decision-making, and strong dependence on government mandates. In many settings, transparency and mechanisms for civil society engagement were limited, restricting opportunities to integrate lived experience and population-level need. While several countries demonstrated progress through inclusion of ageing expertise and improved governance practices, prioritization of adult immunization remained inconsistent.

Conclusion: This study identified a number of challenges and opportunities to prioritizing a life course approach to vaccination. Amidst the complex global landscape and the many intersecting factors that influence vaccination uptake, there is a strong need to develop advocacy efforts that highlight both the opportunities and challenges in prioritizing a life-course approach within NITAGs, and that engage a range of stakeholders to help influence policy.

Intergrating community and hospital pharmacists into national surveillance systems to combact counterfeit and falsified medicines in low-resource settings: Evidence from Ghana

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Background: Falsified and counterfeit medicines remain a public health challenge in Ghana, where regulatory systems are often constrained. WHO has shown that approximately 1 in 10 medical products in low- and middle-income countries is substandard. These products contribute to treatment failure, increasing morbidity, mortality, and antimicrobial resistance. Even though the FDA's role is to help in drug safety and surveillance, their interventions are often delayed due to under- and late reporting. Pharmacists, as frontline medicine experts, represent an underutilized resource in strengthening surveillance and early detection mechanisms.

Purpose: The aim is to evaluate the impact of integrating community and hospital pharmacists into the national surveillance system on the detection and reporting of counterfeit and falsified medicines in Ghana.

H0: Integrating community and hospital pharmacists into the national surveillance system has no significant effect on the detection and reporting of counterfeit and falsified medicines in Ghana.

H1: Integrating community and hospital pharmacists into the national surveillance system significantly improves the detection and reporting of counterfeit and falsified medicines in Ghana.

Method: This study was quasi-experimental. Six communities were selected in Accra, Ghana, involving 120 pharmacists and MCAs (community and hospital-based). Participants were trained on the identification of counterfeit medicines and were enrolled in a mobile-based reporting system using WhatsApp and SMS (the interventions) to report cases of counterfeit medications. This was done for a period of 6 months. Before this, a counterfeit medicines report was obtained from the Accra district health records department and was used as a baseline. Post-intervention data included the number and types of reports submitted, response times, and confirmed cases validated by the FDA of Ghana. Quantitative data were analysed using descriptive and comparative statistics, while qualitative feedback was collected through structured interviews.

Results: The study showed an increase in the reporting rates from 18 reports at baseline to 126 reports within 6months. This represented a 600% increase. Of the 126 reports submitted, 39 cases (31%) were confirmed as counterfeit or substandard medicines by the FDA Ghana. The average reporting time improved significantly, with pharmacists submitting reports within 48 hours of detection compared to an average of 14 days pre-intervention. Community pharmacists accounted for 65% of total reports, highlighting their accessibility in early detection. Additionally, 82% of participants reported improved confidence in identifying falsified medicines, and 76% indicated willingness to continue participation without financial incentives. Post-intervention results showed a significant increase in reporting rates from 18 to 126 cases ($\chi^2 = 45.6$, $p < 0.001$). The average reporting time reduced significantly from 14 to 2 days ($t = 6.8$, $p < 0.001$).

Conclusion: The study found that integrating pharmacists into the surveillance system significantly increased detection and reporting of counterfeit medicines while reducing reporting delays. The findings imply that leveraging existing human resources with simple digital tools can improve public health outcomes. Future studies should include control groups, longer follow-up periods, and cost-effectiveness analyses to enhance generalizability and support large-scale policy implementation.

Nicotine Use, quit intent, and treatment Gaps in Canada: Insights from a national usage & attitudes survey

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Background: Nearly five million Canadian adults continue to report daily nicotine use across cigarettes and alternative nicotine products (ANPs). Understanding prevalence, intentions, and triggers is essential to design pharmacist-led, quit pathways.

Purpose: To describe (i) adult daily nicotine use by product, (ii) intention to reduce/quit (“dissonance”), (iii) real-world use of nicotine replacement therapy (NRT), and (iv) key quit triggers to inform pharmacy practice.

Method: Analysis of the Canada wave of a multicountry Usage & Attitudes survey (fieldwork Dec 2023–Jan 2024; n=2,490 nicotine users). Usage patterns surveyed included daily & occasional use of cigarettes, e-cigarettes/vapes, heated tobacco as well as nicotine pouches; dissonance levels (happy/reduce/quit); NRT penetration (past 12 months) in adults and tobacco users; NRT use in the last quit attempt; and quit triggers.

Results: Among the adult population in Canada, use prevalence was reported as follows: cigarettes (11.4%), vapes (5.5%), heated tobacco (1.3%), and nicotine pouches (0.9%). Among adults who smoked cigarettes in the past three months, 73% expressed a desire to quit or reduce smoking. Similarly, 68% of recent vape users reported wanting to cut down or quit. In contrast, only 48% of nicotine-pouch users indicated a desire to reduce or quit.

NRT use was approximately 13–15% among tobacco users. 32% of nicotine users attempting to quit have used NRT before. Top triggers to quit were financial concerns (17%), healthcare professional (HCP) recommendation (13%), followed by friends/family intervention (12%) and personal health issues (10%).

Conclusion: In Canada, daily nicotine exposure spans cigarettes and ANPs for which the long-term health effects are unknown1.

Most users wish to reduce or quit, except pouch users, the majority of whom do not. This discrepancy, particularly as pouches are pharmacy-available and may be perceived as low risk, warrants investigation.

The Canadian Task Force (CMAJ 2025) guideline recommends behavioural support plus pharmacotherapy (including NRT) for all adults who smoke and suggests against routine e-cigarette use for cessation2.

Despite frequent quit attempts, NRT use remains low. HCP advice is a primary motivator for quit attempts, highlighting the opportunity for pharmacist-led combination NRT initiation and structured follow-up at the point of care.

Insights from the front line: How Canadian and UK pharmacists view alternatives to smoking and opportunities to strengthen smoking cessation support

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Background: Previous work in 2025 summarized the evidence-based continuum of tobacco and nicotine product risk, showing cigarettes as the highest risk. Alternatives such as heated tobacco products, tobacco pouches, e-cigarettes, and nicotine pouches presented lower, though not risk free, exposure profiles. Nicotine replacement therapy (NRT) was the lowest risk option, with a long-established safety profile.

Purpose: To build on previous findings and gather real world insights from Canadian and United Kingdom (UK) pharmacists regarding:

- perceived relative risks of alternatives to smoking
- barriers that limit pharmacist-led smoking cessation counselling
- concerns about misuse of nicotine products
- ways to strengthen pharmacist-delivered smoking cessation support

Method: A cross-sectional online survey was conducted in February 2026 through Sermo, a global digital community of verified healthcare professionals. Community pharmacists in the UK (n = 200) and Canada (n = 125) completed a structured questionnaire, capturing the goals mentioned above. Responses were summarized descriptively, and all data were anonymized by Sermo.

Results: Perceived risk continuum of alternatives to smoking
• Pharmacists' perspectives on the perceived risk continuum align with established scientific evidence, with NRT remaining as the safest option.

Practice barriers of smoking cessation counselling
• Limited consultation time was the most common barrier in both countries. Quick counseling tools or decision trees and product comparison charts were identified as the most helpful resources for more effective counselling.
• Concerns about misuse of nicotine products were present in both markets but were more pronounced in Canada (43% vs 31%).

Nicotine products of misuse concern

Among those who expressed concern about misuse
• UK pharmacists most often identified vaping products (81%).
• Canadian pharmacists most often identified nicotine pouches (59%), driven by concerns about addiction potential, youth interest, and recreational use rather than smoking cessation use.

Opportunities to strengthen smoking cessation support
• UK pharmacists emphasized the need to increase public awareness and staffing capacity to expand smoking cessation services.
• Canadian pharmacists strongly supported wider access to pharmacist delivered smoking cessation programs, with 91 percent agreeing that robust programs in British Columbia and Quebec should be implemented across the country.

Conclusion: Pharmacists in both countries view NRT as the safest option for smoking cessation and understand that alternative nicotine products have lower risk than cigarettes but can still cause harm. Time limitations are the main barrier to providing smoking cessation counselling, and tools such as a quick counseling guide and a comparison chart were identified as useful for effective counselling. Differences in misuse concerns, particularly around nicotine pouches in Canada, may reflect local regulations that require pharmacist involvement compared with broader access in the UK.

Pharmacists are well positioned to support people seeking safer nicotine options and evidence-based quitting strategies. These findings identify opportunities to strengthen pharmacist-delivered smoking cessation services in both countries.

Effectiveness of interpersonal psychotherapy in managing postpartum depression: A systematic review and meta analysis

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Background: : The postpartum period, extending up to a year after childbirth, involves profound physiological, hormonal, and psychological transitions that can pose serious challenges to maternal well-being. Among the most prevalent and debilitating conditions during this period is postpartum depression (PPD), affecting an estimated 10–20% of new mothers. Characterized by persistent sadness, anxiety, irritability, and fatigue, PPD can significantly hinder a mother's ability to care for herself and her child. Interpersonal Psychotherapy (IPT), a structured, time-limited, evidence-based approach, has been recognized for its effectiveness in treating PPD and is recommended as a first-line treatment by the World Health Organization.

Objectives: This systematic review aims to evaluate the effects of Interpersonal Psychotherapy on managing postpartum depression among affected mothers. It synthesizes existing empirical studies to determine whether IPT promotes a reduction in depressive symptoms. The review also seeks to raise awareness among mothers about the signs and symptoms of PPD and promote timely interventions to reduce its severity and prevent recurrence.

Method: A total of 15 studies published between January 2010 and March 2025 were included. We searched multiple electronic databases, including PubMed/MEDLINE, Web of Science, CINAHL, CENTRAL, PsycINFO, PsycARTICLES, SocIndex, Psychology and Behavioral Sciences Collection, Academic Search Premier, and Embase. Gray literature from reputable health organizations such as the WHO, APA, and others was also reviewed. A combination of Medical Subject Headings (MeSH) and text words in English was used to ensure comprehensive coverage. Eligible studies encompassed randomized controlled trials, non-randomized trials, observational studies, qualitative research, and mixed methods designs. Studies that did not use IPT to manage postpartum depression or were published in languages other than English were excluded. Quality assessment tools included RoB 2.0, ROBINS-I, CASP, NIH tools, and MMAT, with discrepancies resolved through discussion or by a third reviewer. Certainty of evidence was evaluated using GRADE and GRADE-CERQual frameworks.

