

CONFERENCE ABSTRACTS

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Health and medicines information

Development of practice recommendations for potential drug disease interactions in patients with pulmonary hypertension

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Introduction: Pulmonary hypertension is characterized by increased pressure in the pulmonary artery. It can be caused primarily by a vasculopathy in the small lung arteries (pulmonary arterial hypertension, World Health organization (WHO) group 1) and obstruction (chronic thrombo-embolic pulmonary hypertension, WHO group 4) or secondary by heart failure (WHO group 2), lung disease (WHO group 3) or miscellaneous and unclear etiologies (WHO group 5). Because of the complexity of the disease, patients with pulmonary hypertension are treated by multidisciplinary teams in expertise centres in the Netherlands.

Regulatory agencies identified pulmonary hypertension as a contraindication in 2020 in the Netherlands. Therefore, recommendations for potential clinically relevant drug-disease interactions (DDSI) with pulmonary hypertension were evaluated.

Purpose: The purpose of this study was to evaluate drugs with a potential clinically relevant DDSI with pulmonary hypertension.

Methods: We used a previously developed six-step plan, which combines literature and expert opinion to generate practical recommendations. The scope was defined to identify which sub forms of pulmonary hypertension should be included and which outcomes were clinically relevant. Next, a systematic literature search was performed for drugs that were suspected to worsen pulmonary hypertension,

based on the list of contraindicated drugs with pulmonary hypertension in European Society of Cardiology Guideline of pulmonary hypertension and expert opinion. The results of the literature search were combined with expert opinion of two cardiologists specialized in pulmonary hypertension to assess clinical relevancy of each drug. Five drug(group)s were evaluated in this study, seven other drug(group)s still need to be assessed.

Results: Primary pulmonary hypertension group 1 and 4 were classified as relevant for the DDSIs, since in the case of secondary hypertension treatment is focused on the underlying disease rather than pulmonary hypertension. Clinically relevant outcomes were WHO functional class, six minute walking distance and the right ventricular function. Dopamine and the calcium antagonists diltiazem and verapamil were classified as drugs with a relevant DDSI. Dopamine-induced pulmonary vasoconstriction cannot be compensated in pulmonary hypertension patients due to lack of cardiac reserves. Diltiazem and verapamil are negative inotropic drugs that can lead to cardiac effects as hypotension and cardiac arrest. Both drug(group)s should be avoided.

Pulmonary vasoconstriction may occur with tyrosine kinase inhibitors (TKIs) dasatinib, ponatinib and bosutinib, hence hemodynamic checks are indicated during treatment. In the Netherlands, an alert in electronic prescribing systems was not considered necessary as these checks are already performed according to protocols that guide TKI-management. Additionally, no convincing evidence was found for the interaction between beta-blockers and pulmonary hypertension. Lastly, the concomitant use of nitrates and phosphodiesterase inhibitors can lead to severe hypotension, which is signalled as an interaction and beyond the scope of this DDSI.

Conclusion: So far, two drug(group)s can clinically-relevantly worsen pulmonary hypertension (especially WHO 1 and 4). These DDSIs will be implemented in clinical decision support systems to support health care

professionals to provide optimal care for their patients with pulmonary hypertension.

Management of adverse drug reactions to biologicals and the support by alerts in electronic prescribing systems

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Background: Biologicals are drugs that are designed to mimic human proteins to have a more focused effect than traditional drugs like immunosuppressants and cytotoxic agents, which use is often limited by severe generalized unwanted side effects. Nevertheless, biologicals can also cause adverse drug reactions. In this literature study we examined what adverse drug reactions occur, what actions are needed to optimize safety of biologicals in case of adverse drug reactions, and how these actions can be implemented in electronic prescribing systems.

Purpose: The aim of this study was to identify the adverse drug reactions associated with biologicals, and to determine what actions and precautions are necessary to minimize the risk of adverse events during their administration.

Methods: We conducted a literature review to identify studies that described adverse drug reactions to biologicals. We extracted data concerning the reported adverse reactions, actions needed, cross-reactivity and suggested precautions.

Results: Adverse drug reactions to biologicals can be divided in two categories: agent-related and target-related side effects. Agent-related side effects are either directly linked to the mechanism of action (type α ; over stimulation), or to a hypersensitivity reaction (type β ; direct or delayed immunogenicity). Safe re-exposure is often possible with premedication and a reduced infusion rate, unless the reaction is severe. Severe reactions such as anaphylaxis or multi-organ failure should be registered by the pharmacist or prescriber in the system and an alert should be given to prevent this prescribing or dispensing the biological in the future.

Target-related side effects are specific for biologicals (type δ , ϵ or γ). They are the consequence of direct interference with the immune system, what makes the patient vulnerable for undesirable effects even though the biological itself is relatively safe. Target-related side effects can present with a new condition such as heart failure caused by a biological used in the past or a newly developed allergy. Future exposure to the biological has to be avoided in the case of a target related side effect.

Cross-reactivity (type β) between biologicals can only occur if binding epitopes on the protein are similar. Since most biologicals have a unique protein structure, they are generally not expected to cross-react. So far, no harmful

immunogenicity has been seen in clinical trials after switching a biological to a biosimilar.

Conclusion: Biologicals can cause agent and target related side effects. With agent related side effects, re-exposure is often possible. In case of severe reactions, re-exposure has to be avoided. Target related side effects are unique to biologicals and also acquire avoidance of the biological. Lastly, due to the uniqueness of the protein structure, cross-reactivity testing has no place in adverse reaction protocols for biologicals. Implementation of this knowledge in electronic prescribing and dispensing systems will enhance the possibilities of pharmacists to support safe use of biologicals with good information about adverse drug reactions in biologicals.

Efficacy and safety of molnupiravir treatment for COVID-19: A systematic review and meta-analysis of randomized controlled trials

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Introduction: At present, there are some differences in the research results of molnupiravir. The purpose of this study was to evaluate the efficacy and safety of molnupiravir in the treatment of COVID-19.

Methods: PubMed, Embase, CENTRAL (Cochrane Central Register of Controlled Trials), ClinicalTrials.gov, ICTRP (International Clinical Trials Registry Platform), and MedRxiv were searched to identify relevant RCTs (randomized controlled trials) from inception to January 1, 2023. The Cochrane Handbook for Systematic Reviews of Interventions was used to assess the bias risk of the included studies. Revman 5.4 software was used for meta-analysis (PROSPERO Code No: CRD42023388502).

Results: A total of nine RCTs were included, including 31575 COVID-19 patients, of whom 15844 received molnupiravir. In addition, there are six RCTs in progress. The meta-analysis results showed that the molnupiravir group had a higher proportion of patients than the control group in terms of clinical improvement (risk ratio [RR] = 2.41, 95% confidence interval [CI]: 1.18 to 4.92, Day 5; RR = 1.45, 95% CI: 1.04 to 2.01, Day 10), RT-PCR (real-time polymerase chain reaction) negativity (RR = 2.78, 95% CI: 1.38 to 5.62, Day 5; RR = 1.18, 95% CI: 1.07 to 1.31, Day 10). However, no significant difference was observed between the two groups in terms of mortality, hospitalization, adverse events, and serious adverse events.

Conclusions: Molnupiravir can accelerate the rehabilitation of COVID-19 patients and RT-PCR negativity, which helps to reduce the transmission of COVID-19, but it does not significantly reduce hospitalization and mortality. Further large-scale studies remain to validate these findings.

Uncertain COVID-19 messages: The perspectives of rural older adults

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Background: Public health messages aim to protect communities from disease transmission and consequent health impact. However, with no prior knowledge nor immunity against the novel coronavirus, public health authorities grappled with uncertainty in the validity of scientific evidence, alongside misinformation and mistrust around the dissemination of messages. Uncertain communication may misguide communities, which may eventually diminish public health credibility, and hence negatively impact community resilience.

Purpose: This study examines how the uncertainty in Covid-19-related messages impacted rural community members in dealing with the pandemic.

Method: We recruited participants from rural populations in southwestern Ontario through website posting, radio broadcast, pharmacist network, conference posting, and words of mouth. We conducted semi-structured interviews via Zoom to explore participants' thoughts about Covid-19-related messages which they can access, their actions towards those messages, and their recommendation for a strategy for effective communication in rural areas in Ontario. We analyzed qualitative data using Excel. We applied measures to ensure the accuracy of data coding and analysis (two-coder coding, codebook, debrief workshop, reflexivity).

Results: We interviewed 7 informants. Data analysis revealed two major themes. The first theme discusses participant's perspectives on accessibility and quality of messages. Participants shared their thoughts on the sources of information shared by the government and commented on specific messaging they heard. They felt the media was inconsistent about the messaging regarding masking and protective measures. Participants felt responsible as citizens to keep up to date on the information and used various resources. They liked and trusted Twitter the most due to its customizability and instantaneity to follow.

The second theme is about communication strategy. Participants believed that most of the messaging they had received were quite pessimistic. When humor was used in a few cases, they liked it as they felt it was non-judgemental. Initial messaging by government excluded the opinions of stakeholders, which was not effective at disseminating the information since people didn't feel heard, hence resulting in not listening to the messaging shared. A panel with representatives from various groups was suggested as one way to share messages. Participants asked to improve accessibility issues, such as access to masks that had a clear section, so the mouth was visible for those hearing impaired and / or rely on lip reading. Community resilience involves having a trusted network that shares non-politicized messaging through a community-level strategy.

Conclusion: Rural older adults had variable accessibility to social media and used the internet and different news sources quite frequently to triangulate information. Word of mouth played an important role in shaping community knowledge during the pandemic. Pandemic messaging was not comprehensive for diverse populations and the types of communication they best respond to. More personalized messages, and a structured way to keep messaging consistent were recommended as improvement.

Recommendations for safe medication use in patients with cirrhosis

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Background: The biotransformation and transport of medication are dependent on liver function. Hence, impaired liver condition can influence the pharmacokinetics and pharmacodynamics of medicines, especially of medication with a high hepatic extraction such as some analgesics, antidepressants and antihyperlipidemic medication. In 2013, it was estimated that 29 million persons were suffering from a chronic liver condition in the European Union. One common liver condition is cirrhosis.

Cirrhosis is a slowly progressive disease and results from ongoing inflammation of the liver. Liver architecture is changed into structurally abnormal nodules, fibrosis and subsequently loss of hepatocyte density and function. Precautions in medication use with cirrhosis are often included as warnings in the Summary of Product Characteristics (SmPC) without detailed advice on when to adjust dosage exactly or when to avoid certain medications. Studies show that in patients with cirrhosis, dosages of medication are incorrect and many patients experience adverse drug reactions.

Purpose: To highlight the characteristics of cirrhosis in relation to medication safety and provide practical advices on safe medication use in patients with cirrhosis.

Methods: We provide an overview of knowledge about the pharmacokinetics and pharmacodynamics of medicines in patients with cirrhosis. We combined literature review with expert opinion to evaluate medication safety of drugs in patients with cirrhosis resulting. The safety was classified as safe, no additional risks known, additional risks known, unsafe, unknown or dependent on the severity of liver cirrhosis (Child-Pugh classification). If applicable, drug-specific dosing advice was provided. All recommendations were implemented in clinical decision support systems and on a website.

Results: Cirrhosis can affect pharmacokinetic parameters, resulting in increased plasma drug concentrations. The extent of increase depends on drug and patients characteristics, such as pharmacokinetic properties and the

administration route of the drug and the severity of cirrhosis. Moreover, patients with cirrhosis may have an increased susceptibility to the toxicological effects of medicines due to pathophysiological changes. In total, 297 recommendations were developed for 288 drugs: 29 drugs were classified as 'safe' in 29 recommendations (9.8%), 'no additional risks known' in 71 (24%), 'additional risks known' in 21 (7.1%), and 'unsafe' in 32 (11%). In 89 (30%) of the recommendations, safety depended on the severity of liver cirrhosis and was 'unknown' in 55 (19%) recommendations. Large alterations in pharmacodynamics were the main reason for classifying a drug as 'unsafe'. Drugs classified as unsafe that were frequently dispensed in pharmacy practice were NSAID's, atorvastatin, pantoprazole and zolpidem. Results and underlying reports were published on a public website, www.geneesmiddelenbijlevercirrose.nl, and implemented in Dutch electronic prescribing and dispensing systems.

Conclusions: Almost 300 recommendations were developed for the safe use of drugs in patients with liver cirrhosis and implemented into clinical practice in the Netherlands. These recommendations can enhance the role of the pharmacist to support patients and prescribers in safe use of medication in patients with cirrhosis in both hospitals and primary care.

Optimisation of prescription drug labels: The patient's perspective

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Background: Correct interpretation of prescription drug labels (PDLs) is needed for safe use and better adherence to prescribed drugs. PDLs are often too difficult for patients, especially for those with limited health literacy, and insufficient comprehension leads to unintentional non-adherence and consequently failure of their therapy, adverse events and hospital admissions. About 25% of the population in the Netherlands has limited health literacy and half of the population experiences problems with understanding instructions on prescription drug labels. So far, the opinions of patients about the amount and type of information they desire on PDLs is unknown. As patients need PDLs for proper use of their medication, their opinions should be taken into account when adjusting the PDLs and making them more suitable to the patients' needs.

Purpose: The aim of this study was to explore the perspective of patients in pharmacies on the type and right amount of information on PDLs.

Methods: Qualitative, semi-structured patient interviews were conducted in four community pharmacies in the Netherlands until data saturation was reached. Patients were selected purposively according to gender, age, cultural background and health literacy. The transcripts were coded

and an inductive and deductive qualitative analysis were performed.

Results: A total of 26 interviews were performed in patients with an adequate distribution according to the selection criteria. No relation between patient characteristics and content-related aspects was found. PDLs should include the usage instructions and directions about combining medicines with food and drinks. Warnings about the use of alcohol and driving should be included when they were applicable to the patient. For patients, it was also important that they could read on the PDL that the medication was prescribed for them. The optimal length of PDL contained four lines of information of about warnings and advices in addition to the dosage instructions. Other, more detailed information was preferred to be explained verbally and written in the package leaflet. Finally, patients experienced the written information on the PDL as part of the total information provided in the pharmacy.

Conclusion: Patients experience the PDL as an important source of information about medication. They prefer information about drug use and information about how to combine medication with food and drinks, and concise information concerning auxiliary instructions. Using the PDL as a supporting aid when verbally explaining the instructions can help patients to understand the information better. Incorporating patients' preferences in the design of PDL may further enhance the PDL as source for communication about medication and shared decision making between patient and pharmacist.

Your PAAL: Evaluation of an after-hours pharmacist advice line on emergency department usage

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Background: There is a lack of access to after hours and urgent care for low acuity conditions. This is being driven by longer travelling times, higher fuel costs, fewer General Practitioner (GP) visits and limited pharmacy services, increasing the health burden of those living in rural and regional areas. These pressures are transferred to emergency department (ED) presentations that in turn experience access block, extended waiting times and overcrowding. Approximately 28% of Australians live in rural areas; they experience higher rates of hospitalisations, deaths, injury and poorer access to, and use of, primary health care services, than people living in major cities. One potential solution is telepharmacy; defined as "the provision of pharmacist care by registered pharmacists and pharmacies through the use of telecommunications to patients located at a distance". A new telephone-based service called The Pharmacist After Hours Advice Line (PAAL) service, provides advice only, where users are triaged, have their medication history assessed, and are provided with

evidence-based verbal and written suggestions to assist their query by a local registered pharmacist.

Purpose: To evaluate the clinical, financial and patient experience components of a virtual pharmacy service.

Methods: Service users and service pharmacists completed non-identifiable online surveys to record experience and outcomes. Service users participated in semi-structured interviews. Cost benefit analysis (CBA) was performed by the researchers to determine the cost of unnecessary ED admissions. The Tasmanian Department of Health funded the service from October 2022 until May 2023, an area with one of the most rural and remotely dispersed populations of any state or territory in Australia. PAAL was targeted at members of the general public, aged care facility staff and palliative carers and includes five service pharmacists.

Results: Within 4 months of operation, 192 contacts were made to the service, with a 72% participant consent rate. Of these, more than three-quarters of callers (n=116; 76.7%) were calling from home and less than one-quarter (n=116, 23.3%) from an institution, such as a group home, a residential disability service or respite, rehabilitation, or aged care service. Common enquiries included questions about Covid-19 treatment (n=138, 15%), side effects from medication (14%), and questions about prescription access (15%). Without access to the service (n=137), 38% of callers would have contacted another health professional or health service, including an ED (11%) or GP visit (18%), and 16% would have done nothing or watched and waited. Callers were referred from either nationally funded Health Direct (n=35), COVID hotline (n=10), or GP Assist (Tasmania) (n=6). Discussion. There is a clear need to offer alternatives models of care that overcome the issues of cost, isolation, workforce availability and medication harm internationally. Service users require pharmacy-specific advice that is not currently provided by existing services. The service is expected to reach 500 occasions of service before the end of May. Full data analysis will be completed and presented at the FIP conference.

Conclusion: Evaluation of a pharmacist after-hours advice line will contribute to the future development a model for virtual pharmacist services.

Association between participating in drug abuse prevention activities and drug abuse among African American aged 10-24 years

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Background: Drug abuse represents a significant public health problem worldwide, with socioeconomic consequences shaped by a cluster of behavioral, cognitive, and physiological phenomena and serious social, physical, emotional problems. Drug abuse has dramatically increased, particularly in developing countries and it is complex due in

part to its varieties, degree of secrecy, health challenges, and different legal connotations globally. Global survey on drug abuse among the general population consistently indicates that the extent of drug abuse is greater among young people than the older population, and the peak of drug abuse occurs between ages 18–25 years.

Early intervention for drug abuse, among other preventive measures prior to high school, is essential. Preventive interventions have proven to be useful and rates of drug abuse by young people suggest that prevention and intervention efforts geared towards these young people are critical. Generally, few studies on drug abuse intervention have focused on the impact of youth mentoring associated with adolescent and youth drug abuse prevention.

Purpose: The study was to assess the association between participating in drug abuse prevention activities and drug abuse among African American Aged 10-24 Years.

Method: The study was a nonexperimental, retrospective correlational cross-sectional inquiry with a quantitative descriptive approach using an existing secondary dataset from the 2014 National Survey on Drug Use and Health (NSDUH). The study population included African American adolescents and young adults aged 12 to 24. The data was analyzed using SPSS v 25 to assess association between participating in drug abuse prevention activities and drug abuse.

Results: The total number of respondents was 3533. 32.2% of the respondents were between 21-25 years and 14.8% were between 12-13 years. 48.7% were males while 51.3% were females. 7.8% respondents had less than high school education, 21.4% were high school graduates, 17% had some college education while 3.8% were college graduates. 42.9% respondents reported the abuse of drugs will 57.1% reported no abuse of drugs. Further, 16.1% of the respondents participated in the drug abuse prevention activities while 83.9% did not participate in the drug abuse prevention activities. The chi-square analysis results revealed a non-significant association between participation in drug abuse prevention activities and drug abuse [$\chi^2(1, N = 1742) = 3.219, p = .073$].

Discussion & Conclusion: The observed non-association in this study may be attributed to the approach and components of the school and community-based intervention. This finding is contrary to a similar study where significant association was recorded between school-based mentoring intervention programs and drug abuse among African American aged 10-24 Years which was also in line with Rigg et al. (2018) which pointed out the significance of schools as a venue for implementing drug prevention programs and have also reported school-based programs as an efficacious and cost-effective method of reducing drug abuse among young people.

Further studies could explore the role of components of each of the drug abuse prevention activities to determine what factors, features, content, and approaches may contribute to benefit young people and reduce drug abuse.

What if patients can update shared digital medication records in partnership with healthcare professionals? A qualitative co-design study

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Background: Patient involvement is increasingly acknowledged as an essential component of safe and high-quality medication management across healthcare providers. Concurrently, numerous countries have committed to the digitalization and standardization of processes to facilitate access to and communication about a patient's current medications, including shared digital medication plans (SDMPs). Despite these advances, patients are not given the possibility to report self-medication or engage in maintaining an accurate medication list through system-wide platforms. This is a striking paradox, given the rapid growth in mobile health technology and the fact that patient-driven changes contribute significantly to discrepancies between actual medication usage and medication records overseen by prescribers and/or pharmacists.

Purpose: This study aims to determine the potential value and challenges of enhancing patient-professional partnerships in medication plan management using a digital platform. We report from a Swiss program to design and implement an interactive solution within context of the federal electronic patient record system. Our co-design project applied lessons learned during a regional pilot study.

Method: We conducted focus groups and individual interviews with polypharmacy patients, informal caregivers, and health professionals (physicians, nurses, pharmacists). Data collection focused on experiences of and contributions to managing medication plans aiming to identify potential benefits of digital technologies as well as enabling mechanisms, and barriers for collaborative medication management. We applied thematic analysis, guided by the coproduction framework. The multidisciplinary study team included five patient partners as co-researchers.

Result: Engaging 31 participants in eight interviews and five focus groups, we followed up with two co-design workshops that brought together all participants. The value propositions for SDMP lies in (a) seamless access and updating of comprehensive medication information - beyond prescriptions - through a single platform; (b) explicit shared responsibility for accurate information and visible individual contributions to the medication plan; (c) support for collaborative management of the medication plan, including enhanced joint planning, execution, monitoring,

and individually tailored information access to SDMPs, while fostering interprofessional collaboration; and (d) potential for quality improvement and digital health innovation through reinforced care partnerships and improved care integration, efficiency, and patient safety. The study also highlights the importance of integrating co-management of medication plans into clinical practice and information systems and the need for favorable financial and policy conditions. Customization of SDMPs according to individual capabilities and preferences is deemed essential for successful patient engagement.

Conclusion: Empowering patients and professionals in co-producing and co-managing medication plans with digital technology can have multiple benefits. Digital medication information systems must accommodate the complexity of medication management enabling various collaborative situations between patients and professionals. These value propositions challenge the current limited roles allowed to patients in directly updating the shared information on national/regional digital platforms, and bring new perspectives for policy, research and innovation.

What's next after medication instruction videos in Malaysian Sign Language?

Focus areas to improve medication literacy among deaf patients in University of Malaya Medical Centre (UMMC).

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Communication barriers and the lack of medication information in sign language contribute significantly to low health literacy among the deaf community. This results in a poorer state of health for deaf community compared to hearing individuals. To improve the deaf community's medication health literacy, the Department of Pharmacy, University of Malaya Medical Centre (UMMC) introduced QR-coded labels that link to medication instructions videos in Malaysian Sign Language. While this is one step towards reducing health barriers and promoting health equity, it is insufficient to promote medication adherence, especially when patients' do not understand the need or indications of their prescribed medication(s). Non-adherence to medication can lead to preventable deaths and high healthcare costs. As part of our quality improvement plan, we identified the common pharmacological groups prescribed among deaf patients seeking treatment at UMMC to prioritize the medication information required by them. A total of 115 deaf patients (48.7% male; 43.5% >60 years old) were identified between August 2022 to March 2023 using the hospital's Pharmacy Information System and retrospective analyses of 1,683 prescribed medications were performed. The common pharmacological categories for clinics' (61.7% of prescribed medications; patient:medications ratio 1:3) were antihypertensive (13.7%), antidiabetic (10.9%), analgesic (10.9%); wards'

(19.8% of prescribed medications; patient:medications ratio 1:6) were antidiabetic (18.6%), analgesic (12.3%), antihypertensive (11.1%) and the emergency department (18.5% of prescribed medications; patient:medications ratio 1:3) were analgesic (23.2%), antibiotic (13.8%), antisecretory (10.3%). These findings will be used to create medication education videos in Malaysian Sign Language, focusing on the indications and counseling information (e.g. precautions, common side effects, missed dose, storage of medications) specific to the identified pharmacological groups. These videos can be used directly by deaf patients or by healthcare professionals to improve medication literacy and positively impact medication adherence among deaf patients.

Medicine and vaccine investigation and surveillance: How we do pharmacovigilance in Australia

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Background: With the nationwide rollout of COVID-19 vaccines, there has been growing interest in how pharmacovigilance is conducted in Australia. In this presentation we will provide local case studies to demonstrate the Therapeutic Goods Administration's (TGA) pharmacovigilance system in action. Sharing the Australian experience will build confidence and understanding in pharmacovigilance practices and highlight the important role that pharmacists play in interfacing with the medicines regulatory system.

Pharmacovigilance is defined by the World Health Organization as the science and activity related to detecting, assessing, understanding and preventing adverse effects and other medicine-related problems. Post-market surveillance is important to identify safety issues that may not have been detected in clinical trials, particularly as trials often have small sample sizes and exclude diverse populations.

Purpose and method: Australia has a mixed model of pharmacovigilance reporting and assessment. Pharmaceutical sponsors have a legal responsibility to notify the TGA of significant safety issues and any serious adverse reaction reports they receive. Healthcare practitioners and the general public are encouraged to report adverse events to medicines, however this is not mandatory.

High quality local reports from health professionals are integral to the TGA's pharmacovigilance activities and every report counts. Even a small number of reports can assist the TGA to detect a new safety signal early and take action to protect the Australian public.

We will present case studies discovered through different signal identification methods to highlight the strengths and limitations of pharmacovigilance and spontaneous adverse event reporting in Australia. This will include the measures we use to collect adverse event data, data-mining processes to identify and assess adverse events and our regulatory actions to minimise health risks.

Results: Our regulatory actions include risk communication to consumers and health professionals, updating the prescribing information and/or product labels, requiring post-market studies, restricting use in certain populations, investigating manufacturing sites, recalling products from the market, and suspending or cancelling products.

In the 2021-2022 financial year, the TGA completed 71 vaccine and 379 medicine investigations, leading to over 350 updates to our information for prescribers and consumers.

Conclusion: Pharmacovigilance is a crucial part of medicine safety and public health.

Pharmacists play an important role in reporting potential medicine safety issues which may trigger regulatory action with a real-world impact to consumers and health professionals. Every spontaneous adverse event report helps the medicines regulator to build a picture of the safety profile of a product.

Improving awareness of the pharmacovigilance systems in place will give pharmacists greater confidence in contributing to the regulatory system.

Have clinical pharmacist reviews at the University of Otago School of Pharmacy Clinic improved patient outcomes?

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Background: Medicine-related problems (MRPs) can negatively impact patients' health outcomes and increase healthcare costs. Clinical pharmacists can help identify and address MRPs through medication therapy management (MTM) services. The University of Otago School of Pharmacy Clinic (the Clinic) is a campus-based non-dispensing clinic led by a small team of registered clinical pharmacists who work with patients and their health care providers to identify and address MRPs.

Purpose: To characterise the MRPs and the impact of clinical pharmacist recommendations on improving health outcomes.

Method: A prospective observational study was conducted in the Clinic in Dunedin, New Zealand. Patient demographic data, your health and well-being (SF12v2) health questionnaire, were obtained from a standardised database derived from records at the pharmacy clinic. The MRPs were identified from clinical pharmacists' consultation summaries and classified using the DOCUMENT classification system. The top ten Anatomical Therapeutic Chemical (ATC) medicines were identified. The impact of the recommendations on improving health outcomes was evaluated using the SF12v2 survey (contains the Physical Component Score (PCS) and Mental Component Score (MCS) at baseline and 30 days after using the minimum clinically important difference (MCID) measure.

Results: 448 patients were included in the study, with a mean age of 68.95(SD 14.18) years. The majority of patients identified as male (50%). The most frequent interventions included monitoring (27%), medicines information (23%) and drug selection (17%). The clinical pharmacists made a total of 836 recommendations out of the total 925 (90.4%) medicines prescribed, with a mean of 1.11 recommendations per patient. A change in therapy (35%) was the most common recommendation. Out of the 754 MRPs identified, the following top ten ATC medicines accounted for (30%) of the total; vitamin D and analogues (cholecalciferol), lipid modifying agents (atorvastatin) and proton pump inhibitors (omeprazole). According to the SF12v2 survey results, there was an improvement in their PCS score for 39% respondents. Out of those who showed improvement, 22% achieved a change that exceeded the (MCID) value of 9.68. Additionally, 45% had a positive change in the MCS, with 33% of them achieving a change that exceeded the MCID value of 9.08 after the clinical pharmacists' recommendations were communicated.

Conclusion: Clinical pharmacists working in the clinic setting have demonstrated their ability to identify MRPs through MTM services. However, while these findings are promising, future research is needed to confirm and expand upon these results, as well as to examine the long-term impact of clinical pharmacist interventions on patient health outcomes.

Topic area: Health and medicines information.

A web database providing probiotics practice reference information for pharmacists and other healthcare professionals—Its conception, development and preliminary evaluation

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Background: Community pharmacists are deemed as trusted healthcare professionals that the public can turn to for reliable information and recommendation about health supplements. In Singapore, a survey conducted between July and August in 2018 among 222 full-time or locum community pharmacists revealed that they generally lacked confidence in their knowledge of health supplements (unpublished data). One contributing reason include pharmacists felt that the undergraduate pharmacy program was inadequate in health supplements education and they had to gain such knowledge from continuous professional education and training. Moreover, there was a general belief among community pharmacists in Singapore that they did not have sufficient access to reliable materials that would improve their knowledge of health supplements.

Purpose: With the goal to bridge the knowledge gap for community pharmacists and other healthcare professionals,

a digital means of providing up-to-date reference information of health supplements for healthcare professionals was conceived. As a start, the database was intended to provide reference information of a particular category of health supplements. Probiotics were chosen for two reasons: 1) The range of probiotic products available is wide, but efficacy of probiotics, even for the same indication, is strain specific, and 2) international guidelines and online databases that healthcare professionals can refer to for probiotic information are not regularly updated and do not provide product-specific information.

Method: Search was conducted on PubMed to retrieve all relevant systematic reviews, meta-analyses, randomized controlled trials (RCTs), follow-up studies and case-control studies. For assessment of quality and risk of bias, compiled RCTs were evaluated using the Cochrane Risk of Bias 2.0 tool. Available probiotic products were searched from pharmacies and local domain of online stores in Singapore. Relevant information from published studies and products for each probiotic strain, as well as product-study links were compiled using Microsoft excel and stored in CSV format. CSV files were used as primary information source for development of the probiotics database. Community and hospital pharmacists were recruited between September to October 2022 to try out the database and complete a questionnaire to provide feedback about the database.

Results: The database captured information from 556 full-text articles published between January 2008 to June 2022, and 753 probiotics products, of which a total of 5,708 links were found upon probiotic-study matching. In its current form, the database contains 3 features, allowing users to search by 1) indication, 2) product and/or 3) strain. Survey results revealed that pharmacists found the database user-friendly, of good quality and applicable to their practice. Additionally, 88% found the database able to improve their probiotic knowledge and 84% agreed they were able to address enquires more confidently and promptly with the use of the database.

Conclusion: Results obtained from survey participants have suggested that the in-house developed probiotic database has the potential to be a reliable e-reference for pharmacists and other healthcare professionals to not only use for their practice, but also to bridge the knowledge gap that can boost confidence among pharmacists to provide reliable information and recommendation about probiotics.

The impact of repeated interventions on improving the use of medicines and health services: Successes from the veterans' medicines advice and therapeutics education services program

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Background: The Veterans' Medicines Advice and Therapeutics Education Services (MATES) is an ongoing initiative of the Australian Government Department of Veterans' Affairs (DVA) with the aim of improving the health and wellbeing of the Australian veteran community through better use of medicines and health services. The continuous nature of the program enables repeat interventions that build health literacy and skills over time. This presentation focuses on the evaluation of repeat interventions.