Results: Fifteen studies were included in the meta-analysis, representing diverse healthcare settings and geographic regions. IPT was delivered in various modalities, including individual, group, and telephone-based formats. Across studies, IPT was associated with significant reductions in depressive symptoms among postpartum women. Pooled effect sizes demonstrated consistent improvements on standardized measures such as the EPDS, CES-D, and SCID. Notable outcomes included a mean difference of -5.9 (95% CI: -7.8 to -3.9) on the CES-D and a reduction in SCID-diagnosed depression (OR = 0.22, 95% CI: 0.10 to 0.46). These findings suggest a moderate to large therapeutic effect of IPT across different populations and delivery methods.

Conclusion: This review provides robust evidence supporting the effectiveness of Interpersonal Psychotherapy in reducing postpartum depressive symptoms. Given its adaptability to various care settings and feasibility of delivery by trained professionals, IPT presents a scalable and accessible intervention for maternal mental health. Broader implementation of IPT could enhance early intervention strategies, improve maternal outcomes, and support family well-being during the critical postpartum period.

Prognostic impact of 5-alpha reductase inhibitors and alpha-blockers in bladder cancer: A systematic review and meta-analysis

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Background: Bladder cancer is a highly prevalent malignant tumor of the urinary tract, with a higher incidence observed in men than in women. In addition, the prevalence of benign prostatic hyperplasia (BPH) increases with age in the male population, and it is commonly treated with 5-alpha reductase inhibitors (5ARIs) and alpha-blockers. Recent studies have suggested that the use of 5ARIs or alpha-blockers may be associated with a reduced incidence of bladder cancer and decreased overall mortality among patients with bladder cancer. However, the relationship between these medications and bladder cancer prognosis remains controversial. Therefore, the aim of this study is to investigate the potential impact of 5ARIs and alpha-blockers on the prognosis of bladder cancer.

Method: PubMed, EMBASE, and the Cochrane Library were systematically searched for relevant studies using the keywords "5α-reductase inhibitors," "finasteride," "dutasteride," "alpha-blockers," "tamsulosin," "doxazosin," "prazosin," "terazosin," and "silodosin," along with corresponding MeSH terms and their synonyms, from database inception to March 1, 2026. Two independent reviewers screened eligible studies and extracted relevant data. Disagreements were resolved through discussion with a third investigator. A meta-analysis was performed to estimate pooled hazard ratios (HRs) with 95% confidence

intervals (CIs) using a random-effects model. Study quality was independently assessed by two investigators using the Newcastle–Ottawa Scale (NOS). Heterogeneity among studies was evaluated using the I^2 statistic. All statistical analyses were conducted using Review Manager version 5.4.1.

Results: This meta-analysis included 15 studies with a total of 717,284 participants to assess the effects of 5ARIs and alpha-blockers on bladder cancer prognosis. Compared with nonusers, patients who used 5ARIs showed an 18% reduction in all-cause mortality among those with bladder cancer (HR = 0.82, 95% CI = 0.68–0.99; p = 0.04). A similar trend was observed for cancer-specific mortality among patients receiving 5ARI therapy, although the association did not reach statistical significance (HR = 0.90, 95% CI = 0.75–1.08; p = 0.27). In contrast, the use of alpha-blockers was associated with a slightly increased risk of all-cause mortality (HR = 1.16, 95% CI = 1.07–1.24; p < 0.05). A similar trend was also observed for cancer-specific mortality among patients receiving alpha-blocker therapy, although this result was not statistically significant (HR = 1.10, 95% CI = 0.95–1.27; p = 0.21).

Conclusion: This study found that the use of 5ARIs may be associated with lower all-cause mortality in patients with bladder cancer. However, the use of alpha-blockers did not appear to improve clinical outcomes in terms of bladder cancer prognosis. In addition, no significant association was observed between the use of 5ARIs or alpha-blockers and cancer-specific mortality in bladder cancer. Further studies, particularly randomized controlled trials, are needed to clarify the potential causal relationship.

Innovating community pharmacy business models: Enhancing patient engagement, health literacy, and financial sustainability

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Background: Community pharmacies are at a critical junction, facing challenges from aging populations, polypharmacy, technological change, systemic crises and economic recession. Beyond dispensing, pharmacies must adopt their business models that actively promote health literacy, patient engagement, preventive care, and e.g. deprescribing, while maintaining financial sustainability and securing the evolving professional role of pharmacists. Effective communication and structured information delivery are essential for empowering patients and improving person's outcomes.

Method: This workshop applies a structured, participatory methodology using the Business Model Canvas, the Fraunhofer Grid, and a SWOT analysis. Participants collaboratively map existing services, identify opportunities for innovation, and design strategies that integrate clinical, preventive, and educational services with sustainable revenue models. The approach emphasizes the development of patient communication strategies that enhance understanding, support shared decision-making, and foster active patient engagement in their care.

Results: Participants develop actionable plans to redesign pharmacy workflows, expand professional responsibilities, and implement services that combine clinical impact with financial viability. Strategies address deprescribing, preventive interventions, and effective patient education, ensuring that health literacy and engagement are core components of service design. Economic sustainability is considered through revenue streams, cost structures, and value-based care models. The workshop also contextualizes pharmacy transformation within broader systemic challenges, including technological adoption and resilience in times of multiple healthcare crises.

Conclusion: Structured, tool-based approaches equip pharmacy teams to innovate business models that are patient-centred, outcome-oriented, affordable, and economically sustainable. By embedding health literacy and patient engagement into redesigned services, pharmacies can strengthen healthcare system resilience, redefine pharmacist roles, and empower patients to take an active role in their care, ensuring long-term viability and impact.

Translating Complexity in Patient-Centred Care: An Explorative Learning Framework to Strengthen Health Literacy and Patient Engagement

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Background: As a key component of patient-centred care, health literacy requires educational approaches that equip future professionals to translate knowledge for meaningful patient understanding. Despite its critical role, it remains

underdeveloped in healthcare curricula, limiting the ability of professionals to effectively engage patients and faciliate informed decision-making.
This contribution introduces a forward-looking conceptual framework that integrates explorative learning and interdisciplinary team teaching to reorient pharmacy education towards impact, lifelong learning, and patient engagement.

Method: The framework is grounded in an explorative, student-centred learning philosophy, combined with interdisciplinary teaching across pharmacy and the intersecting fields of economics, healthcare practice, and global health.
Interactive learning formats such as case-based problens, collaborative projects, and scenario analysis will enable active and interdisciplinary knowledge construction. This approach addresses system-level challenges such as lifecycle management, market dynamics, vaccine development, pandemic governance, healthcare access, and planetary health. Portfolio-based assessment and structured reflection are used to deepen learning and foster critical thinking.
A central feature of the framework is the integration of systems thinking with patient- and caregiver-facing communication. This supports students in translating complex health and healthcare infromation into clear, relatable, patient-centred communication. In this model, explorative learning guides both learners and educators to effectively navigate an increasingly complex and evolving healthcare landscape.

Results: This framework is designed to cultivate lifelong learning and support the development of a strong, future-oriented professional identity. It enables students to interpret complex health system dynamics and translate them into patient-centred care strategies.
It also strengthens awareness of health literacy as a key driver of access and outcomes, while embedding patient engagement as a core component of healthcare education and service delivery. The interdisciplinary design promotes cross-sectoral understanding and encourages students to think beyond disciplinary boundaries.
By integrating scientific, economic, and societal perspectives, the framework supports the development of T-shaped professionals capable of navigating complexity, embracing uncertainty, and contributing meaningfully to evolving healthcare systems.

Conclusion: Explorative learning within interdisciplinary team teaching offers more than an educational innovation, it also offers a strategic framework to align pharmacy education with the demands of modern healthcare. By linking systems thinking with patient-centred practice, it enables future professionals translate knowledge into meaningful action. As a scalable and adaptable model, this framework contributes to advancing health literacy, strengthening patient engagement, and fostering lifelong learning, key prerequisites for improving health outcomes in an avolving world.

Exploring the experiences and needs of children and young people taking complex polypharmacy and the healthcare professionals prescribing for them: Insights from a qualitative study

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Background: Nearly 100,000 children live with a life-limiting condition in the UK; ~40% of this population take ≥5 medicines daily, and ~12% take ≥10, which increases the risk of interactions and adverse drug reactions (ADRs). Polypharmacy in children places significant pressures on families and increases the risk of hospitalisation and inappropriate prescribing. While in hospital, more than 25% of children experience adverse drug reactions, and 1 in 15 children experiences a clinically significant prescribing error. Children are three times more likely to suffer harm due to prescribing errors. Medication errors are the main cause of injury and avoidable harm in health care systems globally. There is limited literature on how children and their families experience polypharmacy and interventions to address its impact on families and healthcare teams. Most of the polypharmacy evidence is derived from studies in older people.

Aim: This study aims to understand the impact of polypharmacy on children and young people and families living with complex conditions and to identify their support needs.

Method: Semi-structured interviews were conducted online with video or audio call, with parents/carers (n=6) of children and young people with complex polypharmacy, and healthcare professional prescribers (n=10), between September- December 2024. The interviews explored families and Healthcare professionals' (HCPs) experiences of complex paediatric polypharmacy, their needs and potential solutions to the challenges they face. The interview data were pseudo-anonymised, transcribed verbatim, managed using a qualitative data management package, QSR NVivo (NVivo - Lumivero), and analysed using thematic analysis. The study has been reviewed and approved by the West Midlands – Black Country Research Ethics Committee (24/WM/0160) and the Faculty of Health and Applied Sciences, University of the West of England University Research Ethics Committee (CHSS.24.07.262).

Results: Interviews revealed five shared themes between families and HCPs including: Communication challenges due to multiple disjointed health records; medicines administration challenges; the time and energy required to manage complex polypharmacy; the impact on families and carers; and their support needs. HCPs interviews identified four further themes including: Managing side effects of medicines; checking for interactions; how parents/ carers

abilities influence their prescribing decisions; and the formal and informal psychological support they provide for families. Specialist pharmacist's support and a complete, up-to-date medicines list for the child have been suggested by families and HCPs as helpful strategies to improve the safety of paediatric polypharmacy and reduce the burden on families and HCPs prescribers.