Methods: Of the Veterans' MATES programs with repeat messaging were interventions on the management of pain and dementia. The programs provide repeated multifaceted interventions, composed of patient specific audit and feedback and educational components to general practitioners, with supportive educational material provided to veterans, pharmacists and allied health professionals. The interventions were informed by Social Cognitive Theory, the Transtheoretical Model, and the health promotion model PRECEDE-PROCEED. Materials were sent via either standard post or electronic delivery directly to the clinical desktop of doctors. Retrospective observational studies were conducted using administrative claims data from DVA to evaluate the impact of the interventions. We used rates of dispensings and volume of medicines dispensed in terms of defined daily doses (DDD) per 1000 per day.

Results: The primary intervention on pain management for veterans in 2017 reduced the median oral morphine equivalents (OME) per day from 11.7 mg pre-intervention to 9.3 mg. The proportion of veterans taking doses between 50 and 150 OME on average per day decreased following the intervention, $p < 0.0001$, while use of lower doses increased consistent with program messages. The intervention with the supportive intervention of the 2020 topic on gabapentinoids and the 2019 TGA pack size changes resulted in 650,000 patient-months of opioid use avoided.

The primary intervention on dementia management in 2016 aimed to reduce the use of antipsychotics in veterans with dementia. Reduced use of risperidone from 127 per 1000 veterans in 2015 to 105 per 1000 veterans in 2016, to 95 per 1000 veterans in 2017 was observed. In terms of volume of dispensing, the use of medicines for behavioural symptoms of dementia (BPSD) decreased from 1.5 DDD/1000/day in 2016 to 0.6 DDD/1000/day in 2021. Supportive interventions also contributed to this significant change including the 2018 interventions to reduce medicines causing dry mouth and falls, the 2019 intervention to reduce medicines associated with cognitive impairment and the 2015 Australian

Therapeutic Good Administration change of the product information for risperidone to limit its use for BPSD to a maximum of 12 weeks.

Conclusion: Repeated Veterans' MATES interventions on the use of medicines and supportive policy changes resulted in declines in use of overused medicines including opioids and antipsychotics thereby decreasing the risk of harm from these medicines.

Access to essential medicines through essential medicines list-case of Kosovo

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Introduction: To have access to essential medicines and guide the provision of fundamental health care, in 1977, WHO developed Essential Medicines List – EML. Nevertheless, even after 46 years, one third of worldwide population does not have access to essential medicines yet. EML is selected based on evidence on efficacy and safety and rational cost-effectiveness.

Aim: To assess the concept of the EML and its application and the connection with access to essential medicines.

Methods: Based on the principles of the WHO approach to essential medicines, a narrative literature review was performed in Medline and PubMed, which helped in addressing the issues regarding the access of population of Kosovo in essential medicines through EML.

Results: The results revealed that EML improved drug affordability regarding pricing of generics and providing for public sector at low cost. EML offered good evidence for future reimbursement decisions. Poor management leads to expired and wasted medicines. Arguments over price regulation are inconclusive.

Conclusions: In Kosovo the EML has been a great advocacy instrument that has impacted policy makers to improve access to medicines for the population of Kosovo. However, increasing expenditure for health care and high cost of medicines put at risk equitable and cost effective management of supply of pharmaceuticals. Moreover, the impact of counterfeit pharmaceuticals and continued drug shortages threaten the reliability and sustainability of the global medicines supply, and worsen resources. Hence, structured and harmonized approaches are crucial to provide expanded health care needs at the patient point of care. A thorough research of the application of the medicines list concept in countries with developed economies may offer an understanding into approaches to access challenges.

Views, barriers, and facilitators of human immunodeficiency virus -infected individuals, doctors and nurses regarding the use of a mobile health application to improve self-management in HIV-infected individuals

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Background: Mobile health applications (m-HA) have been shown to facilitate human immunodeficiency virus (HIV)-infected individuals to improve their self-management skills, which may translate to better healthcare outcomes, reduced healthcare cost, and improved quality of care given. To date, no “self-management” m-HA has been developed for HIV-infected individuals in Malaysia.

Purpose: To explore the views, barriers and facilitators of HIV-infected individuals, doctors, and nurses, with regards to the use of a m-HA to improve self-management in HIV-infected individuals.

Method: A qualitative study was conducted from January to March 2020 at a tertiary hospital in Malaysia. HIV-infected individuals [having a CD4 count (T-cell count) of more than 200cells/mm³], ≥21 years and on treatment for >3 months; as well as doctors and nurses who were involved in the care of HIV-infected individuals, were recruited. All participants owned a smartphone and were able to speak in English or Malay. In-depth interviews were conducted using a semi-structured topic guide. Interviews were transcribed verbatim and analyzed using a thematic approach.

Results: Seventeen HIV-infected individuals (32–60 years), 9 doctors (32–47 years) and 2 nurses (40–41years) were recruited. Themes that emerged were: 1) Features of the m-HA that could improve self-management. Participants believed that reliable, up-to-date information in a m-HA could improve an individual’s knowledge regarding HIV, and provide the necessary knowledge to improve self-management. Participants also reported that they would like a chat function in the m-HA, as it would enable HIV-infected individuals to communicate quickly with their healthcare provider when experiencing side effects or unsure about what to do when medications have run out when travelling. In addition, documentation and tracking of laboratory results in a m-HA would organize results systematically; which may encourage HIV-infected individuals to do better when they see positive trends. Our participants believed that all these features could potentially help improve their self-management skills and would enable them to have fruitful discussions with their doctor. 2) Utilitarian and hedonic motivations to use m-HA. Participants were of the opinion that the utilitarian motivations of the m-HA should be simple to use, user friendly, free of charge and available in more than one language. Meanwhile, the hedonic motivations should include gamification, rewards, or

incentives to make the m-HA more appealing and engaging. 3) Influences from peers (among group of friends or within same social support group) and externally (from healthcare professionals). This would increase HIV-infected individuals’ acceptance to use the m-HA. Influence coupled with satisfaction and daily habits lead to increased satisfaction and continued usage of using a m-HA. Although desired features, motivators, and influences in the development of m-HA were identified; information overload, data confidentiality, credibility and security remained a key concern as HIV is associated with stigma, social isolation, and discrimination.

Conclusion: Our findings will provide the information needed for the development of a m-HA to improve their HIV self-management skills. This will be done in the next phase of our project.

An exploration of the timeliness of dopaminergic medicines administration in care homes using an electronic Medicines Administration (eMAR) database

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Background: Older adults residing in care homes remain some of the most vulnerable members of society. They are commonly susceptible to medicines related harm, yet they are frequently exposed to polypharmacy and inappropriate prescribing. A major challenge for pharmacists working in care homes is identifying residents that are most likely to exhibit adverse drug reactions to their medicines given that medication administration records are ordinarily paper based making their examination resource intensive and time consuming.

Purpose: In this current study, we examined the utility of a database of secondary, pseudonymised electronic Medicines Administration Record (eMAR) data in exploring medicines prescribing and administration in care homes using dopaminergic medicines as a test case.

Method: The administration of dopaminergic medicines such as levodopa is time sensitive and dose omissions or failure to administer to the resident’s schedule can precipitate symptoms in Parkinson’s disease. We therefore explored the frequency of dose omissions and the timeliness of scheduled administrations with any administration within 30 minutes of the scheduled time classed as on time. SQL code was used to process data from the eMAR source database, and statistical analysis was undertaken using R code and Microsoft Excel.

Results: A total of 9,082 residents across 310 care homes were in the eMAR database. Of these, 375 (4%) and 319 (3.5%) were prescribed dopaminergic or levodopa medicines respectively. The average age of residents receiving dopaminergic medicines was 83 years of age and a

significantly greater proportion of residents prescribed dopaminergic medicines were male (of the total population 45% male vs 29% female, $P < 0.001$). The majority of scheduled doses were administered with only 2.15% (864 doses) omitted and this was most commonly due to the resident declining the administration (43.98%), being asleep (22.80%) or stock was not available (13.31%). Of note however, was of the 35,729 levodopa doses scheduled, only 19,008 (53.2%) were administered on time (i.e. within 30 minutes of the scheduled time) with the majority of doses (90.11%) administered within 90 minutes of the scheduled time.

Conclusion: In this study we have demonstrated that an eMAR database of medicines administration data can be rapidly interrogated to identify individuals that are not receiving their dopaminergic medicines in a timely manner. Such an analysis simply could not be undertaken using paper-based MAR charts. Whilst it was beyond the scope of this study to explore the clinical consequences of administrations that were not to schedule evidence has shown that timeliness of dopaminergic administrations is an important factor in ameliorating symptoms of Parkinson's disease. Together, the analysis of eMAR data shows promising utility in identifying residents at risk of medicines related harm.

Implementation of a project to increase knowledge about the MSc in pharmaceutical sciences and the pharmacy profession in high schools-Preliminary results

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Background: A report from the Centre for Research and Studies in Sociology, in the context of a programme of the Portuguese Government Ministry of Science, Technology and Higher Education, has shown that young people identify the lack of information regarding the university courses and professional opportunities as one of the main problems in the transition to higher education.

The South and Autonomous Regions Branch (SARB) of the Portuguese Pharmaceutical Society (PPS) is committed to providing students information about the MSc Pharmaceutical Sciences programme available in Portugal and promoting the Pharmacy Profession within Portuguese high school communities.

Purpose: To present preliminary results of the development and implementation of a project, run by undergraduate pharmacy students, that aims to inform high school students about the MSc in Pharmaceutical Sciences and the pharmacy profession.

Methods: The Pharmacy Profession Awareness Campaign (PPAC) is a project originally created by the International Pharmaceutical Students Federation (IPSF), adapted, and implemented in Portugal by the PPS in collaboration with the national and local students' representative associations. The project consists of an online capacity building training that comprises an asynchronous course and a synchronous session for all MSc in Pharmaceutical Sciences students who aspire to become trainers. The asynchronous course is run through the Moodle learning management system and aims to provide information regarding the Pharmacy profession and general information about the project and practicalities for implementation. On the synchronous session, which is held on Zoom Platform, students develop their communication skills and simulate trainings.

After the capacity building training the undergraduate student trainer autonomously conducts a training session supported by a presentation and materials produced in an interactive process by the PPS and the Students' representative Associations.

The initiative is assessed through on-line surveys by high school students.

Results: Since the beginning of the project in 2022, two editions have been carried out. From the 84 MSc Pharmaceutical Sciences students who have enrolled in the training, 47 (56%) became trainers. A total of three training sessions were held in high schools, impacting 144 students, of which 81 (56%) answered the online survey.

On a scale of 1 to 5, where 1 is none and 5 is high, 11,43% (n=9) of high school students rated their interest in the MSc in Pharmaceutical Sciences as equal to or higher than 4 before the training session, in comparison to 29.63% (n=24) after the training session. MSc in Pharmaceutical Sciences is a graduation option by 22,22% (n=12) of the high school students. 88,89% (n=72) of high students indicated that the training session helped them to better understand the pharmacy career opportunities.

Conclusion: The implementation of PPAC in Portugal has demonstrated positive results in terms of high school students' knowledge and interest in the MSc in Pharmaceutical Sciences and in the pharmacy profession.

Barriers and facilitators to integrating deprescribing recommendations into clinical practice guidelines: a qualitative study

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Background: Deprescribing is the process of clinician-supervised withdrawal or dose reduction of medications where the potential harms outweigh the benefit for an individual. Clinical practice guidelines are used by healthcare professionals (including pharmacists) as a source of the best evidence in combination with clinical expertise and patient preferences. They play an important role in the translation of evidence to practice. They are also used in education and training and can influence policy. A reported barrier to deprescribing in practice is a lack of recommendations on when and how to deprescribe in clinical practice guidelines.

Objective: To explore the barriers and facilitators to inclusion of evidence-based deprescribing recommendations in clinical practice treatment guidelines.

Methods: Qualitative semi-structured interviews were conducted with guideline developers (including chairs, methodologists, clinicians and consumer representatives) and key stakeholders from organisations involved in informing guideline development. Interviews were audiotaped and transcribed and then conventional content analysis was conducted.

Results: 18 guideline developers (including 7 people who had been involved in development of deprescribing focused guidelines) and 8 stakeholders that inform guideline development were interviewed. Participants were from North America, Australasia and Europe and ranged in experience from being involved with one guideline to more than 20. Barriers and facilitators identified related to whether deprescribing was seen to align with the goal of guidelines, awareness of deprescribing, availability of evidence to inform the recommendations, internal and external influences on the scope of the guideline, and logistical considerations. Logistical barriers included the time, money and effect on the length of the guidelines (to expand the scope to include deprescribing), lack of confidence or expertise of team members and methods to guide the process, and a disease focus instead of drug focus. Participants reported that clear and appropriate wording of deprescribing recommendations was essential to prevent negative consequences. There were differing views on where they could be placed within the guideline, for

example, following the prescribing recommendations for each medication or in a dedicated deprescribing section. A template on how to word deprescribing recommendations was thought to be helpful for future guideline developers.

Discussion: While there are facilitators to inclusion of deprescribing recommendations, a champion within the guideline development team or recommendations from respected organisations is likely needed for deprescribing to be included within the guideline scope. Pharmacists and geriatricians were highlighted as professionals who should be a part of guideline development teams and could act as champions for deprescribing. Research with guideline end-users (e.g. medical doctors, pharmacists, nurses and consumers) is needed to inform the necessary content and optimal presentation of deprescribing recommendations to support implementation in practice.

Application of Internet + pharmacy consultation model during the epidemic of COVID-19

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Objective: To explore the application of Internet plus pharmaceutical consultation model during the COVID-19 epidemic, build a diversified pharmaceutical service model, and further improve the quality of pharmaceutical service.

Methods: The situation of Internet drug counseling during the epidemic period of COVID-19 was analyzed, the characteristics of the population and counseling problems were analyzed, the application effect of Internet + drug counseling was discussed, the feasibility of online drug counseling service was analyzed, the pharmaceutical service model was enriched, and the service population was expanded.

Results: From December 12, 2022 to January 21, 2023, a total of 1553 patients received Internet drug counseling during the peak period of COVID-19 epidemic, with a male to female ratio of 0.73 and an average age of 37 years. 62.07% of them were consulted by themselves and 34.26% by family members. The positive rate of COVID-19 accounted for 68.71%. The rate of not seeking medical treatment was 87.51%. 65.49% of the patients took drugs by themselves. The proportion of patients with combined chronic diseases was 21.24%. The consultation questions covered 52 types of COVID-19 symptoms; The proportion of patients with less than 5 symptoms was 86.61%. The proportion of symptom onset time \leq 2 weeks was 92.21%. Consultation related to medication accounted for 48.04% (1181 cases), including 545 cases of drug selection, 189 cases of drug efficacy, etc. Pharmacists found medication problems such as repeated medication, abuse of antibiotics, drug selection, drug interaction, etc.

Conclusion: The Internet + telemedicine + drug consultation model provides convenient pharmaceutical care and interactive space for patients, and greatly improves the quality of pharmaceutical care.

Managing medications during 'sick days' in patients with chronic conditions: A theory-informed approach to intervention design

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Background: Most people with chronic conditions, including kidney and cardiovascular disease, require multiple medications. Although medications are crucial to improving long-term outcomes, they can contribute to serious complications in the face of common acute illnesses, including those causing volume depletion, hypotension, acute kidney injury, diabetic ketoacidosis, or hypoglycemia. Sick day medication guidance (SDMG) typically includes recommendations for withholding specific medications for the duration of symptoms that lead to reduced oral intake. There is a knowledge gap regarding barriers and enablers to SDMG and strategies to change behaviours of patients and health care providers. In addition, the COVID-19 pandemic has drastically changed how patients interact with the healthcare system.

Purpose: To describe the perspective of patients and health care providers related to (1) barriers and enablers of behaviour change (2) theory-informed strategies for intervention design, and (3) the acceptability, practicality, and equitability of an eHealth tool for SDMG.

Methods: A qualitative descriptive study using qualitative conventional content analysis was undertaken. Interviews and focus groups were held with patients and health care providers from January 2021 to April 2022. Barriers and enablers to patient and health care providers behaviours was analysed using the behaviour change wheel and theoretical domains framework. The intervention options were assessed for acceptability, practicality, and equitability using the APEASE criteria.