Conclusion: Complex paediatric polypharmacy may not be avoidable for many families but can be safer and less burdensome. This study identifies systematic communication challenges, a substantial carer burden, and significant time and resources requirements as key drivers of risk and distress. Streamlining communication and care oversight, tailored input from specialist pharmacists, and supporting families with polypharmacy challenges could enhance the safety and wellbeing of children and young people taking multiple medicines and their families. The findings provide the foundation for developing an intervention to identify complex/problematic polypharmacy and guide targeted support within paediatric services.

Oral anti-cancer agents in the community setting: A survey of pharmacists in the greater Accra region

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Background: Given the increasing complexity of oral anti-cancer agents (OAAs) and their integration into outpatient cancer care, optimizing the role of community pharmacists is no longer optional; it is imperative. Understanding pharmacists' perspectives will facilitate collaborative strategies that integrates community pharmacy into the broader cancer care continuum. This can significantly improve OAA management and overall oncology outcomes.

Objective: To evaluate the experiences, knowledge, perceived barriers, and practices of community pharmacists in the Greater Accra Region concerning oral anti-cancer agents.

Method: A case study design was conducted among twenty (20) community pharmacists selected within the Greater Accra Region. Participants were recruited via purposive sampling. Data were gathered using semi-structured, face-to-face interviews. Thematic analysis was employed and substantiated with verbatim quotations from participants.

Results: A total of 20 community pharmacists, predominantly male (60%) and within the 33–37 age group (45%), with a relatively balanced distribution of years of professional practice showing 35.0% for 1–5 years of practice, 30.0% for 6–10 years, another 30.0% for 11–15 years, and 5.0% for more than 15 years of practice. This distribution suggests a fairly balanced mix of early-career and experienced pharmacists. Thematic analysis revealed minimal exposure to oral anticancer agents, with most participants reporting rare encounters and limited practice experience in dispensing OAAs. Significant knowledge and confidence gaps were identified, as only two (2) pharmacists had received oncology-specific continuing professional development, and many relied solely on undergraduate training. Pharmacies lacked standardized dispensing protocols, appropriate storage infrastructure, protective equipment, and formal collaboration with oncologists, resulting in fragmented care and safety concerns. Financial barriers, limited insurance coverage, and cultural stigma surrounding cancer further hindered patient access, adherence, and effective pharmacist–patient engagement in the community setting.

Conclusion: Most community pharmacists had rarely dispensed oral anticancer agents (OAAs), reflecting their limited integration into community practice. Despite financial barriers, cultural stigma, and system limitations, pharmacists demonstrated strong willingness to pursue further training and policy support to enhance their role in oncology care. While community pharmacists in the Greater Accra Region possess the potential to support OAA management, they are currently hindered by the challenges.

USP's standard on the communication of patient medication information

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Background: A patient's understanding of their medication is foundational to health literacy and medication adherence. The absence of clear medication instructions can result in undesirable health outcomes, increased hospitalizations, or a delay in resolution of an illness. Well-developed consumer medication information contributes to improved comprehension of dosing regimens. Medication guides with clear and consistent formatting promote safe and effective use of prescribed medication. When patients receive medication guides that are easy to read and understand, they are more likely to follow dosing instructions correctly and avoid harmful errors.

The United States Pharmacopeia (USP) recently revised a standard that addresses consumer medication information, General Chapter <1265> Prescription Drug Information - Guidelines. The chapter provides insight into formatting, content, and patient considerations when developing medication guides. This poster or presentation will discuss the history of this USP standard, recent revisions to principles

for developing medication guides, information on emerging technologies, and connections to health literacy.

Safety profile of topical Diclofenac Sodium Gel 1%: Clinical, PK, and mechanistic review

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Background: Topical NSAIDs are widely used in the management of arthritis because they provide localized analgesic and anti-inflammatory effects while limiting systemic exposure. Diclofenac sodium gel 1% (DSG) is one of the most extensively studied topical NSAIDs. This review characterises the safety profile of DSG, integrating findings from clinical studies with supporting pharmacokinetic and mechanism of action data.

Method: A literature review was conducted using PUBMED and EMBASE (1985-2025), identifying studies in humans evaluating topical diclofenac sodium gel 1%. Eligible publications included clinical trials, observational studies, meta-analyses, and case reports that reported any form of safety data. Publications involving non-topical routes of administration or other strengths and salts of diclofenac were excluded. Adverse events were summarized descriptively, focusing on events reported more often with topical diclofenac than comparator. Pharmacokinetic and mechanism data was also reviewed to support the interpretation of these safety findings.

Results: Across 21 publications, DSG 1% demonstrated a favourable safety profile, with adverse events generally mild, localized, and often comparable to placebo. Skin AEs were the most common, occurring in approximately 4-15% of patients, primarily pruritus, erythema, dermatitis, and dry skin, although they rarely led to discontinuation. Gastrointestinal events occurred infrequently (typically <1-8%) with rates generally comparable to placebo and consisting mainly of mild dyspepsia or abdominal discomfort. Cardiovascular events were uncommon and rarely treatment related, with only one thromboembolic event judged related in a high-risk patient. Renal and hepatic events were rare (≤1%) and were generally limited to laboratory abnormalities without clinical sequelae. No deaths were attributed to DSG.
In a pharmacokinetic study comparing topical and oral diclofenac forms, systemic exposure with DSG 1% applied for 7 days was substantially lower than with oral diclofenac. At steady state (Day 7), systemic exposure was 5.79% of oral exposure.
This is consistent with its mechanism of action: After topical application, diclofenac penetrates the skin and underlying tissues, forming a local reservoir in the epidermis from which the drug is slowly released, allowing it to reach deeper structures such as the synovium. This enables anti-inflammatory activity directly at the site of application without relying on high systemic exposure.

Conclusion: In this safety data review, topical diclofenac sodium demonstrated a favorable tolerability profile across 21 studies, with adverse events predominantly local and mild in nature. The low systemic exposure observed in PK analyses, together with its well-characterized mechanism, supports the observed safety findings and represents a significant advantage vs oral NSAID formulations in the management of pain conditions.

Topical NSAIDs for pain management in older adults with comorbidities: Insights from osteoarthritis and musculoskeletal pain guidelines and implications for pharmacy practice

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Background: Older adults with osteoarthritis (OA) and acute musculoskeletal injury often have multimorbidity (e.g., cardiovascular disease, gastrointestinal risk, frailty) and polypharmacy that complicate analgesic selection. Topical nonsteroidal anti-inflammatory drugs (NSAIDs) provide effective pain relief with reduced systemic exposure and are recommended in major guidelines. The Osteoarthritis Research Society International (OARSI) 2019 guidelines use a comorbidity-specific framework that places topical NSAIDs as first-line therapy for knee OA across risk phenotypes. The American College of Rheumatology/Arthritis Foundation (ACR/AF) 2019 guidelines similarly endorse topical NSAIDs for knee OA, citing comparable short-term efficacy to oral NSAIDs with a more favorable safety profile. For acute non–low back MSK injury, The American College of Physicians/American Academy of Family Physicians (ACP/AAFP) 2023 guidelines recommend topical NSAIDs (± menthol) as first-line therapy, improving pain, function, symptom relief, and patient satisfaction.

Purpose: This abstract aims to (1) synthesize recommendations for topical NSAIDs across the OARSI 2019 guidelines, the ACR/AF 2019 guidelines and the ACP/AAFP 2023 guidelines; (2) compare OARSI's comorbidity driven treatment stratification with ACR/AF's risk mitigation approach; (3) evaluate the applicability of ACP/AAFP recommendations for acute MSK injuries in the context of geriatric multimorbidity; and (4) identify gaps in guideline relevance for highly complex older adults.

Method: We conducted a comparative narrative analysis of OARSI 2019, ACR/AF 2019, and ACP/AAFP 2023 guidelines,

focusing on efficacy, safety, comorbidity considerations, and implementation in older adults. Recommendations were compared by risk-stratification framework and analgesic hierarchy.

Results: (1) OARSI 2019, ACR/AF 2019, and ACP/AAFP 2023 each recommend topical NSAIDs as first-line therapy for knee OA and/or acute non–low back MSK injury, citing short-term pain and function benefits with lower systemic risk than oral NSAIDs. (2) OARSI uses comorbidity-phenotype stratification that elevates topical NSAIDs for higher-risk profiles (e.g., cardiovascular disease, GI risk, frailty, polypharmacy), whereas ACR/AF prioritizes topical therapy primarily to minimize systemic exposure. (3) ACP/AAFP aligns with geriatric safety goals but offers limited guidance on dosing, duration, and monitoring in older adults with multimorbidity and drug interactions. (4) Gaps include recommendations for highly complex patients (e.g., multiple interacting comorbidities, advanced frailty, anticoagulant/antiplatelet therapy) and pharmacy-facing implementation (product selection, counseling, adherence, escalation).

Conclusion: Across OA and acute MSK injury guidelines, topical NSAIDs are consistently recommended as first-line therapy, supporting their central role in multimorbid older adults. OARSI's comorbidity-phenotype stratification and ACR/AF's risk-mitigation approach both favor topical therapy, while ACP/AAFP guidance for acute injury requires geriatric-specific detail on dosing, duration, and monitoring. Future work should address recommendations for highly complex patients and pharmacy-led implementation (selection, counseling, adherence,

Construction and application of intelligent medication knowledge system driven by multi-source data fusion and intelligent algorithms

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Background: The growing diversity of pharmaceutical products available on the market has created significant challenges in medication management: patients often struggle to access comprehensive drug information, healthcare professionals face inefficiencies in medication-related inquiries, and healthcare institutions lack standardized, quantifiable criteria for new drug selection. Information technologies such as big data and artificial intelligence (AI) offer a promising pathway to address these issues, making the development of an integrated, full-chain intelligent medication system an urgent priority in the field of pharmacy. Therefore, this study aims to design and implement a multidisciplinary, full-chain intelligent medication solution. The objectives are to advance the intellectualization of medication services, enhance medication safety, deliver comprehensive pharmaceutical services across all relevant scenarios, and ultimately contribute to the establishment of a robust intelligent medication ecosystem.