Results: Forty-eight participants (20 patients, 13 pharmacists, 12 primary care physicians, and 3 nurse practitioners) were recruited to participate in the interviews. Feasible and acceptable intervention options were identified, these included: (1) SDMG prescriptions provided by a community-based care provider, (2) pharmacists adding a label to SDMG medications, and (3) built-in prompts for prescribing and dispensing software. Most participants accepted the concept of an eHealth tool and identified pharmacists as the ideal point-of-care provider. Challenges with an eHealth tool concept were raised and included credibility, privacy of data, medical liability, clinician remuneration and workload impact, and equitable access to an eHealth tool.

Conclusion: This study adds to the existing literature providing support for potential non-technology and eHealth-based interventions to aid in the delivery and application of SDMG. Additionally, it confirms pharmacists have an important responsibility to provide SDMG to their patients. These findings will be used to inform the design of SDMG interventions and studies to assess the impact on patient outcomes.

Adverse events associated with vericiguat : An analysis of FAERS database

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Background: Vericiguat is a newly approved soluble guanylate cyclase stimulator, which is mainly used for the treatment of chronic heart failure. An increasing number of patients are choosing vericiguat according to guidelines. However, There are no post-marketing safety studies of this drug now.

Purpose: To explore the signals of adverse events (ADE) related to vericiguat in the real world, and to provide reference for for clinical medication safety.

Method: Data from January 1, 2018 to September 30, 2022 in the US Food and Drug Administration Adverse Event Reporting System (FAERS) database were retrieved for disproportionality and Bayesian analysis. Reporting odds ratio method and Bayesian confidence interval progressive neural network method were used to analyze the occurrence of ADE.

Results: A total of 20 ADE signals were detected, involving 502 ADE reports, in relation to 9 system organ classes (SOCs). The proportion of males (63.94%) was significantly higher than that of females (27.29%). The age was unknown in 55.58% reports, while patients over 65 years old account for 38.05%. The SOC involved mainly contained cardiac organ diseases, vascular and lymphatic diseases, systemic diseases, and various reactions at the site of drug administration. ADE signals with more reports included

hypotension, dizziness, decreased blood pressure, anemia, etc. Five new suspected adverse reactions that were not recorded before were found, including syncope, vertigo, atrial fibrillation, ventricular tachycardia and angina.

Conclusion: The common adverse reactions of vericiquat in the real world are consistent with the drug instructions, but there are some newly found signals with high statistical correlation. According to the principle of suspicious report, we should pay attention to such signals in clinical practice.

Pharmacists' pivotal roles in responding to novel healthcare communications

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Health digitalization has risen recently, and a novel form of health information can be easily found on social media. The ubiquity of consumers accessing online health information on social media might affect patient behavioral changes on medicine demands. The emerging unprecedented amount of misinformation about medicine and rumors spread on social media has been highlighted. Pharmacists, as the accessible primary health frontline in the community, play pivotal roles in providing evidence-based medicine information and preventing inappropriate medicine use. Therefore, it is imperative to understand pharmacists' perceptions and contributions inclusively to untangle community health misconceptions.

A semi-structured interview was conducted, transcribed verbatim, and analyzed using the framework approach. In total, 8 participants were female (75%) with more than five years' experience. The mean interview duration was 45 minutes and lasted between 32-76 minutes. The findings highlight that pharmacists have optimized the use of online health information for cross-checking medical cases, evaluating the quality and evidence of health infographics in social media, as well as identifying problems during pharmaceutical practice. Pharmacists' perceptions of online health information were positive, they found that social media is an effective tool for spreading health information concerning community health literacy levels. Moreover, professionals' contributions were divided, with participants either delivering myth-buster health infographics from official sites or disseminating recreated health evidence-based content on pharmacists' own social media. In conclusion, the most important role of pharmacists in this internet era is to clarify health misinformation spread on social media. Therefore, future studies should focus on pharmacists' health literacy competence to be able to deliver high-quality and practical medical information to the community.

Pediatric treatment satisfaction with medication measurement research and related evaluation tool: A systematic review

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Objectives: To analyze the current status of pediatric studies using evaluation tools to measure patient treatment satisfaction with medication (TS-M), and to evaluate the development quality and measurement performance of the TS-M evaluation tool in children.

Methods: Seven biomedical databases and two medical scale websites were systematically searched from inception to November 2022 for the TS-M measures for children. Two reviewers independently screened literature, extracted data, descriptively analyzed the status of children studies using TS-M assessment tools and the characteristics of pediatric TS-M scales, assessed the methodological quality of included studies in terms of the process of developing TS-M instruments and measurement properties of the instruments using the Consensus-based Standards for the selection of health Measurement Instruments (COSMIN) checklist, and assessed the certainty of evidence using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE).

Results: We included 158 studies, including 151 pediatric studies using TS-M evaluation tools and 7 studies on the development and validation of TS-M scales for children. The 151 pediatric studies covered twelve categories of diseases, most commonly childhood pain, attention deficit hyperactivity disorder (ADHD), asthma, and other disorders. 67.5% of the pediatric studies used unvalidated self-administered TS-M questionnaires or interviews, 24.5% used validated developed adult TS-M scales, and only 2.0% used three pediatric-specific developed validated TS-M scales. The three pediatric TS-M scales were specific to children with diabetes, receiving iron chelation therapy, and ADHD, with the Diabetes Treatment Satisfaction Questionnaire for Teenagers and Parents (DTSQ-Teen/Parent) being used most frequently [4.6% (7/151)]. Seven studies on the

development and validation of pediatric TS-M scales involved seven pediatric TS-M specific scales. Concerning the scale development, overall development quality of the Diabetes Treatment Satisfaction Questionnaire for inpatients (DTSQ-IP), Satisfaction with Antipsychotic Medication Scale[®] (SWAM), Satisfaction with Iron Chelation Therapy (SICT), Satisfaction with Iron Chelation Therapy for patients (ICT-Sat), and Satisfaction Questionnaire with Intravenous or Subcutaneous Hemophilia Injection (SQ-ISHI) was considered "doubtful". In terms of the measurement properties, high-certainty evidence showed that the internal consistency of the Satisfaction with Medication Scale (SAMS), DTSQ-IP, SWAM, SICT, and ICT-Sat was rated "sufficient", but moderate- and high-certainty evidence showed, respectively, that the construct validity and construct validity of the above five scales were probably "uncertain". High-quality research on the content validity and test-retest reliability of the pediatric TS-M scale is still lacking.

Conclusion: Currently, the use of TS-M evaluation tools in pediatric studies has irrationalities; and the existing pediatric TS-M scales globally have narrow applications, questionable development quality, and lack some measurement performance studies; pediatric TS-M scales with wide a range of applications are still lacking.

Preparing for climate change: The essential role of pharmacy in addressing the next global crisis

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The impact of climate change on human health has yet to be fully dimensionalized and the uncertainty around the timing and magnitude of increased greenhouse gases brings additional variability to this issue. Notwithstanding the efforts underway to reduce carbon footprints and reach net zero, including those by health sector stakeholders such as hospitals, retail pharmacies and their suppliers, the imperative to prepare for the future of 2040 or 2050 has never been more urgent.

In this context, understanding how the pharmacy sector can and must prepare to play its full role in responding to the consequences of climate change is both timely and necessary.

Pharmacies and pharmaceutical scientists have multiple roles to play in addressing the next global crisis, including:

- Contributing to the global disease mapping and surveillance activities. Surveillance is needed to track the unevenly distributed global disease burden and how this will be affected by changes in temperature, rainfall, air quality and other consequences of climate change. Pharmacies will also be on the front-lines of identifying and tracking the emergence of new pathogens as climate change brings pathogens closer to people, including mosquito and other vector-borne infectious diseases.

- Responding to changes in disease prevalence across climate zones to ensure availability of appropriate medicines. As the incidence and prevalence of both communicable and non-communicable diseases shift due to climate change impact, pharmacies will be tasked with ensuring the right medicines and formulations are available in the right parts of a country and world according to the new distribution of disease. Pharmacotherapy expertise will also be needed as patients look to manage their health changes that are directly or indirectly caused by climate change.
- Protecting the supply chain. As climate change precipitates population shifts, new demands for specialized storage and handling of medicines, and protection from extreme weather events, pharmacies will have a major role to play in protecting the integrity of the supply chain, in conjunction with pharmaceutical wholesalers, manufacturers and other stakeholders.

A new framework has been developed for dis-aggregating the potential impact of climate change – and therefore the need for the pharmacy sector to be prepared – through delivering diagnostics, therapeutics, vaccines and medical care

- Direct impact in low and middle-income vs. high income countries (demand for medicines, supply chain, administration (e.g. temperature sensitive medicines))
- Impact on communicable disease vs. non-communicable disease (i.e. which therapy areas will be affected)
- Direct impact of climate change (vector-borne, heat-related conditions, etc) vs. Indirect/secondary impact (stress, migration, food supply/nutrition disruption)
- Needs met by existing medicines vs. new medicines that need to be developed e.g. new pathogen vaccines/therapeutics, new heat-disorder-related therapeutics, new respiratory modalities, new temperature-stable formulations

This framework has been applied to the estimated 3.2 trillion defined daily doses of medicines currently managed and handles by pharmacists in hospital and community settings, and this provides the basis for important discussion about priorities, roles, resources, and commitment needed in the pharmacy sector to best prepare for the oncoming impact of climate change.

Outlook for medicines use and spending through 2027: Impact on the pharmacy sector

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As we move beyond the COVID-19 pandemic era, the enduring impact on medicine use and spending continues to shape the demand for, and use of, medicines globally. Drug budgets are constrained, a large backlog of patients seek access to health delivery resources that are suffering from worker burnout and reduced capacity, and ongoing direct and indirect impacts of the pandemic result in increased

demand for treatment including those suffering from long-COVID and related mental health issues. Policymakers across developed and emerging economies are shifting from crisis to rebuilding modes with a focus on longer-term issues of sustainability. Complex trade-offs remain, and improved efficiency and quality of healthcare informed by evidence-based decision-making will inform the critical decisions in the coming decade.

The largest driver of medicine spending through the next five years is still expected to be global COVID-19 vaccinations, but leaving aside the pandemic, global spending on medicines continues to be driven by innovation and offset by losses of exclusivity and the lower costs of generics and biosimilars. In this session, we will quantify the impact of these dynamics and examine the spending and usage of medicines in 2022 and the outlook to 2027, globally and for specific therapy areas and countries. Areas of particular relevance to the pharmacy sector will include:

- The pipeline of new drugs that are expected to be launched over the next five years, totaling about 300 novel active substances, many of them complex specialty therapies requiring special handling, administration, and patient care
- The growing use of biosimilars across major developed markets, including important self-administered biologics handled by community or specialty pharmacies
- Expanded volume growth of medicines, especially in Latin America, Asia and Africa, driven by a mix of population growth and expanded access; contrasted with North America and Europe which will see very low volume growth
- The amount of spending on medicines globally will reach about \$1.9 trillion by 2027, before the impact of rebates and discounts, up from about \$1.4 trillion in 2022 and reflecting a moderated growth of 3-6% per year
- The therapy areas with the highest forecast spending in 2027 will be oncology, immunology, and anti-diabetics, followed by cardiovascular, and driven by greater use of innovative medicines and expanded access

Implications of the shift in demand, geographic differences and changes in the role of medicines handled by pharmacies will be explored in the context of these dynamics.

Categorization of global digital health resources to empower educators and practitioners

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Background: Digital health is an innovative and evolving field that should be incorporated in education and practice. There are numerous global and national initiatives to integrate digital health ("The FIP digital health Train-The-Trainer;"

American Association of Colleges of Pharmacy's (AACP) Curricular Outcomes and Entrustable Professional Activities (COEPA). In addition, the World Health Organization (WHO) Guiding Principles for Global Strategy on Digital Health 2020-2025 outlines four principles to expand digital health: institutionalization, integrated strategy, appropriate use for health, inequity and impediments. Therefore, providing a roadmap will benefit educators and practitioners to navigate the global guidance for digital health.

Purpose: Categorize digital health resources available globally to the WHO Guiding Principles for Global Strategy on Digital Health 2020-2025.

Methods: Digital health resources available globally (available in English) across six continents were identified through a literature review and online search. Key terms included digital health and telehealth. Specifically, digital health resources were identified in the following continents, Africa, Asia, Australia, Europe, North and South America. Each digital health resource was categorized according to the four principles of the WHO Guiding Principles for Global Strategy on Digital Health 2020-2025.

Results: Digital health resources from six continents were reviewed for utilization in education and practice. Overall, there are few quality resources available for educators and practitioners to integrate digital health content in the curricula and practice. Multiple countries offered digital health resources to use in a variety of practice settings. The intended use and audiences of digital health resources varied greatly. Most resources targeted several WHO global strategies.

Conclusion: There is a lack of standardization among global resources in digital health. This search provides a roadmap for educators and practitioners to identify the most appropriate digital health resource(s) to implement in curricula and practice. It is recommended to develop a global toolkit in collaboration among health professional associations. Having a road map on current digital health resources will empower future educators and researchers to enhance global digital health resources.

Pilot project demonstrating the role of community pharmacist in outpatient setting in India

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Background: Currently, India has around 77 million diabetic and 256 million hypertensive patients. While these diseases could be well managed with drugs and lifestyle modifications, only one-tenth of the rural and one-fifth of the urban Indian hypertensive population have their blood

pressure under control. Number of doctors in India per 100,000 patients is 5. India approved and started training clinical pharmacists since 2008, but those pharmacists' do not practice in the community setting thereby having no impact on the healthcare outcome of the nation.

Purpose: To demonstrate that inclusion of clinical pharmacy services in a community setting will improve patient outcome and thereby increasing their recognition as a member of the healthcare team.

Method: This study was conducted by community pharmacist in an outpatient setting in the primary health centers of Mysuru district of Karnataka. 100 participants were surveyed for demographic information as well as on their treatment compliance with respect to hypertension and diabetes. Data was collected by interviewing patients using a pre-tested structured questionnaire which included details on socio-demography, medical documentation, treatment details and factors assessing the compliance, knowledge and attitude towards the disease. All relevant data entered into an Excel sheet and results analyzed using suitable statistical method.

Results: Of the 100 patients, 43 patients were only diabetic, 37 patients had only hypertension and 20 patients had both hypertension and diabetes. Only 43% of diabetic patients had random glucose level of less than 140. Similarly, only 3 patients out of 61 could be considered to have normal blood pressure of <120/80. While 99% and 92% of the patients reported that they monitor their diabetes and hypertension regularly. In terms of compliance – 66% of the patients were fully compliant and the remaining 34% of the patients could be considered somewhat compliant. The most common reasons for non-compliance were lack of motivation, and many mentioned difficulty to remember to take daily medications due to work or forgetfulness. This is followed by lack of funds and insurance coverage to purchase medications. Tiredness, headache, drowsiness, constipation, dry mouth were some of the common side effects observed by patients after consumption of prescribed medications. More than 80% of study population made lifestyle changes like walking, meditation and yoga for the betterment of prevailing conditions.

Conclusion: To our knowledge this is the first demonstration of applying clinical pharmacy services in an outpatient setting in India. Only if patient has access to the clinical pharmacists' expertise during their encounter in an outpatient setting – the potential of positive healthcare outcome could be realized in the Indian setting.

A review of acute paediatric pain guidelines in Australian hospitals

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Background: Australian paediatric care is guided by clinical practice guidelines to assist decision making. To elucidate barriers to pain management worldwide and ensure children are provided with optimal care, a Lancet Child & Adolescent Health commission, published in January 2021, identified areas to: Make pain matter, Make pain understood, Make pain visible, Make pain better. Understanding how hospitals manage acute pain in children is crucial to realising these goals.

Purpose: To analyse and identify discrepancies between Australian hospital guidelines for management of acute pain in children.

Method: Relevant guidelines from quaternary hospitals in Australia were identified via online searches. A comparative analysis was performed focussing on discrepancies, particularly in analgesic recommendations.

Results: Amongst Australian paediatric hospitals, Clinical Practice Guidelines (CPG) endorsed by the Paediatric Improvement Collaborative (PIC – An Australian collaborative to improve the safety, reliability, and effectiveness of care for children in any acute setting) were found for:

- The Children's Hospital Westmead (New South Wales)
- Royal Children's Hospital Melbourne (Victoria)
- Queensland Children's Hospital (Queensland)

CPG not endorsed by PIC were found for:

- Women and Children's Hospital (South Australia)
- Perth Children's Hospital (Western Australia)

5 other hospitals were identified that did not have CPGs:

- John Hunter Children's Hospital (NSW)
- Sydney Children's Hospital Randwick (NSW)
- Monash Children's Hospital (Victoria)
- Mater Children's Hospital (Queensland)
- Centenary Hospital for Women and Children (Australian Capital Territory)

Analysis of guidelines found alignment in age recommendations and frequency of analgesic administration. However, the following discrepancies were identified:

Asthma

Asthma is a known precaution for ibuprofen, due to rare aspirin-sensitive asthma increasing risk of bronchospasm. Current best practice suggests trialling NSAIDs if appropriate and tolerance is unknown (RCH Melbourne PIC guidelines). Yet asthma is non-specifically stated to be a contraindication in the Children's Hospital Westmead guidelines.

Gastrointestinal (GI)

Western Australia Health states doses ibuprofen can optionally be given with milk or food to reduce discomfort. The PIC guidelines and South Australia Health indicate doses of ibuprofen should be given with food initially but notes if feeding is inconvenient doses may be administered without food. Advice on administration of ibuprofen regarding food is omitted from other guidelines. Contraindications such as inflammatory bowel disease and GI ulceration/bleeding were not mentioned in the PIC or the Western Australia guidelines.

Other precautions with paracetamol and ibuprofen

Hepatic failure, renal failure, dehydration, and bleeding due to anti-platelet effect were inconsistently mentioned in guidelines.

Duration of treatment

Risks noted were based on long-term, higher dose treatment, rather than short term acute treatment

Conclusion: Overall the guidelines are similar, however with some deviations, particularly relating to potential ibuprofen adverse effects

Future perspectives

There is an opportunity for harmonised guidelines to reduce medication variance and clarify risks based on short-term use of analgesic. This could include informed counselling by discharge pharmacists to caregivers on surveillance and accurate analgesic dosing. A project focused on new guideline creation targeted for community pharmacists is currently underway.

List of Australian potentially inappropriate medicines–The AUS-PIMs List

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Background: Older people are at high risks of medicines-related harms. Potentially inappropriate medicines (PIMs) list has been developed to assist clinicians and researchers to identify medicines with risks that may potentially outweigh their benefits in order to improve medicine management and safety. Existing lists of PIMs developed in other countries were found to be only partially applicable in the Australian setting due to differences in medication availability, prescribing and clinical practice guidelines, and the healthcare system.

Purpose: To develop a list of potentially inappropriate medicines (PIMs) for older people specific to Australia.

Method: This study used a Delphi technique to reach consensus across all participating expert panel members. Clinicians and researchers with expertise in geriatrics, general medicine, pharmacy, clinical pharmacology, general practice and epidemiology were identified and invited to participate in a multidisciplinary panel. A consensus list was developed for medicines deemed potentially inappropriate, the settings in which they are inappropriate, and any potentially safer alternatives.

Results: A total of 33 panel members (20 females, 13 males) participated in the first round and 32 participated in the second round. Almost half of the panel members in both rounds considered themselves to be experts in geriatric medicine or pharmacy.

A total of 19 medications or medication classes were evaluated in both rounds. Consensus was reached for 16 medicines or medication classes as having one or more medicines as potentially inappropriate in older people. All 19 medicines or medication classes had specific conditions which makes them more potentially inappropriate, while alternatives were suggested for 18 medications or classes. Up to 17 medications or medication classes were deemed as inappropriate if the patients are frail or have a high risk of falls.

Conclusion: An explicit PIMs list for older people living in Australia has been developed containing 19 medicines or medication classes. The PIMs list is intended to be used as a guide for clinicians when assessing medication appropriateness in older people in Australian clinical settings and does not substitute individualised treatment advice from clinicians.

I do not understand asthma: A qualitative exploration of asthma management among Middle Eastern Arabic speaking refugees and migrants

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Background: Asthma is a common non-communicable chronic disease, with over 262 million people reported to have asthma worldwide in 2019. Adherence to asthma medication was reported to be only 30-50% worldwide; ethnic minorities have additional factors that may affect their medication adherence including health literacy, illness perceptions, health beliefs and cultural beliefs.

Purpose: The key aim of this exploratory study was to determine the perception of asthma among Middle Eastern Arabic-speaking refugees and migrants, its impact on lives as well as identify barriers and enablers to their optimal asthma self-management.

Method: In this study, 15 participants who identified themselves as Middle Eastern refugees and migrants in Australia and had been diagnosed with asthma were interviewed (migrants = 8, refugees = 7) using semi-structured interviews. Recruited participants were asked about asthma control, perception of medication, knowledge about asthma, asthma exacerbations, action plan, thunderstorm asthma, asthma education, the use of complementary medications as well as traditional methods to manage asthma and patient-healthcare provider relationship. Interviews were recorded, transcribed and translated, and then thematic analysis was used to analyse qualitative data using NVivo 12 program for Windows.

Results: Five key themes emerged from the interview analysis: (1) Participants' descriptions of their experience with asthma, emotional consequences, and the impact of asthma on their lives; (2) Participant's perception of asthma, asthma medications, complementary medicine, and healthcare providers; (3) Asthma management with prescribed and complementary and traditional medicines; (4) Perceived barriers to asthma management; and (5) Asthma health literacy. Differences were found between refugees and migrants relating to asthma perception, use of complementary medicines, barriers to optimal asthma management and health literacy. In this study, refugees expressed difficulties with accepting being diagnosed with asthma, denying having asthma and reported not understanding asthma - "No one teaches you here, many asthmatics know nothing about asthma, there is no education here" (Refugee 1.). Migrant participants showed more concerns about asthma medications' adverse effects in comparison to refugees. The use of complementary and traditional methods was more prevalent in migrant participants to manage their asthma - "Anise is given to children who have a cough, so I thought of using it since it is natural" (Migrant 1.). Migrant participants were more concerned about the cost of asthma medication and considered it as a barrier to optimal asthma management.

Conclusion: Knowing the differences between Middle Eastern Arabic speaking refugees' and migrants' beliefs and culture is key to understanding their asthma self-management. Asthma does not appear to be well managed and issues such as asthma knowledge and patient nonadherence can compromise treatment. The findings from this project can support the co-development of a pharmacist-led intervention to address these barriers/enablers, improve the quality of life and reduce preventable hospital admissions in this ethnic minority population with asthma.

The Covid-19 pandemic perspective from a New Zealand medicines information service

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Background: The COVID-19 pandemic has proved challenging for every aspect of healthcare. Accurate information on the prevention and treatment of COVID-19, and associated issues such as medicine shortages, monitoring of medicines in lockdowns and misinformation is imperative. Medicines Information (MI) services are ideally placed to provide such advice.

Purpose: To analyse COVID-19-related enquiries received from hospital and community-based health professionals by a MI service in Aotearoa New Zealand during 2020-2022.

To compare and relate these data to non-COVID-19-related MI enquiries, and prominent pandemic events including lockdowns, border closures and the introduction of vaccines and antivirals.

To describe the use of proactive MI via the addition of COVID-19 content to an established local MI website.

Method: All MI enquiries received from 1 January 2020 to 31 December 2022 were extracted from the local electronic MI database and a retrospective analysis was conducted. Traffic data for the MI website were acquired.

Results: 388 COVID-19 enquiries were received over the three years (32 in 2020, 42 in 2021 and 314 in 2022), representing 7% of the total 5310 MI enquiries. Most enquiries were from pharmacists and doctors (65% and 35%, respectively, for COVID-19 enquiries compared to 56% and 36%, respectively, for non-COVID-19 enquiries). 338 (87%) of the COVID-19 enquiries related to COVID-19 treatments and/or vaccines (including 270 enquiries regarding the antiviral nirmatrelvir+ritonavir and 37 regarding vaccines). COVID-19 enquiries increased from 2% of the total in both 2020 and 2021, to 17% in 2022. In 2020, 75% of COVID-19 enquiries related to medicine selection, compared to 11% of non-COVID-19 enquiries, highlighting the increased pressure to prescribe alternatives due to supply problems, border closures and lockdowns. In 2021, 62% of COVID-19 enquiries related to vaccines, reflecting initiation of the national vaccination programme, while 24% related to ivermectin, following the circulation of misinformation. In 2022, there were 195 COVID-19 enquiries regarding drug-drug interactions and 185 of these involved nirmatrelvir+ritonavir. This was an increase from just one and 10 COVID-19 drug-drug interaction enquiries in 2020 and 2021, respectively. 62% of COVID-19 enquiries in 2022 related to drug-drug interactions compared to 15% for non-COVID-19 enquiries, illustrating the demand for specialist clinical advice to manage COVID-19 drug-drug interactions. The proactive MI COVID-19 webpage received 16,719 views over the three years (mean 491/month). Monthly views

peaked at 4358 in March 2020, likely reflecting the lack of available information early in the pandemic. Other peaks in November 2021 and March 2022 coincided with delta and omicron waves. The influx of drug-drug interaction enquiries in 2022 prompted the publication of specific information on this topic, which received 3369 views (mean 374/month). Overall traffic to the MI website increased after the addition of COVID-19 content, from 1346 views/month in 2019 to 3659 views/month during 2020-2022.

Conclusion: MI services can play a crucial role in the provision of reliable evidence-based advice, both reactive and proactive, during a global pandemic.

Oral direct factor Xa inhibitor-related vasculitis: Analysis of the FDA Adverse Event Reporting System (FAERS) data and literature review

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Background: Oral direct factor Xa inhibitor is a kind of the newer direct oral anticoagulants (DOACs) being used to manage venous thrombosis, which is a potential cause of cutaneous vasculitis.

Aim This study aimed to determine the general clinical characteristics and possible mechanisms of oral direct factor Xa inhibitors-related adverse drug reaction (ADR) of vasculitis and provide references for rational medication use in clinical practices.

Method: Data were derived from the U.S. Food and Drug Administration Adverse Event Reporting System (FAERS) database about apixaban, edoxaban, rivaroxaban and betrixaban related vasculitis published before 1 February 2023. Disproportionality analysis for accessing potential risk signals was reported by proportional reporting ratio (PRR), reporting odds ratio (ROR) and information component (IC). The research about case reports of vasculitis induced by oral direct factor Xa inhibitors was conducted using Pubmed, SCI, Embase (OVID), CNKI, Wanfang, VIP database from inception to 1 February 2023. Screening and extracting data including the basic patient profile, medication status, occurrence frequency, treatment options and outcomes of vasculitis.

Results: In FAERS, 441 cases of vasculitis associated with apixaban (n=202), edoxaban (n=21), and rivaroxaban (n=218) from 2004 to the last quarter of 2022. But there was no betrixaban-related vasculitis reported in the database. Vasculitis was significantly associated with edoxaban (ROR=1.99, 95%CI 1.30, 3.05), while was not associated with apixaban (ROR=0.92, 95%CI 0.80, 1.06) and rivaroxaban (ROR=0.97, 95%CI 0.85, 1.11). Excluding bleeding events, a total of 359 cases of vasculitis, including apixaban (n=166), edoxaban (n=15) and rivaroxaban (n=178), were retrieved. Vasculitis was significantly associated with edoxaban (ROR=2.16, 95%CI: 1.30-3.58) and rivaroxaban (ROR=1.68, 95%CI: 1.45-1.95), while was still not associated with

apixaban (ROR=0.95 95%CI: 0.82-1.11). In literature review, 17 case reports of 21 patients consisting of 12 males and 9 females with an average age of 67.71±17.47 years, were identified in patients treated with rivaroxaban (n=6), apixaban (n=14), and edoxaban (n=1). Leukocytoclastic vasculitis (LCV) was reported in 15 cases, 14 of which were confirmed by biopsy. The interval from drug initiation to the symptomatic onset was 1 hour to 5 months.

Conclusion: This study suggested a significant link of oral direct factor Xa inhibitor and LCV.

Propionic acid derivatives improve cardiovascular disease in patients with diabetes

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Background and objectives: Diabetics often have dyslipidemia, which can lead to cardiovascular disease. According to the International Diabetes Federation, 536 million adults have diabetes in 2021 and 783 million by 2045. Almost 1 in 2 adults with diabetes don't know they have diabetes. Diabetes is a major driver of mortality worldwide, with an estimated 6.7 million adults dying from diabetes or its complications. This corresponds to 12.2% of all-cause deaths in this age group. About one-third (32.6%) of all deaths. In addition, the incidence of CVD in patients with hyperlipidemia is about twice that of normal patients. The aim of this study was to investigate whether propionic acid derivatives could improve cardiovascular disease in diabetic patients.

Methods: Using the National Health Insurance Research Database of the Taiwan Ministry of Health and Welfare, there were 30,142 diabetic patients from 2004 to 2005, and the statistical time was from 2004 to 2013. After excluding patients with severe comorbidities and use of other medications, we included eligible patients (treated group) and matched patients (untreated group). Participants were followed up for acute coronary syndrome and stroke after receiving the propionic acid derivative or the corresponding calendar date. Results were finally presented using Cox proportional hazards models and Kaplan-Meier survival curves.

Results and Discussion: Diabetics are at higher risk of dyslipidemia and cardiovascular disease. After using propionic acid derivatives. In age, sex, comorbidities and drug treatment adjusted Cox models. The incidence of ACS

was reduced by 48.8% (HR=0.512; CI=0.358 to 0.734; P=0.0003), and stroke was reduced by 40.3% (HR=0.597; CI=0.389 to 0.918; P=0.0189). In this study, we calculated a large database, but we cannot know the patient's compliance and living habits, and the results may be biased.

Conclusions: Propionic acid derivatives reduce the incidence of ACS and stroke in diabetic patients. The use of propionic acid derivatives and hypoglycemic drugs may be a useful therapeutic strategy.

Artificial intelligence in the management of cardiovascular disease

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Background: Artificial Intelligence (AI) is a tool with potential to shape present and future healthcare, facilitating patient care to be more personalised, convenient, and effective.

Purpose: The study aimed to explore the use of AI in the management of cardiovascular disease (CVD). The objectives were to identify applications, opportunities, benefits and challenges of the use of AI in the management of CVD.

Method: A bibliographic study was conducted using PubMed® by applying the search terms and Boolean operator "Artificial Intelligence" AND "Cardiology". Inclusion criteria were peer-reviewed articles, available as free full-text, in the English language, published between 2017 and 2022, and human studies.

Results: The literature search generated a total of 2,829 records. No duplicate records were identified. After applying the inclusion criteria, 2,735 records were excluded, and a total of 94 studies were included in the review. Most publications were published in 2021 (n=26) and 2022 (n=23), and most publications were review articles (n=58). The highest number of publications originated from North America (n=42), followed by Europe (n=26) and Asia (n=22). The most common applications identified were the integration of AI in medical devices for cardiac imaging and monitoring (n=81), such as in the interpretation of electrocardiogram (n=52) and echocardiogram (n=47) results, followed by using AI in the prediction of CV events and mortality (n=64), such as cardiac-related mortality (n=29) and cardiac arrhythmias (n=25). The most common benefits identified were the capability of predicting future cardiovascular events and diseases (n=67), and the ability of AI to diagnose and detect diseases rapidly and accurately (n=52). The most common challenges identified were lack of transparency in decision-making processes when AI is used (n=24), and difficulty in interpretation of data processed by AI models (n=23).

Conclusion: The study showed that the interest and use of AI in the cardiology specialty, particularly with respect to medical devices, is increasing, and benefits of AI outweigh challenges. AI has great potential as a supportive tool for healthcare professionals in cardiovascular medicine, and further research is warranted.