Method: Guided by a multidisciplinary team—led by pharmacists and comprising data engineers, information engineers, clinical physicians, and bioanalysts—drug information was standardized, cleaned, and integrated using natural language processing (NLP) and artificial intelligence (AI) technologies, drawing on authoritative databases and publicly available drug-related data. This process resulted in a unified medication knowledge system. Subsequently, three corresponding products were developed to provide end-to-end decision support.

Results: A comprehensive medication knowledge base containing over 10,000 drug entries was successfully established. Two core applications — the Patient Medication Assistant and the Clinical Medication Assistant — along with a Drug Selection and Evaluation System were developed and implemented. Together, they form a closed-loop, full-scenario intelligent medication service system. The Patient Medication Assistant provides automated medication guidance and risk warnings to patients. The Clinical Medication Assistant supports healthcare professionals with rapid drug information inquiry and clinical decision-making. The Drug Selection and Evaluation System enables objective assessment for new drug selection and off-label use management The solution demonstrates strong technical versatility and cross-institutional transferability, offering customizable and replicable intelligent medication frameworks for healthcare institutions at various levels. This research led to the establishment of two innovation centers, received a 200,000-yuan upgrade award, secured multiple national and provincial honors, produced over 10 publications, and obtained 8 funded projects.

Conclusion: The intelligent medication system developed in this study shows promise in improving medication safety and optimizing decision-making efficiency in preliminary clinical applications. Its methodology and technical architecture possess cross-institutional and cross-regional scalability, providing a referential paradigm for the broader development of intelligent medication systems.

The quality of artificial intelligence-powered chatbots on oral anticancer drug information

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Background: The rising use of oral anticancer drugs (OADs) offers greater convenience to cancer patients compared to intravenous chemotherapy but also introduces new challenges such as maintaining adherence and managing side effects. Consequently, patients have higher demands for comprehensive drug information. Intensified clinical pharmacological or pharmaceutical care programs can help cancer patients undergoing OAT treatment meeting this higher demand, but may not always be available in routine clinical care, especially in resource-poor settings. Recent advances in generative artificial intelligence (AI) could address patients' higher information needs. However, rigorous evaluation is required prior to integration into routine clinical care. To date, studies have primarily focused on using AI-powered chatbots to support clinicians, leaving a research gap regarding the patient perspective, particularly in the context of OAD treatment.

Purpose: The objective of this study was to assess the completeness of relevant information, accuracy, and readability of AI-powered chatbot answers given to patient questions regarding OAD treatment information.

Method: Microsoft's Copilot and Google's Gemini, the two leading AI-powered chatbots integrated into search engines, were analysed in this study. A team of healthcare professionals with expertise in clinical pharmacology assessed the quality of chatbot answers to four frequently asked patient questions concerning 20 OADs, including ten different pharmacological drug classes with ten commonly prescribed and ten recently approved drugs. Patient questions referred to precautions for use, drug storage, side effects, and drug/ food interactions. Chatbot answers were generated in June 2024, with each query issued three times to capture variability. Completeness of relevant information and accuracy were assessed against standardized OAD fact sheets used in routine clinical care. Readability was estimated using the Flesch reading ease score (scale 0-100).

Results: Overall median completeness of relevant information of chatbot answers was 61.1 % (interquartile range [IQR], 35.3-78.7 %) for Copilot and 73.8 % (IQR, 50.0-100.0 %) for Gemini. By contrast, accuracy of chatbot answers was consistently high, with an overall median accuracy of 100.0 % (IQR, 83.3-100.0 %) for Copilot and 100.0 % (IQR, 98.5-100.0 %) for Gemini. Thereby, not a single one of Copilot's or Gemini's answers in their entirety showed an accuracy of 0.0 %. Both chatbots' answer quality did not differ substantially between commonly prescribed and recently approved OADs. Readability was low, with mean Flesch reading ease scores of 38.8 for Copilot and 50.9 for Gemini, indicating necessitated reading levels of college and 10th to 12th grade, respectively.

Conclusion: Modern AI-powered chatbots generated overall accurate answers to patient questions on OAD treatment information but demonstrated only moderate completeness and low readability. Thus, their current ability in addressing cancer patients' high demand for information on OADs could be limited in practice. However, the rapid development in generative AI may resolve these limitations soon.

The rise of social media fitness influencers and misuse of medicines: A public health crisis?

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Background: The rapid expansion of social media–driven fitness culture has contributed to growing misuse of image and performance enhancing drugs (IPEDs) in the UK. Influencers frequently promote unverified information, normalising IPED use, distorting risk perception and fuelling a widening public health issue through shaping public perceptions around appearance, performance, and health. Anabolic steroids remain the most widely used IPEDs, while emerging misuse of substances such as GLP 1 receptor agonists and readily accessible selective androgen receptor modulators (SARMs) reflects a shifting and increasingly complex public health landscape. The resulting rise in preventable harms underscores the need for pharmacist led public health interventions.

Aim: This presentation aims to explore how social media narratives drive IPED misuse, outlining associated clinical risks, and highlighting the essential role of pharmacists in harm reduction, early intervention, and public health advocacy. It also aims to provide healthcare professionals with practical strategies to counter misinformation and support at risk individuals.

Method: This work shares evidence on patterns of IPED use, emerging harms reported in practice, and behavioural influences stemming from online fitness communities. It examines common IPED categories - including anabolic steroids, SARMs, diuretics, laxatives, and GLP 1 agonists - with a particular focus on steroid related harms due to their prevalence and interface with community pharmacy needle exchange services. We also draw on qualitative evidence demonstrating low disclosure rates to healthcare professionals, highlighting barriers to engagement.

Results: Analysis indicates that social media fitness influencers significantly affect public perception of IPED safety and efficacy, contributing to increased normalisation and reduced trust in healthcare professionals. Pharmacists may encounter steroid related harms, including cardiometabolic risk, endocrine dysfunction, and injection related complications, however many healthcare practitioners remain unfamiliar with this clinical area in practice. Evidence also reveals that many IPED users perceive online communities and underground sources as more trustworthy than clinicians, limiting opportunities for intervention. Successful harm reduction approaches employ non judgemental communication, communication of accurate risk information, and referral to local support services.

Conclusion: IPED misuse driven by social media influence represents a growing public health crisis requiring action. Strengthening education, improving service visibility, and fostering trust are critical to the implementation of harm reduction strategies in IPED misuse. Further learning resources and professional development opportunities - such as sports pharmacy training and specialist networks - can equip practitioners to meet this evolving challenge. This presentation represents a call to action for pharmacists - as uniquely accessible and positioned healthcare professionals - to respond through harm reduction, needle exchange support, risk communication, and engagement with individuals who may not access traditional healthcare pathways.

Empowering pharmacists to promote antimicrobial resistance literacy among children and older adults

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Background: Antimicrobial resistance (AMR) remains a growing global public health threat, requiring integrated action through a One Health approach. The International Pharmaceutical Federation (FIP) highlights One Health as a central cornerstone in combating AMR, emphasising that mitigation efforts must consider antimicrobial use across humans, animals and the environment. Promoting health literacy among vulnerable populations, such as children and older adults, is therefore essential.

In this context, the South and Autonomous Regions Branch (SARB) of the Portuguese Pharmaceutical Society developed the Healthy Generation Project, an established initiative aimed at promoting health literacy across different population groups. As part of this ongoing programme, a new training module on "Antimicrobial Resistance" was developed to equip pharmacists with tools to deliver tailored educational interventions within their communities.

Purpose: To describe the development and implementation of an antimicrobial resistance training module integrated within an existing health literacy programme, aimed at supporting pharmacists in promoting responsible antibiotic use among children and older adults.

Method: A training needs assessment was conducted with pharmacists to identify gaps in communicating AMR-related concepts to the target populations. Based on this assessment, educational materials were developed and adapted to the literacy levels of children and older adults, incorporating key messages on appropriate antibiotic use, prevention of AMR and health promoting behaviours.
The training module was made available through an online continuing education platform as part of the Healthy Generation Project. Upon completion, pharmacists are equipped to deliver educational sessions—either in person or through community-based activities—within the framework of this programme.

Results: The "Antimicrobial Resistance" training module was launched in November 2025 and is currently available to pharmacists as part of the Healthy Generation Project portfolio of educational resources. Evaluation of the initiative will include indicators such as number of pharmacists enrolled, the number of community-based sessions delivered, and the number of children and older adults reached.

Conclusion: The integration of an antimicrobial resistance module within an established health literacy programme supports the role of pharmacists in delivering community-based health education aligned with the One Health approach endorsed by FIP. Embedding priority public health topics within structured, pharmacist-led initiatives provides a relevant framework to strengthen health literacy and promote responsible antimicrobial use. Ongoing monitoring will support evaluation of the programme's reach and inform future developments.
Healthy Generation Project demonstrates the pharmacist's potential as a community leader in health education and AMR mitigation, aligned with the One Health approach endorsed by FIP. The creation of a structured, needs based training course for vulnerable groups represents a valuable tool for disseminating key preventive messages and strengthening health literacy. Ongoing monitoring of the defined indicators will support evaluation of the model's effectiveness and inform future educational strategies aimed at reducing antimicrobial resistance.

FarmaIA: Where artificial intelligence meets pharmacy and patient care

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Background:

Introduction: Community pharmacists require rapid, reliable access to trustworthy medicines information to support safe dispensing and therapeutic follow-up. FarmaIA was designed to harness the transformative potential of artificial intelligence while safeguarding the rigour, transparency and accountability required in pharmacy practice.

Method: FarmaIA is a scalable AI platform for community pharmacy, powered by large language models with retrieval-augmented generation. Its first specialised assistant retrieves information exclusively from official public medicines sources, including Summaries of Product Characteristics, package leaflets and correlated medicines data. The system operates within a controlled environment, provides source-linked answers, and is designed to withhold responses when supported information is unavailable. To promote and facilitate sustained use, access to FarmaIA has been integrated into the Pharmacy Information System that supports dispensing and patient care workflows.