Comparative analysis of antibiotic prescribing at the time of sore throat in three European countries: Implications for antimicrobial resistance

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Background: Overuse and misuse of antibiotics in upper respiratory tract infections (e.g. pharyngitis [sore throat]) significantly contribute to antimicrobial resistance (AMR). Tackling unnecessary antibiotic use and AMR is a global health priority. Many countries have implemented strategies to target inappropriate antibiotic use, including discouraging antibiotic treatment first-line for sore throat. To understand whether strategies are working, and the contribution of inappropriate prescribing to AMR, it is useful to compare antibiotic prescribing patterns in Europe.

Purpose: To compare antibiotic prescribing patterns for sore throat among physicians across Italy, Russia and the United Kingdom (UK).

Method: This multicentre, retrospective, observational study analysed prescribing data from primary care practices between different timepoints across Italy (November 2018–October 2021), Russia (January 2019–November 2021; outpatient reimbursement segment only) and the UK (November 2016–October 2021). Real-world data (from Longitudinal Database [LPD], IQVIA Ltd® [Russia; Italy] and LPD, IQVIA Ltd® incorporating data derived from THIN, A Cegedim Database, Oct 2021 [UK]) were filtered to identify patients with a laryngitis, pharyngitis, tonsillitis or glandular fever diagnosis within 14 days of an antibiotic prescription.

Results: Antibiotic prescribing mirrored the seasonal trend of selected respiratory infections across the countries included in the analysis, despite variability across the UK's devolved countries and smaller regions of Russia. In the UK and Italy, the absolute number of patients with sore throat prescribed antibiotics declined over time (UK [2017–2021]: –55% [n=466,972]; Italy [2019–2021]: –51% [n=667,061]). However, in Russia (2019–2021), there was an increase (+51% [n=3428]), although these data were more limited. The proportion of patients with sore throat prescribed antibiotics decreased by 2% in the UK (2017–2021),

increased by 6% in Italy (2019–2021), and increased by 19% in Russia (2019–2021). In the quarter to October 2021, in the UK and Italy respectively, 15% (n=3600) and 25% (n=8500) of physicians were high prescribers (covering 50% of total prescriptions) of antibiotics to patients with a sore throat diagnosis. In the UK (2017–2021), ~65% of second-line prescriptions to patients with sore throat were another antibiotic. In Italy (2019–2021), this increased to over three-quarters (83–85%). Similar data could not be collected for Russia.

Conclusions: Despite efforts to reduce inappropriate antibiotic use for sore throat, antibiotics are still being prescribed first-line in several European countries, and this contributes to AMR. However, the magnitude of the problem appears to be different depending on the country. Russia demonstrated increased antibiotic prescribing over time. Additionally, sectors not included in this study (e.g. hospital) would also further contribute to antibiotic consumption. Although there was a decline in antibiotic prescribing in Italy and the UK, there was an ongoing high use of antibiotic treatment (first and second line) for patients with sore throat. Despite countries implementing strategies to combat inappropriate antibiotic use, it is clear that unnecessary antibiotic prescribing is still a problem. This study highlights the need for: educational campaigns to prevent antibiotic misuse; increased antimicrobial stewardship; establishment of regional guidelines to support prescribing decisions. Furthermore, facilitating enhanced health literacy will enable patients to make better treatment choices.

Authorised medicinal products produced using recombinant DNA technology

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Background: The use of genetically modified organisms and technologies such as recombinant DNA (rDNA) technology, enabled opportunities to produce new medicinal products and novel treatments which target previously untreated conditions, such as the production of insulin for diabetes. Along the years, numerous therapies were approved which address unmet therapeutic needs.

Purpose: The aim of this study was to identify products produced using rDNA technology which are approved within the European Union.

Method: A list of products, which included biological medicines, biosimilars and vaccines, produced using rDNA technology and approved within the European Union was identified using the European Medicines Agency website. The inclusion criteria used for the study were that they are currently approved, are for human use, and produced using rDNA. The identified products were categorised according to

the active pharmaceutical ingredient, the indication for use and the date when approval was granted.

Results: A total of 63 products approved for human use were identified. The oldest product produced using rDNA technology to be granted marketing authorisation and which is still currently authorised within the EU is insulin lispro (Humalog), which was approved in 1996. The most recently approved product was the biosimilar medicine teriparatide (Kauliv) which was granted approval in January of 2023 and is indicated for osteoporosis. The highest number of biological products to be authorised was observed in 2002, with 6 products being granted approval, whereby 5 of the products were approved for use in diabetes mellitus and 1 product was approved for immunization against Hepatitis A and B. This was followed by 2014 and 2015 with 5 products being approved in each year. Out of the currently approved products, no products were granted authorisation in 1998, 2008, 2010 and 2011. The authorised products are used for 15 conditions. The condition with the highest number of approved products was Haemophilia A and B (n=15), followed by diabetes mellitus (n=14) and Hepatitis A and B (n=10). While asthma and chronic urticaria, short bowel syndrome and obesity have 1 approved product each.

Conclusion: The amount of approved products produced using rDNA technology varied along the years and consisted of biological products, biosimilar medicine and vaccines. Although conditions such as diabetes have a good number of approved products, there are still conditions which require the availability of additional therapeutic options.

Effectiveness of education and regulatory change in preventing anti-doping violations from sports supplements

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Background: Sport supplements have been the leading cause of anti-doping rule violations (ADRVs) in Australia, accounting for a third of positive doping tests in Australia between 2016 and 2019 with significant consequences for athletes' career (up to 4 year sanction) and impact on physical and mental wellbeing. Sports Supplements in Australia have been found to contain a high rate of non-disclosed ingredients including WADA prohibited substances with significant health risks such as stimulant alkylamines.

Aim: The aim of this real-world initiative was to use a multidimensional intervention to reduce inadvertent ADRVs due to sport supplement use.

Method: This initiative used a collaborative approach to design and implement innovative education programs for athletes and a regulatory changes to reduce the risk of ADRV in athletes.

Education: Co-designed with Australian athletes, including athletes who had tested positive through supplement use, the educational approach shifted from avoidance (“do not use” advice) to harm minimisation, providing athletes with a list of low-risk sports supplements to choose from if they decided to use a supplement. This was supported with a mobile app (2018), with an interactive list of low-risk supplements and a risk assessment survey. Supplement education was included in every Anti-Doping education session for athletes at all levels in all sports, and online course including for coaches, parents and medical support staff. The agency also worked with athletes to create educational videos, which are now used in anti-doping education programs worldwide.

Regulation: Sports supplements were regulated as a food, without strict requirement manufacturing and regulatory standards. A collaborative approach between SIA and partners including national sporting organisations, the National Measurement Institute, the Australian Institute of Sport, Food Standards Australia and New Zealand (FSANZ) and Therapeutic Goods Administration was used to drive change. This included market surveys in 2018 and 2020 which confirmed the continued presence of disclosed or undisclosed WADA prohibited ingredients. Major regulatory was achieved in September 2020 when sports supplements became regulated as therapeutic goods now subject to greater regulation with strict requirements on quality and safety.

Results: The educational approach was well received by athletes and sport support personal. The mobile app to guide safe supplement use was downloaded 65,094 times, with almost 23,000 supplement checks a year since 2018. Impact on ADRVs: The number of athletes with a positive doping test due to supplement use was 33 athletes in period from 2016 to mid-2020. In 2021–22 for the first time in over a decade, not a single athlete tested positive due to a supplement in Australia. This has significant benefits for athletes who have been prevented from inadvertent doping violations and adverse health impacts, the broader community who use sport supplements, sporting organisations and SIA.

Discussion: Innovative education and regulatory change had a significant impact on the sports supplements sector and resulted in inadvertent doping risk reduction as well as prevention of adverse health outcomes for athletes and the community. This model of combining education and regulation could be applied to other health risks.

The pharmacoeconomics of Covid-19: Effects on access to medicines and universal health coverage in Nigeria.

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Background and Objectives: The COVID-19 pandemic has affected global health and other issues including medicines pricing which in turn affects access to medicines. In Nigeria, many essential medicines and commodities rumored to provide preventive/curative effects on COVID-19 were affected by significant price increase. Hence, this study assessed the effects of the pandemic on price of pharmaceuticals and the implications on access to medicines.

Approach: Descriptive survey was used to assess the effects of the pandemic on price of certain medications in 170 community and retail pharmacies in Abuja Nigeria. The Statistical Package for Social Sciences was used for data analysis.

Results: All community pharmacies assessed reported increase in price of some medications rumored to be effective against COVID-19 especially Hydroxychloroquine, Azithromycin, Vitamin C and Zinc. As much as 500% increase in cost of these medications and face masks was reported during the first lockdown period. All facilities reported that price hikes affected other essential medicines like antimalarials. All facilities reported that price increase has persisted.

The pandemic led to increase in price of pharmaceuticals in Nigeria which has implications for health coverage and affordability of medicines. This fosters inequities in access to medicines and have significant pharmacoeconomic implications for millions of Nigerians, majority of whom pay out of pocket for their health and medicines needs. This is further worsened by weak price regulation and monitoring mechanisms.

Conclusion: Considering measures for better pricing policy and regulation, strengthening supply chains, and creating buffers against future pandemics/epidemics is key to ensuring vulnerable populations are not disenfranchised from accessing essential medicines. Pharmacoeconomic capacity building in LMICs for pharmacoeconomic stability and pricing regulation could help reduce inequities and improve access to medicines.

SELF-Rx: A digital application to monitor patients' adherence in the practice of self-medication and a clinical reference tool for pharmacists in the provision of self-medication therapy in Indonesia

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Background: The practice of self-medication, which is defined as the selection and use of medicines by individuals to treat self-recognised illnesses or symptoms, becomes the first-line option of approximately 84,23% Indonesian citizens in 2021. The high prevalence of self-medication practices in Indonesia gives way to unmonitored and uneducated practices, leading to several negative risks which might be imposed on the patients themselves. One of the initiatives that the International Pharmaceutical Federation (FIP) took to achieve the Sustainable Development Goals (SDGs) includes the publication of the 21 FIP Development Goals. Out of the 21 goals, goal no.14 (Medicines Expertise), no.15 (People-Centred Care), no.18 (Access to Medicines, Devices, and Services), and no. 20 (Digital Health) holistically emphasise the importance of having healthcare providers, specifically pharmacists, who possess expertise when it comes to the rational use of drugs, as well as being capable of providing people-centred care services, equal access to all, and adequate usage and optimization of existing digital platforms to achieve all those. Research on this topic shows that there is a need to provide a tool to help pharmacists in Indonesia in the provision of equal, adequate, and people-centred self-medication services.

Aim: With the previous considerations in mind, this research aims to provide a solution in the form of the development of a digital application, called "SELFRx". The expected outcome of this solution would be for this application to encompass all four aforementioned FIP Development Goals in supporting the practices and services of self-medication in Indonesia, both from the provider's side (pharmacists) and receiver's side (patients).

Methods: This development of this idea was generated through the process of a literature review of existing relevant secondary and tertiary data.

Results: SELF-Rx will specifically target two groups of people, the first one is the group of patients who are currently undergoing self-medication for their ailments, and the second one is the group of pharmacists who are in charge of those patients. The features that will be evident on the first step of development of the digital application include features for monitoring the patients' adherence (pill reminder, pill tracker, refill reminder, drug information, appointment scheduling, live consultation) and features which act as clinical reference tools to support the pharmacists in terms of the pharmacotherapy of several common self-medicated diseases (digital therapy algorithm,

database of monitored patients, patients' adherence alert, drug interaction checker, drug side effects search engine).

Conclusion: In conclusion, SELF-Rx plays a vital role in helping both pharmacists and patients in the practice of self-medication in Indonesia. With its dual roles, SELF-Rx will be able to monitor the patients' adherence, as well as serving as a clinical reference for pharmacists. It will allow for the fulfilment of the end goal of ensuring proper self-medication practices in Indonesia.

Impact of interventions on medication adherence in patients with coexisting diabetes and hypertension

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Background: The coexistence of hypertension and diabetes is a worldwide public health concern associated with worse clinical outcomes than each condition alone. Poor adherence and persistence to medication poses a problem universally, especially for asymptomatic conditions such as hypertension. However, there are interventions to help patients adhere to treatment regimens and in turn, lower the risk of micro- and macrovascular complications.

Purpose: This review aims to investigate the impact of interventions targeting patients with coexisting hypertension and diabetes on their medication adherence in both conditions.

Method: We conducted an electronic search of three databases (PubMed, EMBASE and CINAHL) and screened for eligible articles. Studies published in English from June 2012 to March 2023 that analysed interventions addressing medication adherence to therapeutic medicines in coexisting hypertension and diabetes were included. We limited the time of search to June 2012 as the ABC taxonomy for medication adherence which promotes consistency in taxonomy and methods used in studies addressing adherence to medication was published in April 2012. Studies that focused on medication adherence to prophylactic medication were excluded. Covidence systematic review software was used for data screening and extraction.

Results: Six studies were included in this review. For each study, we analysed the study design, methods of assessing patient adherence, type of intervention used and impact of intervention on medication adherence. All six studies employed indirect methods of measuring adherence due to low cost and easy applicability (Objective n=4 and Subjective n=2). One study used a multifaceted intervention while five studies used single interventions, with informational (n=4) interventions being the most common strategy and behavioural being the least (n=1). Most studies reported on

pharmacist-led (n=5) interventions while one intervention was physician-led. Most pharmacist-led interventions (n=4) reported a significant impact ($p < 0.05$) in improving medication adherence when compared to controls. Two studies did not show a statistical significance in improving medication adherence. Nonetheless, all interventions were successful in improving one or more clinical outcomes assessed in patients with coexisting hypertension and diabetes.

Conclusion: Literature suggests that patient centred interventions have great potential to increase medication adherence in patients with coexisting hypertension and diabetes. As experts in drug therapy and patient education, pharmacists can be excellent initiators of interventions that target patients with coexisting chronic conditions. However, the review highlights the need to develop interventions which can be tailored to the individual patient needs over the duration of their chronic disease management. The limited number of studies highlights the need to promote medication adherence intervention studies that focus on coexisting hypertension and diabetes.

Hospital pharmacists counselling practices in Sri Lanka: Do pharmacists need institutional support?

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Background: Patient counselling by hospital pharmacists is a crucial aspect of pharmaceutical care that aims to improve patient outcomes by ensuring the safe and effective use of medication. Hospital pharmacists are responsible for providing patients with adequate information on their medication, including medication name, indication, dose, dosage form, administration routes, side effects, and drug interactions. However, the effectiveness of patient counselling by hospital pharmacists may be hindered by various factors such as increased workload, time constraints, lack of training programmes, and institutional support. At present, the role of hospital pharmacists in Sri Lanka is limited to drug dispensing, providing limited medicine information, pharmaceutical store management, and compounding within the hospital.

Purpose: This study focused to investigate the current patient counselling practices of hospital pharmacists, and barriers to patient counselling and identifying the need for institutional support to improve the provision of patient counselling.

Method: A cross-sectional survey was conducted among hospital pharmacists in 6 government hospitals in the Central Province of Sri Lanka and 137 pharmacists

participated in the study. A self-administered questionnaire was used to collect the data on pharmacists' current practices, barriers, and factors that influence their counselling practices. A descriptive analysis was performed using IBM SPSS (Version 25) software.

Results: After excluding 28 incomplete questionnaires, 119 were used for data analysis. Pharmacists engaged in patient counselling at hospitals responded, that 68% of them are engaged in patient counselling always or frequently. More than 80% of the participants reported that they provide information on the medication name, the indication, route of administration, prescribed dose, frequency of administration, duration of treatment, and storage conditions. However, 87% of participants responded insufficient time available for counselling was a challenge. Interestingly, only 29% of pharmacists claimed that hospitals offer training programs to educate them about counselling. The study also found that pharmacists had different ways of improving their knowledge of patient counselling, with the majority (79%) preferring to use the internet, followed by continuing professional development (CPD) outside of hospitals (45.4%), learning from senior pharmacy colleagues (39.5%), textbooks (47.9%), and from other hospital staff (19.3%). The high workload was a barrier that prevented 83% of pharmacists from providing counselling to patients. Nonetheless, the study showed that 91% of pharmacists engage in patient counselling while dispensing medications.

Conclusion: This study revealed that hospital pharmacists are engaged in patient counselling. However, factors like time constraints and workload affect their effectiveness. Institutional support in the form of training programmes and guidelines is needed to improve counselling practices, which would result in better patient outcomes and increased job satisfaction among pharmacists. The study provides valuable insights for policymakers, hospital administrators, and pharmacists to develop strategies to improve patient counselling in hospital settings in lower-middle-income countries like Sri Lanka. It could be recommended to develop a standard guideline for patient counselling and educating patients about the medicine information and services they can obtain from pharmacists.

Patient willingness to use a language learning model for questions related to medication therapy related: A quantitative survey

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Large language models (LLMs) have recently received mainstream attention due to the release of ChatGPT by OpenAI. Despite the widespread recognition ChatGPT has received for its groundbreaking performative functionality, there has yet to be an in depth review of its limitations related to medication information and the downstream risks that it poses to users.

The gap this study will address is to characterize patient willingness to use LLMs or tools based on LLMs for questions related to medication therapy, such as GLP-1 agonists and weight loss. This willingness to use LLMs will be compared to other resources available to patients such as patient trust in pharmacists' recommendations and information from an internet search. The hypothesis that patients' willingness to use a language learning model for questions related to medication therapy will differ from their trust in pharmacists' recommendations or information from an internet search.

This study is a quantitative survey of 25 patients who have been selected for based on previous experience with medication therapy. Patients will be asked to complete a survey that includes questions about their trust in pharmacists' recommendations, information from an internet search, and LLMs. This information will be complemented by information about patients' familiarity and use of technology and their demographics/background. The survey will be conducted in the United States using an established patient research registry. The data will be gathered using the Qualtrics survey platform and analyzed using Python.

The results of this study are currently in progress and will be completed by the time of the conference. We anticipate finding that patients' willingness to use a language learning model for questions related to medication therapy will differ from their trust in pharmacists' recommendations and seeking information from an internet search. We will present the data on patient responses and compare the three sources of information using frequency distributions and t-tests as appropriate for sample size.

The findings of this study will provide insights into patient willingness to use LLMs for medication therapy questions and the relative trust patients have compared to other resources. The results may inform how pharmacists can anticipate and address public perceptions and use of LLMs. This understanding can support the development of new patient education pathways, tools, or interventions to improve the relationship between patients, pharmacists, and medication information to improve patient outcomes. The limitations of this study include the small sample size for such a pilot study and a single site location for the sampled population. Future research could include a larger sample size, more specific use of LLMs, and multiple locations.

Role of pharmacists in vaccination in low-and-middle-income countries before and after the Covid-19 pandemic: A multi-country survey

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Background: Pharmacists are medication experts and one of the most accessible healthcare providers, but their full potential as clinical health care providers in vaccination efforts may not be well utilized globally. Evidence surrounding the successful integration of pharmacists in vaccination efforts in high-income countries especially during the COVID-19 pandemic have been mounting. However, there is a gap in data surrounding the mobilization of pharmacists in vaccination efforts in low- and middle-income countries (LMICs).

Purpose: To assess pharmacists' roles in vaccination efforts in LMICs and reveal any changes in pharmacists' roles in vaccination delivery during the COVID-19 pandemic.

Method: We developed and conducted a knowledge, attitudes, and practices survey among pharmacists and pharmaceutical science professionals in LMICs asking about current roles of pharmacists in vaccinations. The survey assessed pharmacists' reported involvement in various vaccination services domains and elicited perceptions on the role of pharmacists in vaccination and perceived barriers. We distributed three versions of the survey in 2017, 2018, and 2023.

Results: In total, we received 270 responses from pharmacists and pharmaceutical scientists across 53 LMICs. Most survey respondents were from LMICs in Africa (63.3%) and most reported their current job title as a "practicing pharmacist" (71.1%). The most common vaccination-related responsibilities pharmacists were involved were educating about vaccines, advocating for vaccines, and ordering/storing vaccines. Legal administration of vaccines by pharmacists was reported in a few countries and immunization-related training was not mandatory in most countries in the survey. Perceived barriers to pharmacists' roles in immunization services were the perceived lack of support from governments and other healthcare providers, lack of financial incentives, and difficulty in accessing patient immunization records. The 2023 survey data observed some positive changes made to the role of pharmacists in LMICs during the COVID-19 pandemic.

Conclusion: Extending the role of pharmacists in vaccination services could be important to expand vaccination coverage as the rate of global vaccination coverage has stalled in recent years and many countries face shortages of healthcare workers. Even in countries where pharmacists

are not authorized vaccinators, pharmacists can still be involved through vaccine advocacy, patient education, reporting of adverse events, ordering and storing vaccines, patient reminders, and informing immunization policies. Improving access to pharmacist vaccination training, creating incentives, and getting buy in from other health system stakeholders could further support pharmacists' involvement in vaccination services in LMICs.

The impact of drug shortages on drug prices: Evidence from China

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Introduction: Drug shortages pose a serious global public health challenge, affecting China and other countries. Evidence from USA shows that short-supplied drugs demonstrated a very high price growth during and after a shortage. However, the effect of shortages on drug prices in China remains unknown. This paper aims to understand the impact of drug shortages on prices and explore implications for shortage prevention policy.

Methods: We collected the purchase prices and delivery rates of 120 drugs from April 2019 to December 2021 across whole China. We examined price progression of affected drugs using linear mixed-effects models and performed subgroup analyses based on the number of manufacturers and the severity of shortage.

Results: Non-shortage cohort had an annual price growth of 11.62% (95% confidence interval [CI] 8.34 to 14.98). Shortage cohort demonstrated an annual price growth of 8.08% (95%CI 0.12 to 16.77) in the period preceding a shortage, 27.57% (95%CI 6.17 to 52.87) during a shortage, and 9.38% (95%CI -12.64 to 36.39) in the post-shortage period. Drug shortages' impact on prices varied across subgroups. Compared with that of drug markets supplied by a single manufacturer, the price growth rate of markets supplied by more than one manufacture declined more after the shortage resolution.

Conclusions: Shortages resulted in significant price increases of study markets, especially the low-priced markets, while the shortage resolution slowed the growth. The primary shortage driver has shifted from the low price to others

drivers, such as unavailability of active pharmaceutical ingredients. For currently sole-supplied drugs, the expedited review of applications from other manufacturers should be considered.

Issues in advanced pharmaceutical care of companion animals in Japan: an untouched field

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Background: With increasing longevity and the growing trend of companion animals being treated as family members, there is a growing social demand in Japan for advanced veterinary care. In other countries, veterinary pharmacists play a crucial role in the pharmaceutical care of companion animals, but in Japan, pharmacists are rarely involved in veterinary medicine, making it an unexplored area of research.

Purpose: Our aim was to clarify the use of veterinary pharmaceuticals for companion animals in Japan.

Method: In this study, we analyzed the Veterinary Drug Side Effects Database of the National Veterinary Assay Laboratory (Ministry of Agriculture, Forestry and Fisheries) for veterinary drugs available in Japan.

Results: Our analysis revealed 1,438 cases of adverse drug reactions, with antiparasitic drugs being the most common cause (577), followed by antimicrobial drugs (207) and non-steroidal anti-inflammatory drugs (164). Notably, 37.78% of all reported cases were due to deviating from the directions for use described in the package leaflet. The cases also included misadministration of veterinary drugs to humans, improper drug administration, and re-administration of drugs with a history of adverse reactions.

Conclusion: While medical errors related to carelessness are included, the data suggests that veterinarians are struggling to treat companion animals due to the large unmet medical needs of approved veterinary medicines. To optimize drug therapy for companion animals, it is essential to develop a "veterinary medicine pharmacy" in line with clinical situations in Japan, while considering the findings from countries with advanced veterinary medical care. This requires investigating pharmaceutical issues and the needs of veterinarians and veterinary nurses for pharmacists.

Assessment of the quality of drug information provided by ChatGPT to patients

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Background: In addition to pharmacists' and physicians' advice on medication, patients nowadays use search engines for health and medicines information. However, the search engine market is changing due to artificial intelligence and natural language processing features provided by chatbots. The implications of chatbots for drug and patient safety are still unknown.

Purpose: The aim of this study (supported by the German Federal Ministry of Education and Research, project grant No. 01ZZ2320B) was to systematically analyse the correctness, completeness, and readability of drug information from ChatGPT in Microsoft Bing's search engine in comparison to patient information provided by healthcare professionals from drugs.com.

Method: The information for ten commonly dispensed and prescribed drugs (five over-the-counter [omeprazole, acetylsalicylic acid, ibuprofen, fluticasone, and potassium chloride] and five prescription drugs [atorvastatin, sertraline, apixaban, levothyroxine, and metformin]) from various drug classes given by ChatGPT was assessed. For each drug eight questions typically asked by patients regarding their drugs in community pharmacy and clinics were asked:

1. What is [drug] used for?
2. How does [drug] work?
3. Can I take [drug] together with food?
4. Can I drink alcohol while on [drug]?
5. Are there any other drugs that should not be combined with [drug]?
6. What are the most common side effects of [drug]?
7. Can [drug] be used in pregnancy?
8. Can [drug] be used in renal failure?

An interdisciplinary team of pharmacists and physicians assessed the correctness of the answers. Completeness was compared with the corresponding articles in the pharmaceutical encyclopaedia drugs.com. Readability was assessed using the Flesch reading-ease test.

Results: In eighty answers to simulated patient questions regarding their drugs, ChatGPT provided no critically false information. Drug information provided in the answers covered on average 76.7%±37.2% of the information available to patients on drugs.com. Completeness varied between the assessed categories and was lowest in the category drug interactions (43.6%±33.8%) and highest in the category contraindications (in terms of pregnancy) (100.0%±0%). With a median number of three references per answer ChatGPT referred most commonly to the websites drugs.com, mayoclinic.org and nhs.uk. The

chatbot's answers had a mean Flesch reading-ease score of 41.7±15.4, indicating that they are at a US college grade level and may be difficult to read. For questions entered repeatedly, the wording of the answers, but not the key content, showed some variation.

Conclusion: Microsoft Bing's ChatGPT appears capable of providing patients with comprehensive drug information by primarily referencing reliable sources. Nevertheless, the complexity of the answers provided in terms of readability may impede certain patients from comprehending the information in its entirety. Further research regarding additional aspects of drug and patient safety from search engines with natural language processing features is needed.

A pharmacovigilance study of the association between antipsychotic drugs and venous thromboembolism based on food and drug administration adverse event reporting system data

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Background: It has been reported that antipsychotics might induce venous thromboembolism. Currently, but the characteristics and pathogenesis of antipsychotics that cause VTE are still unclear.

Aim: To further evaluate the association of VTE with antipsychotic drugs.

Method: All VTE cases of antipsychotic drugs as primary suspected drugs were extracted from the US Food and Drug Administration adverse event reporting system (FAERS) from 2004 to 2021. Disproportionality analyses were conducted by estimating the reporting odds ratio (ROR) and the information component (IC).

Results: In the FAERS system, a total of 4,455 VTE cases associated with antipsychotics were identified. The two classes of antipsychotics with the strongest FAERS signals in VTE cases are Butyrophenone derivatives and Diazepines, oxazepines, thiazepines and oxepines. The VTE signal was detected in haloperidol, olanzapine, quetiapine and paliperidone. The RORs and the 95% confidence intervals (95% CI) of t haloperidol, olanzapine, quetiapine and paliperidone were (ROR 2.17.85, 95% CI 2.17-1.91 IC 1.1 95%CI 1.52-0.66), (ROR 2.53 95% CI 2.69–2.38 IC 1.31 95%CI 1.52-1.1), (ROR 1.37, 95% CI 1.47–1.28 IC 0.45 95%CI 0.67-0.23) and (ROR 1.6 95% CI 1.83–1.4 IC 0.67 95%CI 1.11-0.22) . Pulmonary embolism occurred in more than 50% of VTE events (2760 cases, 52.84%). It is indicated that venous thrombosis caused by antipsychotics is usually a serious consequence, which is confirmed by the analysis of the outcome including death (883 cases), life-threatening (693

cases), hospitalization (1643 cases) and other serious events (1164 cases).

Conclusion The data mining of FAERS suggested an association between VTE and antipsychotic drugs which reminds medical workers to pay attention to the serious adverse drug effects of antipsychotic drugs leading to venous thromboembolism

Creation of the ew meds list-A comprehensive list of poor tasting liquid medications

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Infants demonstrate a preference for sweetness and umami flavors, as well as a strong dislike of bitterness from shortly after birth. Most oral dosage forms, like capsules and tablets, are specifically designed to minimize taste perception of the active pharmaceutical ingredient and avoid concerns about medication palatability. However, young kids often struggle to take solid dosage forms. Furthermore, masking techniques available for liquid formulations often fall short, making them more likely to have poor palatability. The direct link between poor palatability and non-adherence is well documented. Palatability, as a key component of acceptability, has been incorporated into the European Medicines Agency's evaluation in the approval process for new pediatric drug formulations. Therefore, it is essential to assess which medications are known to be poorly tolerated because of taste, find alternatives that may be more favorable, and highlight home taste-masking interventions to mitigate poor palatability. As pharmacists, we can make medications more manageable for kids. To increase awareness about medication palatability, we created the Ew Meds List© - a comprehensive list of poor-tasting liquid medications and evidence-based recommendations to mask poor palatability.

A PubMed and EMBASE search was conducted using the terms child, bitter, flavor, masking, palatability, and adherence. The search was limited to human randomized control trials and systematic reviews from 1980-2021. Articles containing scored taste perception for medications were used to rank medications to assess eligibility for the Ew Meds List. All scales were aligned to a 5-point Likert score with 1 being dislike it very much and 5 being like it very much. The lowest score was used for any medication appearing in multiple publications. Any medication scoring less than 2.5 met criteria to be added to the Ew Meds List©. Those medications with a score of 2.5 and above were added to "Better Tasting Medications". Studies with taste-masking evidence related to specific medications were used to create evidence-based taste-masking recommendations. The project objective was to identify and compile palatability information into a single resource to expand prescriber and pharmacist awareness about poor-tasting

medications and provide tangible suggestions of alternate medication selections or taste-masking recommendations.

The search yielded 452 abstracts. Upon review, 65 studies were deemed appropriate for inclusion in the analysis. Sixteen articles contained ranked taste perceptions of 30 specific medications. Of those medications, 16 met the criteria for the Ew Meds List© and 14 for the better-tasting meds, and the majority of medications studied were anti-infectives. There were evidence-based recommendations for masking 10 specific medications. Pharmaceutics literature provided general flavoring recommendations to mask basic taste properties such as bitter or sour.

The scoring threshold for better-tasting liquid medications should be higher and work needs to be focused on medications used in chronic illnesses. Knowing the link between acceptability and adherence, there needs to be more emphasis placed on improving new formulations and identifying evidence-based taste-masking techniques to help improve adherence for Ew Meds. We applaud the efforts of government agencies working to increase the focus on taste perception in pediatric medications.

Consumer and clinician perspectives on adverse drug events and adverse drug withdrawal effects of heart failure medications in frail older people

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RFMO-02 - Rapid Fire Session Monday, P1-P2, September 25, 2023, 11:00 AM - 12:30 PM

Background: Heart failure (HF) is increasingly prevalent in the ageing population and associated with high mortality and hospitalisation, particularly in people aged over 75 years. Frailty is defined as a reversible syndrome involving multi-system deficiencies. Optimising HF medications in frail older people can be complex due to multi-morbidities, polypharmacy (>5 medications), deficits in multiple health domains and changes in life expectancy, cognition and patient priorities. Older HF patients living in the community are mostly frail and experience at least one adverse drug event (ADE) from their HF medications; yet are poorly represented in clinical trials and observational studies.