Results: FarmaIA enables faster, more contextualised access to medicines information relevant to dispensing and patient care. Its unique selling point is the combination of natural-language interaction with a restricted, official knowledge base, allowing pharmacists to obtain clinically usable answers without relying on open-web generative tools. Expected benefits include greater professional autonomy, improved efficiency, and stronger support for clinical intervention, particularly in dose calculation, identification of interactions and contraindications, and counselling for higher-risk groups such as older people, pregnant women and patients receiving multiple medicines.

Conclusion: FarmaIA represents a strategic and responsible approach to integrating AI into community pharmacy. By combining usability with verified content, traceability and clear governance principles, it supports pharmacists in optimising the safety and effectiveness of medicine use, while establishing a trustworthy foundation for future AI-enabled services in pharmacy practice.

Developing and Implementing the DECYDE youth substance use education strategy using the knowledge-to-action framework

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Background: Youth substance use is a global public health concern. Schools play an important role in helping youth develop the knowledge and decision-making skills needed to make safe and informed choices. To help address the gap in substance use education, a pharmacy-led interdisciplinary team at Memorial University in Canada developed the Drug Education Centred on Youth Decision Empowerment (DECYDE) strategy, a comprehensive, youth-centred approach to substance use prevention and harm reduction. Guided by scientific evidence and trauma-informed principles, DECYDE aims to strengthen protective factors, reduce risk factors, and support youth well-being across the spectrum of substance use. The Knowledge-to-Action (KTA) framework guided the development and piloting of DECYDE, providing a structured process to identify local needs, adapt resources for school and community contexts, and support implementation.

Purpose: The purpose of this research was to describe the development, piloting, and implementation of DECYDE using the KTA Framework to translate evidence-based substance use education into school and community settings.

Method: The KTA Framework guided the development and implementation of DECYDE across four phases. Phase 1: Identifying the problem included youth focus groups, an educator survey, and scoping reviews to understand current gaps in substance use education. Phase 2: Designing the DECYDE strategy involved an iterative development process with extensive community engagement, including partnerships with community organizations, youth, people with lived/living experiences, and educators. Phase 3: Piloting DECYDE involved teachers using lesson plans in classrooms to gather feedback through interviews, reflective journals, and surveys, which were used to refine the resources. Phase 4: Full implementation included French-language translation, broader school implementation, and evaluation using the Reach, Effectiveness, Adoption, Implementation, and Maintenance (RE-AIM) framework.

Results: In Phase 1, youth identified the need for accessible, harm reduction–focused substance use education. Educators highlighted the need for appropriate curriculum materials, harm reduction approaches, and educator training. Scoping reviews confirmed a lack of evidence-based harm reduction education resources for youth. During Phase 2, DECYDE was developed and refined through community consultations and aligned with jurisdictional health curriculum outcomes. For Phase 3, a Steering Committee provided strategic guidance for the pilot. DECYDE was piloted in urban and rural schools across varied classroom settings. Educators reported comfort

using DECYDE and emphasized the importance of using non-judgmental approaches and supporting healthy coping skills. In preparation for full implementation in Phase 4, materials have been translated into French, educator professional learning is ongoing, and DECYDE has been incorporated within the jurisdiction as a curriculum-aligned resource. An evaluation using the RE-AIM framework will assess reach, impact, and scalability.

Conclusion: DECYDE is a pharmacy-led, trauma-informed, harm reduction approach to substance use education that addresses an important public health need. The KTA framework provided a structured approach to identify the problem, develop, pilot, and implement the DECYDE strategy. This process supported an evidence-informed and iterative approach that responded to the needs of youth, educators, and community partners. The approach may also be useful for others developing substance use education initiatives focused on primary prevention and harm reduction.

Expanding patient access to medications through Drug Classification

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In the complex landscape of pharmaceuticals, understanding standardized classification systems that facilitate medicines access is important for healthcare professionals, researchers, and patients. Use of standardized drug classification systems plays a critical role in supporting patient access to essential drug therapies. The United States Pharmacopeia (USP) has been supporting drug classification since 2003, when the Medicare Model Guidelines (MMG) classification was created. Then in 2017, more than a decade later, USP introduced the USP Drug Classification (USP DC). Both tools were designed to provide a clinically meaningful, therapeutically relevant classification structure for organizing medicines so that formularies reflect the full range of treatment options patients may need.

Developed by the Healthcare Safety, Quality & Nomenclature Expert Committee (HSQN EC), USP's MMG and USP DC play a central role in promoting patient access and supporting medication related decision-making. Originally created to help the Centers for Medicare & Medicaid Services (CMS) implement Medicare Part D, the MMG has become a foundational tool for formulary design. The USP DC extends this framework outside of Medicare Part D, offering a transparent, clinically grounded system for nonacute and outpatient care, including drugs used in community pharmacies, specialty pharmacies, skilled nursing facilities, and infusion centers.

Both classification systems reflect USP's commitment to public health and transparency, incorporating stakeholder engagement through public comment periods. This presentation will outline the history and purpose of the USP DC and MMG and highlight how healthcare and government organizations rely on them to support patient access through informed, evidence-based medication decisions.

Developing person-specific behavioral segments (Archetypes) for antibiotic use messaging: A qualitative methods development project (Works-in-Progress)

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Background: Antimicrobial resistance (AMR) is a global health threat driven by multiple forms of antibiotic misuse in communities: self-medication, incomplete courses, sharing medications, purchasing without prescription, and veterinary misuse. Public health campaigns often use generic messaging that fails to resonate because they target behaviours in isolation rather than the people who make these decisions across different situations. UNICEF's Social and Behaviour Change approach is guided by a Socio-Ecological Model, which conceptualises behaviour as operating on five interconnected levels: individuals; family and peer networks; communities; organisations; and policy environments. This study adapts that model by developing a replicable qualitative method to understand how drivers across these levels shape antibiotic-related decisions. The primary objective is to develop and document a method for manually constructing person-specific behavioural segments (archetypes) based on in-depth community data. The secondary aim is to explore how messages tailored to these segments are perceived by community members.

Method: This qualitative methods development project is being conducted in an Accra township. The research has three phases. First, in-depth interviews with theoretical sampling: the team is conducting extended semi-structured interviews exploring the full range of a person's antibiotic-related experiences; how they manage their own illnesses, their children's illnesses, what they do with leftover medications, whether they share antibiotics, and any experiences with animal antibiotics. Sampling is iterative and driven by emerging concepts to ensure segments are built on a deep understanding of variation. Second, structured qualitative analysis: interviews are audio-recorded, transcribed, and analysed thematically. Analysis is guided by the Socio-Ecological Model as a sensitising framework. All analytical decisions are documented to ensure auditability. Data collection continues until thematic saturation is reached. Third, message perception: once segments are identified, simple messages are drafted for each, addressing relevant drivers. These, along with a standard poster, are shown to 20 community members in brief follow-up interviews to explore

whether people recognise themselves in "their" message and whether messages intended for other segments are rejected. The team mitigates biases through neutral questioning, built-in "test" messages, and independent interviewing.

Results: This project is in progress. Expected outcomes include: a documented codebook of behavioural drivers organised by levels of the Socio-Ecological Model; a small set of empirically-grounded, person-specific behavioural segments defined by cross-cutting drivers(e.g, "social-norm followers" shaped by family and community influences); and preliminary qualitative feedback on how community members perceive segment-tailored versus generic messages.

Conclusion: This work-in-progress contributes a replicable qualitative approach for developing person-specific behavioural segments as a foundation for more relevant health messaging. The method aims to capture the multi-level drivers that generic, behaviour-specific campaigns miss. The research team acknowledges that segmentation involves simplification; it is a practical tool for message design, not a complete portrait of individuals. The approach prioritises transparency and active documentation of variation and outliers. Limitations include the single-site, small-sample design, meaning segments are specific to this community. Future directions include refining the method, testing it in other settings, and exploring how these qualitatively-derived segments might inform larger-scale message design.

Development of an educational booklet on risperidone use for patients with autism spectrum disorder: An experience report

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Background: Autism spectrum disorder (ASD) is a neurodevelopmental condition characterised by impairments in social interaction and communication, accompanied by repetitive or stereotyped patterns of behaviour. Although no pharmacotherapy addresses the core characteristics of ASD, medicinal treatment may be indicated for associated symptoms such as irritability, agitation, aggressive behaviour, anxiety, attention-deficit manifestations, and depressive symptoms. Among the medicines available, risperidone is an atypical antipsychotic commonly prescribed to manage irritability and aggression in individuals with ASD. Its use, however, requires systematic monitoring due to the risk of adverse reactions, including weight gain and hyperprolactinaemia. Ensuring that patients and caregivers have access to clear, reliable and comprehensible information is therefore essential to support safe medication use, adherence, and shared decision-making. Educational technologies, such as printed booklets, can strengthen understanding of pharmacotherapy, extend counselling benefits beyond clinical consultations, and empower families

Method: This descriptive study presents an experience report outlining the development and dissemination of an educational technology in the form of a patient booklet. The booklet was created as one of the outputs of a Master's research project in Pharmaceutical Care. The work was carried out by a postgraduate student, under the supervision of two specialists, and approved by a Research Ethics Committee (CAAE 93041125.2.0000.8267). The development process followed sequential phases. First, relevant content was selected through a literature review based on professional package leaflets and full-text, open-access publications available in Portuguese. Second, the scientific content was rewritten using non-technical, accessible language to ensure readability for patients and caregivers with diverse levels of health literacy. Third, the material was organised into thematic sections addressing: indication for risperidone use; proper storage; administration instructions; guidance on missed doses; and frequent adverse reactions. Fourth, the booklet design was produced using the Canva Design platform, incorporating illustrations and user-friendly layouts to support comprehension. Finally, the printed booklet was made available in a pharmaceutical consultation setting as a complementary tool during patient follow-up.

Results: The structured development approach resulted in a clear, accessible and visually engaging booklet tailored to the needs of patients with ASD and their caregivers. The thematic organisation facilitated understanding of treatment objectives, correct medicine handling, and recognition of possible adverse effects. The use of simple language and illustrative elements enhanced the usability of the material. When implemented in the consultation environment, the booklet was positively received by caregivers, who reported that it served as a reliable, permanent source of guidance during daily medication routines. Pharmacists observed improved engagement during counselling sessions and increased patient and caregiver confidence regarding the safe use of risperidone.

Conclusion: The educational booklet proved to be a valuable tool to support pharmaceutical care for individuals with ASD treated with risperidone. By providing clear, accurate and accessible information, it strengthened communication between healthcare professionals and families, promoted informed decision-making, and facilitated safer and more effective pharmacotherapy. This experience reinforces the importance of pharmacist-led educational technologies in enhancing patient empowerment and improving therapeutic outcomes.

Implementation of AI generated Inter-RAI assessment summaries made easy – use of implementation strategy mapping to produce an adaptable evidence imformed implementation plan.

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Background: Approximately 30–40% of patients do not receive care aligned with current evidence and 20–25% of care may be unnecessary or harmful. Implementation strategy mapping is an evidence-informed, structured approach to closing the evidence-to-practice gap.. Systematically mapping known barriers to evidence-informed implementation strategies can accelerate the uptake of innovations into routine care. This work uses a care of older person project involving artificial intelligence (AI)–generated interRAI assessment summaries as an exemplar to demonstrate how mapping can support pharmacists and wider teams to implement complex interventions more effectively.

The objectives were to:

-apply the Consolidated Framework for Implementation Research (CFIR) and the CFIR–ERIC mapping tool to identify and prioritise implementation strategies that address AI-related barriers (trust, accuracy, security, and personal oversight) in the interRAI context;
-use the Proctor Implementation Strategy Specification Framework to refine and structure these strategies; and
-generate a near-ready, context-specific implementation plan for integrating AI-supported interRAI summaries into care of older people services.

Method: A case study design was used in collaboration with an interRAI researcher and Director from Auckland University's Centre for Co-Created Ageing Research (CCREATE-AGE). Barriers identified in prior work on clinician and whānau (family) views of AI-generated interRAI summaries (including "not knowing enough about AI", trust, accuracy, security, and personal oversight) were mapped to CFIR constructs. The CFIR–ERIC online tool was then used to identify evidence informed implementation strategies for each construct. Strategies were thematically analysed, prioritised, and refined using Proctor's seven specification domains (actor, action, target, temporality, dose, outcomes, justification), and synthesised—using an AI analytic tool—into an integrated implementation blueprint aligned by temporality, actor, and action.

Results: Mapping showed that strategies targeting the cross-cutting barrier "not knowing enough about AI" addressed 29 of 39 CFIR labels across all four AI-related barriers, indicating that improved knowledge and understanding could shift multiple determinants simultaneously. Residual labels (relative advantage, partnerships and connections, tension for change, innovation design, compatibility, structural characteristics, available resources) formed a structural–relational cluster spanning all four barriers, highlighting the need for additional network- and organisation-focused strategies. Strategies such as building coalitions, creating learning collaboratives, conducting local needs assessments, identifying champions, and visiting other sites were combined into a coherent implementation plan specifying who needed to do what, when, and with whom to support trusted, safe, and sustainable use of AI-generated interRAI summaries in older person care. The process produced a practical, evidence-informed blueprint that is readily adaptable to other pharmacist-led and interdisciplinary implementation efforts.

Conclusion: Implementation strategy mapping offers a robust, transferable method for linking empirically derived barriers to evidence-informed strategies, reducing subjectivity in strategy selection, and enhancing transparency for policymakers, clinicians, and patients. In the CCREATE-AGE interRAI–AI exemplar, the approach delivered a structured implementation plan that strengthens trust, supports system-wide alignment, and improves prospects for adoption and sustainability of complex digital innovations in older person care. This method has strong potential to support pharmacy-led implementation and policy initiatives across diverse health systems, particularly where ageing populations and digital tools intersect.

Topical use of lavender and helichrysum essential oils: clinical observation of anti-inflammatory and anti-aging effects

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Background: Essential oils are widely used in dermatology and cosmetic science because they contain natural bioactive compounds with therapeutic properties. Among the most valued are lavender essential oil and immortelle (helichrysum) essential oil, known for their anti-inflammatory, antibacterial, and anti-aging effects on the skin. These essential oils are often included in semi-solid topical preparations such as creams and ointments, which allow better absorption through the skin and prolonged contact with the affected area. Their use is associated with skin soothing, reduction of irritation, prevention of bacterial growth, and stimulation of skin regeneration.

Method: This study was based on the application of semi-solid preparations containing lavender essential oil and

immortelle essential oil on a group of 100 patients with various skin conditions, including mild inflammation, acne, dry skin, and early signs of aging. The preparations were formulated as creams and ointments with properly diluted essential oils to ensure safe topical use. Patients used the preparations daily for a period of four weeks. Skin condition was monitored during the treatment through visual examination, patient feedback, and evaluation of parameters such as redness, presence of bacteria-related changes, skin hydration, elasticity, and appearance of fine wrinkles.

Results: After four weeks of use, most patients showed positive effects on the skin. Anti-inflammatory action was observed through reduced redness, swelling, and irritation. Antibacterial effects were noticeable in patients with acne and minor skin infections, where the number of lesions decreased. In addition, improved skin hydration and elasticity were recorded, especially in patients with dry and mature skin. The presence of immortelle essential oil contributed to better skin regeneration and reduction in the appearance of fine lines, showing anti-aging effects. Out of 100 patients, the majority reported visible improvement without significant side effects, while only a small number experienced mild and temporary skin sensitivity.

Conclusion: The use of semi-solid topical preparations containing lavender and immortelle essential oils showed positive results in patients with different skin conditions. Their anti-inflammatory, antibacterial, and anti-aging properties contributed to improved skin health, better hydration, and enhanced regeneration. When properly diluted and formulated, essential oils can be safely used in dermatological and cosmetic preparations and may provide beneficial effects for a wide range of skin problems.

Medication non-adherence among migraine patients in Lebanon: A multidimensional analysis using the LMAS-14

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Background: Sustaining long-term medication use is among the greatest challenges in chronic disease management, and Lebanon's compounded humanitarian, economic, and healthcare crises have made it considerably harder. Yet adherence patterns among patients in this crisis-affected setting remain uncharacterised. This study aimed to measure medication adherence levels and identify dominant dimensions of non-adherence among Lebanese migraine patients using the Lebanese Medication Adherence Scale (LMAS-14).

Method: A cross-sectional study was conducted among 614 migraine patients on prophylactic and/or acute treatment for ≥6 months from across all eight Lebanese governorates. The LMAS-14 assessed four subscales: occupational, psychological, annoyance, and economic. Non-adherence was defined as a total score <31.5 (75% of maximum of 42). Associations with sociodemographic predictors were assessed using chi-square tests and independent t-tests (α=0.05).

Results: Mean LMAS-14 total score was 34.1/42 (95%CI 33.5–34.8); 31.3% of patients (n=192, 95%CI 27.6%–34.9%) were classified as non-adherent. The occupational subscale yielded the lowest adherence (mean 11.5/15, 95%CI 11.2–11.8; 76.5% of maximum), with indication that busy schedules and travel were the primary adherence barriers. Economic non-adherence was substantial: 24.1% (95%CI 20.7%–27.5%) reported stopping medication when not covered by insurance and 29.0% (95%CI 25.4%–32.6%) when considering it too expensive, compounded by 39.4% of patients having no health insurance. Patients experiencing side effects were

significantly more non-adherent than those without (34.0% vs 21.5%; p=0.008), with side effect severity further predicting non-adherence (p=0.0001). Follow-up was infrequent, with 56.4% (95%CI 52.4%–60.3%) of patients rarely or never consulting their healthcare provider. Of important note, younger patients were significantly more non-adherent (mean age 31.5 vs 34.2 years; p=0.015).

Conclusion: Non-adherence among Lebanese migraine patients is multidimensional, associated with occupational barriers, economic pressures, and medication side effects, each independently contributing to adherence failure in this crisis-affected population. The critically low follow-up rate signals a systemic gap directly actionable by pharmacists. These findings call for crisis-responsive, pharmacy-led adherence support programmes that address behavioural, financial, and tolerability barriers in resource-constrained settings.

Área do Cidadão: Contribution of a medicines information centre to the promotion of health literacy

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Background: Medicines Information Centres embody the core responsibility of pharmacists to provide accurate, evidence based information. Several centres have implemented educational activities targeting patients and the general public, namely through digital patforms. Digital health education initiatives may exert a positive influence on population health outcomes. Within this context, the inadequate levels of digital health literacy among the Portuguese population constitute both a challenge and a strategic opportunity for professional organisations to intervene.

The Medicines Information Centre (CIM) of the Portuguese Pharmaceutical Society (PPS) developed an initiative, Área do Cidadão, designed to strengthen citizens' health literacy by providing an accessible and rigorously validated online informational resource.

Our purpose is to describe the implementation of the Área do Cidadão project and assess its reach using indicators that characterise the initiative's digital visibility.

Method: Description of the project's development, the methodology employed for the production and internal review of the informational materials, and the number of materials produced. Their reach was assessed using indicators such as the number of views on the website between January 2024 and February 2026, on social media between January 2025 and February 2026, and their positioning in search engines.

Results: The implementation of the Área do Cidadão project included the creation of a thematic section on the institutional website, structured into three subsections: General Concepts about Medicines, Responsible Use of Medicines, and Health Promotion. The texts were developed in a structured manner, based on appropriate bibliographic sources and internal review, to ensure simple and accessible language that remained scientifically accurate. From August 2023 to February 2026, a total of 64 informational materials were developed, published and disseminated through social media channels.
Between January 2024 and February 2026, the content hosted on the website recorded 272,645 views. Regarding the PPS's social media channels (LinkedIn, Instagram and Facebook), posts published between January 2025 and February 2026 reached 372,813 views, demonstrating substantial dissemination and engagement across digital platforms.
The analysis of search-engine performance showed that 75% of the content ranked within the top three results presented by Google®, indicating high organic visibility and effective optimisation for search engines.
At the end of 2025, a dedicated subsection was created to aggregate links to Patient Association websites, bringing together 27 associations as of February 2026, thereby enhancing the informational value and practical usefulness of the platform.
The project was also recently disseminated to all Portuguese municipalities. Following this outreach effort, 14% of municipalities promoted the initiative through their communication channels, and several expressed interest in developing joint activities to promote health literacy related to medicines.