Purpose: To examine consumer and clinician perspectives of ADEs and adverse drug withdrawal effects (ADWEs) from HF medications in frail older people.

Methods: Qualitative interviews and focus groups were conducted with consumers (carers, advocates or older individuals living with HF and frailty) and clinicians (pharmacists, nurses, geriatricians, specialist physicians) involved in caring for frail older patients with HF. Semi-structured interview questions were informed by the literature and piloted with clinicians. Recruitment of a purposive sample of participants involved electronic distribution of advertisements through professional and community networks and invited to respond; or contacted directly through snowballing in acute, aged care and community settings across Australia. Interviews were conducted by a pharmacist researcher via videoconference or phone, audio-recorded, transcribed and de-identified. A general inductive content analysis approach was used to identify themes to address the aims.

Results: To date, 24 participants (2 consumers, 4 geriatricians and cardiologists, 7 nurses and 11 pharmacists) have participated in interviews and focus groups. Preliminary analyses identified eight themes relating to characteristics and management of ADEs and ADWEs experienced by frail older people. Participants acknowledged the importance of addressing individuals' physical and emotional function to support individual goals and ability to live independently. Clinicians recognised frailty status was important but not routinely measured nor included in medication management plans. Complex patient factors, medication management and identification of common ADEs could be supported with patient education and communication of the benefits and adverse effects of HF medications across multiple clinical outcomes. Participants described ongoing challenges of multi-disciplinary collaboration, particularly during transitions of care.

Common ADEs identified by participants included hypotension (e.g. falls, dizziness, light-headed) and renal impairment, which warranted clinician intervention. Diuretics (furosemide) frequently caused urinary incontinence which was mostly patient self-managed to balance social and emotional disruption. Common ADWEs included cardiovascular events (e.g., worsening HF symptoms). A participant described, "the big problem is the number of medications that they're on and potential interactions. One of our big issues is patients falling down with hypotensive drugs. With [furosemide], needing to get to the bathroom quickly [can be a] falls concern" [nurse 013].

Conclusion: Based on results so far, this study identified several perspectives unique to medication management in frail older patients with HF. Findings revealed treatment priorities and opportunities to include frailty status in medication management plans. Future observational studies are needed to determine how this information can be applied to support individualised care plans.

Characteristics, content and language of deprescribing recommendations in clinical practice guidelines: A scoping review

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RFMO-02 - Rapid Fire Session Monday, P1-P2, September 25, 2023, 11:00 AM - 12:30 PM

Background: Adherence to prescribing recommendations in clinical practice guidelines may contribute to inappropriate polypharmacy. Healthcare professionals, including pharmacists, require evidence-based recommendations to ensure safe and effective prescribing and deprescribing (medication dose reduction or cessation). The extent to which deprescribing recommendations are included in clinical practice guidelines is unclear.

Purpose: To determine the proportion and characteristics of clinical practice guidelines that contain deprescribing recommendations, and to explore the content and language of these recommendations.

Method: A random 10% sample of all clinical practice guidelines published in the past five years from four international guideline registries (Guidelines International Network [GIN], Canadian Medical Association Infobase [CPG infobase], MAGICapp, and GuidelineCentral) were screened in duplicate to determine the proportion of guidelines containing one or more deprescribing recommendations. Additionally, three databases (Medline, EMBASE and CINAHL Plus) and Google were searched for guidelines published in the last ten years containing one or more deprescribing recommendations. We included guidelines which met the Institute of Medicines definition and criteria of a clinical practice guideline and excluded guidelines focussing on acute treatment only (e.g. related to surgery or interventional investigations, or medicines prescribed short term for an acute condition). Guideline characteristics were extracted, including year and country of development, total number of recommendations, number of deprescribing recommendations, and whether or not a consumer was involved in guideline development. The content and language of recommendations were examined using a conventional content analysis, with two independent reviewers applying the coding framework. The Shell Health

Literacy Editor tool was used to quantify the readability and complexity scores of each recommendation.

Results: Approximately 28% of guidelines identified in the guideline registry search contained one or more deprescribing recommendations. A total of 81 guidelines containing 316 deprescribing recommendations were identified and included in the review. An upward trend in the number of guidelines containing deprescribing recommendations was observed over the ten-year period. The majority of guidelines were on topics relating to the nervous system (e.g. opioids, dementia), and antineoplastic and immunomodulatory agents (e.g. rheumatology guidelines). Only 9% of all recommendations (316 of 3569 recommendations) pertained to deprescribing and there was significant variability in the terminology used (e.g. taper, cease, discontinue). Most included guidelines (91%) contained recommendations on 'when' to deprescribe, yet less than half (40%) provided detailed guidance on 'how' to deprescribe. Guidelines with noted consumer involvement in development had more patient-centred recommendations and less complex language.

Conclusion: Deprescribing recommendations are becoming more common in clinical practice guidelines, however, there is significant variability in their content and language. Few guidelines contain clear and actionable recommendations on 'how' to deprescribe, likely inhibiting implementation of recommendations in clinical practice. Integration of more specific and comprehensive deprescribing recommendations into clinical practice guidelines may better enable pharmacists to deliver evidence-based care and promote quality use of medicines through reduction of inappropriate polypharmacy.

Not just being old or forgetful-Measuring and quantifying causes of medication non-adherence in Norway

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RFMO-02 - Rapid Fire Session Monday, P1-P2, September 25, 2023, 11:00 AM - 12:30 PM

Background: It is well known that patients not always adhere to medication and that adherence rates range from 0%-100%. It is also known that patients' reasons for non-adherence could be complex and originate in different causes of medication-taking behaviour, barriers, and beliefs. Literature is however not in agreement on what impact confounding causes like age, gender, education, regularly use, number of drugs and duration of therapy have on adherence.

Ensuring adherence secures rational use of medicine and patient safety. For health professionals to ensure this,

knowledge on causes of non-adherence and patients at risk is imperative.

To our knowledge little is known in the general Norwegian population about the causes of non-adherence and the impact some confounding causes (age, gender, education, regularly use, number of drugs and duration of drug therapy) have on adherence.

Purpose: To measure and quantify causes of non-adherence in Norway using a non-disease dependent survey tool on self-reported medication-taking behaviour, barriers, and beliefs.

Method: Medication users ≥ 18 years living in Norway completed anonymously OMAS-37, a new validated non-disease-specific online survey-tool for self-reported medication-taking behaviour, barriers, and beliefs. Recruitment was mainly done via Facebook posts.

Results: 812 respondents were found eligible. The mean age was 48 years and 90.6% were women. 517 (64%) scored equivalent with poor adherence.

Increasing age (18-80 years), higher education, self-perceived adherence, and involvement in decision-making for medication treatment had a significant ($p < 0.05$) positive impact on adherence.

Of three compared patient groups, the Cardiovascular Diseases (CVD)- patient group demonstrated significantly ($p < 0.05$) better adherence compared to the Mental Health Disorders (MHD)- patient group and the Pain-patient group. Independent of diagnosis and choosing from 37 causes of non-adherence, the three main causes for the whole sample were "Forgetting to take the medication" (42%), "Feeling better" (40%) and "Fearing adverse drug reactions" (39%).

The main causes of non-adherence varied to some extent between the whole sample, the CVD-patient group, the MHD-patient group, and the Pain-patient group.

Conclusion: Almost two thirds of the whole sample scored equivalent with poor adherence and the main causes for non-adherence were forgetting, feeling better, and fear of adverse drug-reactions.

Adherence improved with age (until 80 years), higher education, and involvement in medication decision-making.

The differences in main causes of non-adherence between the whole sample and different patient groups indicates that it could be of importance to differentiate between patient groups when developing adherence enhancing interventions. This study is part of a project aiming to develop a digital patient intervention that improves adherence to medication.

Further studies are required to test if the results may be generalized for the general Norwegian population.

Tech-ing up pharmacy: Creating a framework to evaluate health information communication technology

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RFMO-02 - Rapid Fire Session Monday, P1-P2, September 25, 2023, 11:00 AM - 12:30 PM

Introduction: Health information communication technology (ICT) has rapidly evolved in pharmacy practice worldwide, enabling safe and timely medication management. The Australian healthcare system is experiencing a paradigm shift to real-time interconnectivity for practitioners and consumers through use of interoperable technologies. With these developments comes a need to evaluate use of technologies specifically in pharmacy practice to optimise their clinical functionality. Validated frameworks for evaluating ICT needs of pharmacists will help ensure successful ICT implementation in pharmacy practice.

Aims: This research aimed to develop a theoretical framework for evaluating health ICT needs and the application of health ICT in pharmacy.

Method: A published systematic scoping review of health informatics and grey literature identified three models relating to ICT adoption that had not been applied to health ICT in contemporary pharmacy practice: the Technology Acceptance Model (TAM), the Information System Success (ISS) model and the Human Organisation Technology-fit (HOT-fit) model. These models were critically appraised and concept mapped, identifying common and unique domains relevant to contemporary pharmacy practice. A novel framework incorporating these domains was then designed, with face validity determined by the research team.

Results: The proposed framework was named the Technology Evaluation Key (TEK). The TEK comprises 10 domains spanning the systems in which pharmacists practice, features of the health ICT, and desired outcomes from utilisation of the health ICT for patient care. The domains are: healthcare system, organisation, practitioner, user interface, ICT, use, operational outcomes, system outcomes, clinical outcomes and timely access to care.

Conclusions: Despite the existence of ICT adoption frameworks for health consumers and professionals, this is the first developed for pharmacists as the users of technologies. The TEK represents a pragmatic way to promote the development, refinement and implementation of new and existing technologies in contemporary pharmacy practice to keep pace with the clinical and professional requirements of community pharmacists. Further research is recommended to validate the TEK using Design Science Research Methodology and specific health ICT platforms used by pharmacists.

An exploration of drivers of COVID-19 vaccine hesitancy in Kenya

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RFMO-02 - Rapid Fire Session Monday, P1-P2, September 25, 2023, 11:00 AM - 12:30 PM

Background: COVID-19 vaccination rates have been low among adults in Kenya (37% as of mid-February 2023) with vaccine hesitancy posing a threat to the COVID-19 vaccination program. Ensuring equitable access to the COVID-19 vaccine is important, however, the novelty of vaccinating the adult population in Kenya has been riddled with challenges.

Purpose: This study sought to examine public attitudes and behavioural influences towards COVID-19 vaccine hesitancy.

Methods: We conducted a qualitative cross-sectional study in two purposively selected counties in Kenya. We collected data through 8 focus group discussions with 80 community members and in-depth interviews (n=8) with health care managers and providers. The data was analyzed using a framework approach focusing on determinants of vaccine hesitancy and their influence on psychological constructs.

Results: Reported perceived barriers to COVID-19 vaccine uptake were influenced by individual characteristics (males, younger age, perceived health status, religion, and belief in herbal medicine), contextual influences (the lack of autonomy among women in decision making and cultural beliefs-more predominant in rural settings, lifting of bans, myths), medical mistrust (towards the government and pharmaceutical companies) and COVID-19 vaccine related factors (fear of unknown consequences, side-effects after first dose, and the lack of understanding of the rationale and number of boosters). These drivers of vaccine hesitancy mainly related to psychological constructs including confidence, complacency and constraints. Respondents also reported strategies that would promote COVID-19 vaccine uptake including their trusted information sources (community health workers and community leaders), preferred messaging content (e.g. transparency on long-term side effects and clarity on number of boosters), preferred delivery strategies (mixed approach, including door-to-door campaigns).

Conclusions: Vaccine hesitancy in Kenya is driven by multiple and interconnected factors. These factors are likely to inform targeted strategies to address vaccine hesitancy among adults. These strategies could include transparent and consistent communication that target fear, misconceptions and information gaps as well as increased individual sensitization through community health workers and community leaders.

Exploring the use of machine learning to categorise online forum posts relating to self-medication by international travellers

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RFMO-02 - Rapid Fire Session Monday, P1-P2, September 25, 2023, 11:00 AM - 12:30 PM

Background: International travellers commonly engage in self-medication and often use the internet to seek initial health advice on recognising symptoms or choosing products to prevent, treat or manage a health condition. Online discussion fora are among those internet resources with the main features of focusing on specific topics and allowing a higher degree of anonymity compared to other social networking platforms. Self-medication advice on online forum platforms may not be given by people with relevant qualifications, which may lead to inappropriate practice. Pharmacists have a role in promoting responsible self-medication but monitoring online conversations is challenging due to the volume, speed and variety of posts. The utilisation of machine learning technology may address this challenge.

Purpose: To describe the development and performance of three machine learning models to classify whether an online forum post refers to self-medication.

Method: We used Indonesia-related fora as part of a larger study on self-medication among travellers in Indonesia. Text data were curated from four online fora: Balipod, Living in Indonesia Forum, Expat Indo Forum and TripAdvisor forum for 'Indonesia' topics. These fora were free to access and the most active fora used by international travellers visiting or planning to visit Indonesia from 7 November 2002 to 15 December 2022. A 1% sample (n=1180 posts) of retrieved posts was randomly selected for labelling. Two pharmacist reviewers independently labelled ('yes' or 'no') each post relating to self-medication. Three machine learning models were developed with different architectures. Data were cleaned for noise, such as unrecognised characters, before applying a 60:20:20 train-validation-test split. Word embeddings, or grouping words close in meaning, were applied to the data. Each model was evaluated for performance before and after word embeddings using the Receiver Operating Characteristic's Area Under the Curve (AUC-ROC).

Results: Cohen's kappa score was 62.2 for data labelling. When data from both raters were merged, a deletion of 71 posts occurred. Of the remaining 1109 posts, 6.04% were labelled as self-medication. As expected, the performance of all models improved after the word embeddings. The best model produced an average AUC-ROC score of 0.79 (SD ±0.05), considered as acceptable performance.

Conclusion: This work demonstrates that machine learning technology can help classify whether an online forum post

pertains to self-medication. The use of machine learning can potentially enable pharmacists to respond to such posts, thereby affording the opportunity for moderation or intervention.

Development of a chinese medicine-drug interaction database "PROBOT"

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RFMO-02 - Rapid Fire Session Monday, P1-P2, September 25, 2023, 11:00 AM - 12:30 PM

Background: Traditional Chinese Medicine (TCM) is widely accepted for the treatment and prevention of various diseases in China and other Asian regions. In 2009, a survey in Hong Kong found that 57.1% of cancer patients used TCM as supportive treatment (Lam YC, 2009). However, the curative effect of the combination of TCM and Western drugs in the surveyed patients (61.7%) was not better than that of patients who used western drugs alone (72%). A Chinese medicine-drug interaction (CMDI) database is highly needed to guide the combined use of TCM and western drugs for clinical practitioners.

Purpose: To develop an on-line database to provide updated interaction information between TCM and western drugs for clinical practitioners.

Method: Published abstracts in PubMed, Wanfang and CNKI about TCM and western drugs are periodically retrieved by our developed web scrapping system (DP2) and stored in our developed Reference Management and Annotation System (RMAS). Then, a series of artificial intelligence (AI) models were developed and applied to the crawled abstracts to (i) screen the CMDI relevancy of an abstract for further processing; (ii) extract the entities of TCM, western drugs, species and pharmacokinetics parameters; and (iii) summarize the conclusion of CMDI between TCM and western drugs. The information extracted by AI were then reviewed and approved by experienced researchers before they could be uploaded and searchable on the final platform named "PROBOT" (<http://www.probot.hk>).

Results: As of February 2023, a total of 4964 CMDI-related references were identified from 1.4 million references in RMAS, from which 6292 interaction pairs were extracted. The numbers of TCM herbs and western drugs included in our developed database were 193 and 726, respectively. The database could be used after authorization and could be retrieved through both Chinese and English keywords and further filtered by study types and sources of data. Since the

platform was launched, the number of queries has exceeded 12,000 and the registered users reached 283.

Conclusion: With the aid of AI, an on-line CMDI database was developed for clinical practitioners' efficient search of CMDI information. As all the information were evidenced by their original source, the CMDI database would become a valuable reference to check the potential safety when combined use of TCM and western drugs occur.