Conclusion: Digital health-literacy promotion activities require that the information provided be accessible, credible, and applicable to citizens' daily lives. The results obtained show that the Área do Cidadão may function as a reliable and user-friendly informational platform, demonstrating high digital visibility, strong reach on social media, and prominent positioning in search engines. This project aims to support more informed health-related decision-making and to mitigate the spread of misinformation, reinforcing the role of pharmacists in promoting health literacy.

Medication-related hospitalizations: an umbrella review of systematic reviews

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Background: Medication-related hospitalisations represent a significant and potentially preventable burden on healthcare systems worldwide. Variability in definitions, study designs, and populations has resulted in inconsistent estimates of their prevalence, causes, and preventability. Although several systematic reviews have investigated this topic, the available evidence remains fragmented across different clinical contexts, limiting its applicability to clinical practice and health policy. A comprehensive synthesis of this evidence is essential to support decision-making and improve medication safety.

Method: An umbrella review of systematic reviews was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and the Preferred Reporting Items for Overviews of Reviews (PRIOR) guidelines. The protocol was registered in the International Prospective Register of Systematic Reviews (PROSPERO; CRD420261341731).
A comprehensive search was performed in PubMed/MEDLINE, Scopus, SciELO, and Google Scholar, without restrictions on language or publication date. A total of 2,028 records were identified, 509 duplicates were removed, and 1,519 records were screened. Sixty-five full-text articles were assessed for eligibility, and systematic reviews investigating hospitalisations associated with medication use were included. Reviews focusing exclusively on specific drugs, diseases, or non-therapeutic exposures were excluded.
Two reviewers independently conducted study selection, data extraction, and methodological quality assessment using a validated appraisal tool. Data were synthesised narratively in accordance with Cochrane recommendations, with findings presented in structured summaries and comparative analyses.

Results: Thirty-seven systematic reviews published between 1998 and 2025 were included, of which 14 reported meta-analyses. Nearly half of the reviews (46%) focused on older adults, reflecting the increased vulnerability of this population.
The prevalence of medication-related hospitalisations varied widely across studies due to heterogeneous definitions, including adverse drug reactions and broader drug-related problems. Despite this variability, these events consistently represented a substantial proportion of hospital admissions, particularly in emergency settings.
High-risk medication classes were consistently identified, including anticoagulants and antithrombotics, cardiovascular drugs, antidiabetics, non-steroidal anti-inflammatory drugs, and psychotropic medications. Polypharmacy emerged as the most significant risk factor, alongside comorbidities, inappropriate prescribing, and clinical frailty.
Importantly, a considerable proportion of medication-related hospitalisations was considered preventable, with estimates ranging from 30% to 50%, highlighting the potential impact of targeted interventions.

Conclusion: Medication-related hospitalisations are frequent, clinically significant, and largely preventable events. Strengthening medication safety strategies, such as medication review, dose adjustment, deprescribing, and improved management during transitions of care, may substantially reduce their burden.
These findings support the need for integrated, system-level approaches to improve medication safety, optimise healthcare outcomes, and guide policy and clinical practice, particularly in high-risk populations.

Novel design methods for antimicrobial resistance awareness campaigns that work

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Background: The wicked problem of antimicrobial resistance (AMR) needs a One Health approach. To mitigate the adverse health and socioeconomic impact of AMR, all member countries of the World Health Organization (WHO) developed national action plans to guide concerted efforts in research, policy, and practice. A key pillar of these national action plans is the importance of educating the general public on AMR. To this end, public awareness campaigns about AMR are a common approach. In Singapore, such campaigns have been a key strategy to raise awareness of appropriate use of antibiotics since 2018. However, campaigns that simply provide knowledge may not lead to meaningful behaviour change. We aimed to develop a novel and theory-driven method for designing key messages for public awareness campaigns on AMR that result in behaviour change. Specifically, to systematically conduct a behavioural diagnostic of inappropriate behaviours around antibiotic use via a theory-driven behavioural framework, and to use the findings to construct campaign key messages that lead to desired behaviours.

Method: A two-step systematic behavioural diagnostic using the Capability, Opportunity, Motivation and Behaviour (COM-

B) framework was conducted on the four most prevalent inappropriate behaviours (identified from our previous study) around antibiotic use in Singapore. First step: to identify the capability (physical, psychological), opportunity (physical or social environment), and motivational conditions that have enabled the inappropriate behaviours. Second step: to identify the conditions that will enable the desired, appropriate behaviours.

Prototypes of campaign key messages were subsequently developed based on the conditions identified to address these behaviours, with each key message addressing a barrier or leveraging an enabler that would result in the desired behaviour.

Results: A total of 54 barriers and enablers for the four inappropriate behaviours and 46 for the corresponding desired behaviours around antibiotic use were identified, mapped to the appropriate COM-B condition. From these findings, 12 prototype campaign key messages targeting the four inappropriate behaviours were developed using the COM-B framework and the Behaviour Change Wheel. The prototype campaign messages and multimedia visual aids were then contextualised for the local population in terms of colloquialisms and graphics.

Conclusion: Developing campaign key messages using theory-driven behavioural frameworks is a novel and promising approach to enable desired behaviour change. In the next phase of this study, we will evaluate the effectiveness of these prototype campaign key messages in changing behaviours around antibiotic use.

Respectful maternity care and the rights of childbearing women in delivery rooms: A study conducted at two public teaching hospitals in Port-au-Prince, Haiti

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Background: To assess the experiences of childbearing women regarding respectful maternity care through the analysis of key dimensions such as reception, treatment, communication, informed consent, and satisfaction, as indicators of the respect for their rights.

Method: This was a cross-sectional quantitative study conducted from March to October 2023 at the State University Hospital of Haiti (HUEH) and La Paix University Hospital (HUP), including pregnant or recently delivered women. Exclusion criteria involved adolescent parturient, those who had undergone a caesarean section, and those less than six hours postpartum. Data were collected using a postpartum questionnaire, semi-structured interviews, and an observation grid in the delivery room. The assessment criteria evaluated communication practices and procedures performed before, during, and after delivery. The Mann-Whitney test was used for the analysis of quantitative variables, and Fisher's exact test for qualitative variables. This study was approved by the ethics committee, guaranteeing participant anonymity, their voluntary consent, and the absence of coercion or inappropriate treatment.

Results: Out of the 95 parturients women approached, only 33 were included in the final analysis due to the application of the inclusion criteria. Among them, 58% were from HUEH and 42% from HUP. Approximately 96% were between 18 and 39 years old, with a mean age of 29.44 years and a mean parity of 2.39. Multiple regression analyses confirmed the statistically significant impact of respect for privacy (B=0.836, p=0.009) and information on parturients' rights (B=0.532, p=0.056) on their delivery room experience. Furthermore, 39% were not informed of their rights. Disparities were observed in communication, pain management, involvement of the parturients, information provided about procedures, etc. Although the reception (85% well-received, 15% poorly received) was significant for overall satisfaction (B=0.665, p=0.056), variations persisted between departments. For our part, qualitative content analysis revealed challenges in communication with medical staff that impacted the delivery room experience. The observation of obstetric practices varied, while highlighting the need for a uniform approach.

Conclusion: In light of the results of this work, this thesis reveals the urgent need to guarantee respectful maternity care centered on the dignity of childbearing women. It also underscores the critical need to intensify awareness-raising actions, both in outpatient clinics and through mass media, aimed at informing and empowering women regarding their reproductive health rights.

Role of pharmacist-led medicines information services in promoting rational antibiotic prescribing

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Background: Antimicrobial resistance (AMR) continues to pose a major global health challenge, with estimates suggesting that by 2050, AMR could lead to 10 million deaths annually if current prescribing practices persist. Inappropriate antibiotic use and limited patient understanding of therapy are key drivers of this issue. Pharmacist-led medicines information services (MIS) can provide timely, evidence-based guidance to both prescribers and patients, supporting rational antibiotic prescribing and informed decision-making. Despite this potential, structured implementation of MIS in hospital settings remains inconsistent, particularly in low- and

middle-income countries, where resources and standardised protocols may be limited. Evaluating the availability, utilisation, and impact of MIS is therefore essential to inform antimicrobial stewardship strategies, optimise patient care, and reduce the risk of resistance development.

Method: A cross-sectional study was conducted over a three-month period in a 750-bed tertiary care teaching hospital. Data were collected from two sources. First, a structured survey was administered to 85 hospital pharmacists to assess the availability, scope, and utilisation of MIS, including the frequency of prescriber consultations, patient counselling sessions, and distribution of information materials. Second, a retrospective review of 300 inpatient antibiotic prescriptions from medical wards was undertaken to evaluate prescribing appropriateness according to institutional protocols and World Health Organization (WHO) prescribing indicators. Patient understanding of antibiotic therapy was assessed using a structured questionnaire measuring knowledge of indication, dosage, duration, and potential adverse effects. Data were entered into a secure database and analysed using descriptive statistics. Associations between MIS availability and prescribing appropriateness were examined using chi-square tests, with significance set at $p<0.05$. Ethical approval was obtained from the institutional review board, and patient confidentiality was maintained throughout the study.

Results: Structured MIS were formally available in 54.1% of hospital departments. Departments with active MIS support demonstrated higher appropriate prescribing rates (78.3%) compared with departments without structured MIS (61.5%) ($p=0.004$). Documentation of antibiotic indication improved from 65.2% to 82.6% in departments utilising MIS. Among 150 patients surveyed, 72.0% correctly identified the indication for their antibiotic, while 58.7% correctly reported treatment duration. Mean patient knowledge scores were significantly higher in wards where pharmacist counselling was routinely provided (7.9 ± 1.3) compared with wards without structured counselling (5.8 ± 1.6) ($p<0.001$). The survey indicated that common barriers to MIS utilisation included limited staffing (43%), lack of formal protocols (36%), and insufficient training (28%).

Conclusion: Structured pharmacist-led medicines information services were associated with improved rational antibiotic prescribing and enhanced patient understanding. Integrating formal MIS frameworks into hospital practice may strengthen antimicrobial stewardship programmes, support evidence-based practice, and contribute to mitigating AMR. Addressing identified barriers, including staffing and training, is recommended to ensure sustainability. Further multicentre studies are warranted to evaluate scalability and long-term impact across diverse healthcare settings.

Pharmacists' role in combating health misinformation and infodemics across healthcare settings

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Background: Health misinformation and the rapid spread of infodemics pose significant challenges to global health systems. According to the World Health Organization (WHO), an infodemic refers to an excessive amount of both accurate and inaccurate information disseminated across physical and digital platforms. This overload can mislead the public, affect health-related behaviours, and pose risks to patient safety. Pharmacists, as highly accessible healthcare professionals and experts in pharmacotherapy, are uniquely positioned to serve as reliable sources of evidence-based information. This study aims to critically examine the strategies employed by pharmacists to combat misinformation, the barriers they encounter, and the systemic enablers that optimise their impact.

Method: A systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. The review was registered with the International Prospective Register of Systematic Reviews (PROSPERO) to ensure transparency. A comprehensive literature search was performed across PubMed, Scopus, Embase, and Google Scholar for studies published between 2005 and 2025. Screening and data extraction were conducted independently by five researchers to minimise bias. Methodological quality was assessed using the Critical Appraisal Skills Programme (CASP) tools.

Results: Out of 2,834 records initially identified, seven studies met the final inclusion criteria. The findings indicate that pharmacist-led interventions, including direct patient counselling, public education campaigns, and social media outreach, effectively improve vaccination rates and address misconceptions regarding antimicrobial resistance. Major barriers identified include time and resource limitations, the rapid flow of new information, and the difficulty of gaining trust in communities influenced by conspiracy theories. Key enablers include the pharmacists' established reputation as trusted medical experts, supportive health policies, and the expansion of the professional scope of practice.

Conclusion: Pharmacists are essential frontline actors in protecting public health against misinformation. While systemic challenges like time constraints and regulatory limitations persist, their proactive involvement in patient education and interprofessional collaboration significantly enhances health literacy. Future strategies should focus on strengthening enabling factors and providing pharmacists

with the digital tools and leadership support necessary to combat evolving infodemics.

Cannabis Consumers' Information-Seeking Behaviours and Perspectives on Pharmacists' Roles: A Qualitative Study

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Background: Medical cannabis has been legal in Canada since 2001 and is typically accessed through medical authorization and obtained directly from licensed producers or personal cultivation, bypassing pharmacy involvement. Following the legalization of recreational cannabis in 2018, some individuals began accessing cannabis through recreational channels, including for self-medication. Access outside traditional pharmacy settings limits opportunities for clinical oversight, creating potential gaps in education, safety assessment, and monitoring. The 2024 Canadian Cannabis Act Review identified pharmacists as potential providers of cannabis consultations and distribution, positioning them to play a meaningful role in the medication use process. Understanding cannabis consumers' perspectives is essential to inform pharmacist scope expansion, patient care approaches, and policy decisions related to pharmacists' involvement in cannabis-related patient care.

Purpose: The purpose of this research was to examine cannabis consumers' information-seeking behaviours within the medication use process, including the sources they use, the information they need, their perceptions of pharmacists as cannabis educators, and factors that may impact their willingness to seek pharmacist assistance.

Method: This qualitative study used semi-structured virtual focus groups as part of the Pharmacists as Cannabis Educators (PACE) project. Canadian adults (≥18 years) who currently used or were considering using cannabis were recruited through email lists and social and professional networks. Participants completed consent and demographic surveys. Seven focus group sessions were conducted, recorded, transcribed, anonymized, and analyzed using Braun and Clarke's thematic analysis approach. The study received approval from the provincial ethics board.

Results: Twenty-one participants were included in the analysis. Three themes characterized consumers' engagement with the cannabis medication use process: (1) the influence of consumer health literacy when navigating cannabis information, including how consumers access, evaluate, and interpret cannabis-related information, and how perceptions of legitimacy and trust influence these processes; (2) the impact of stigma on seeking cannabis information, including how stigma affected disclosure of cannabis use, comfort seeking information, and willingness to consult pharmacists; and (3) factors influencing decisions to seek cannabis consultations with pharmacists, including perceptions of their cannabis expertise, clarity of their role, convenience, and the lack of pharmacy involvement in cannabis distribution.

Conclusion: Cannabis consumers navigate a complex information landscape shaped by varying levels of health literacy, persistent stigma, and uncertainty about pharmacists' roles in cannabis-related care. While participants recognized the potential value of pharmacists as accessible and trusted healthcare professionals, gaps in awareness, perceived expertise, and the current absence of cannabis within pharmacy distribution systems influenced their willingness to seek pharmacist guidance. These findings highlight the need for clearer role definition, improved cannabis education for both consumers and pharmacists, enhanced public awareness, and greater integration of pharmacists into cannabis-related care to support safe, informed cannabis use within the medication use process. It can also help to inform the development of future pharmacy-based models for cannabis-related services.

Advancing Aging in Place and Age-Friendly Pharmacy Education Through Collaborative Online International Learning (COIL): A Multi-Country Interprofessional Model

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Background: Global population aging demands a pharmacy workforce skilled in age-friendly, interprofessional, and culturally responsive care. Traditional education models often lack sustained international collaboration, real-world community engagement, and a co-designed curriculum that addresses the needs of our aging communities. Collaborative Online International Learning (COIL) offers a scalable approach to connect learners, faculty, and communities across the globe. Prior implementation of related virtual IPE models demonstrated up to 93% improvement in perceived interprofessional competencies and increased interest in geriatric care. Partnerships between academic institutions and community organizations strengthened real-world applicability.

The objective of this collaboration was to test and then scale the COIL-based interprofessional education (IPE) program focused on Aging in Place and the Age-Friendly Health Systems movement.

Method: The Aging in Place course offered through a school of pharmacy and graduate school has existed as a hybrid learning model for the last ten years. The course built the foundation to integrate COIL modules. The modules were co-developed between the University of Maryland (UMB), Baltimore (USA) and the University of Helsinki (Finland), with an ongoing expansion to the University of Costa Rica as well as community partners. The current modules discuss social determinants of health, health literacy, ageism, and caregiving which helps to prepare the interprofessional learners engaged in asynchronous lectures, on site community engagement sessions, case-based discussions, and synchronous international discussions. Additionally, existing online modules and discussion incorporated the Age-Friendly 4Ms framework (What Matters, Medication, Mentation, Mobility) and stakeholder-informed iterative refinement.

Results: Since 2015, there have been 290 students enrolled in the Aging in Place course with 255 from UMB, 33 from University of Helsinki and 2 from University of Costa Rica. Starting in the Fall of 2025, we implemented the COIL modules involving 17 students from the three universities. Interprofessional team members, namely nursing and pharmacy, have utilized the COIL modules. Feedback to date has illustrated that the COIL modules have enhanced interprofessional competencies, cultural and social determinants of health awareness, and understanding of global aging challenges. Learners reported improved communication, teamwork, and appreciation of cross-national health systems through these learning experiences.

Conclusion: A COIL-based interprofessional framework at UMB is a sustainable and transferable approach to advancing global pharmacy education in aging. It prepares pharmacists and other professionals to deliver age-friendly care and support international collaboration aligned with global workforce development. Furthermore, it represents a cost-effective, scalable model for global pharmacy education. Challenges included time zone differences, cultural and language adaptation, and technology access, addressed through structured coordination and partner engagement.

Digital Health Quotient: Multi Stakeholder Readiness Assesment linking Patients, Providers, Facilities and Industry

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Background: Digital health ecosystems require synchronized readiness across patients, providers, facilities and industry stakeholders to deliver medicines information effectively. Current assessments focus on single groups, missing ecosystem-wide gaps. No existing framework integrates national digital health identifiers—patient health IDs, provider registries, facility interoperability standards—into a unified multi-stakeholder readiness index. This gap hinders pharmacy's role as digital medicines information integrator. India's Ayushman Bharat Digital Mission provides a 1.4 billion population testbed: 73.9 crore patient health IDs created, 5.23 lakh providers registry-enrolled, 1.52 lakh facilities interoperable. We developed Digital Health Quotient (DHQ) to benchmark medicines information readiness across the entire clinical care continuum.

Purpose: To develop, pilot and validate Digital Health Quotient (DHQ)—a standardized, pharmacy-led instrument comparing digital access, medicines literacy, clinical proficiency, system integration, and patient/industry outcomes across four stakeholder groups. DHQ establishes global benchmarks for digital medicines information delivery while mapping ecosystem maturity against national digital health identifier adoption.

Method: Four parallel, stakeholder-tailored questionnaires measured five DHQ domains: (1) access/infrastructure, (2) digital medicines literacy/clinical proficiency, (3) usage/integration patterns, (4) clinical outcomes/impact, and (5) barriers (privacy, cybersecurity, skills gaps). Using stratified quota sampling across India's five macro-regions (North, South, East, West, Central) and urban/rural locations, we analysed 400 responses (100/group). Digital identifier adoption reflected national prevalence: patient health IDs (53% target), provider registry enrollment (30%), facility interoperability (45%). Non-parametric analyses included Kruskal-Wallis H-test for overall group differences, Bonferroni-corrected Mann-Whitney U post-hoc tests, and Cronbach's alpha for subscale reliability. DHQ scores ranged 1-5 (higher=better readiness).

Results: DHQ hierarchy was clear: patients (3.64±0.38) > providers (3.42±0.44) > hospitals (3.31±0.53) > organisations (2.91±0.76) (Kruskal-Wallis $H=71.49$, $p<0.001$). Patients significantly outperformed all groups; providers/hospitals exceeded organisations (all $p<0.0083$ Bonferroni). 64% patients achieved high DHQ (≥3.5) vs 35-39% system

stakeholders. Critical gaps emerged: patient medicines literacy (3.76/5) exceeded provider AI/decision support proficiency (2.78/5), hospital analytics capability (3.16/5), and organisational real-world evidence utilisation (<3.0/5). Data security trust scored lowest (patients: 2.86/5). Digital identifier adoption aligned with targets: 37% patients registered, 36% providers enrolled, 53% facilities interoperable. Subscale reliability (α<0.70 across domains) indicates factor-analytic refinement needed.

Conclusion: WORLD's FIRST DHQ reveals patients lead digital medicines readiness while healthcare systems lag despite infrastructure deployment. This pharmacy-led, universal framework provides actionable global benchmarks, positioning pharmacists as digital ecosystem integrators to accelerate medicines information delivery through targeted AI training, analytics development and trust-building initiatives.