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Poster Abstracts


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Engaging Community Pharmacies in detection of missing Tuberculosis patients through Public-Private Mix intervention in Pakistan.

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Introduction. Globally, Pakistan ranks fifth in terms of Tuberculosis (TB) burden. Public-Private Mix (PPM) interventions are contributing significantly to the case detection, diagnosis and treatment of TB. However, it is estimated that many cases of infected TB patients go undetected. It is likely that these 'undiagnosed' active TB cases seek treatment from community pharmacies, amongst other venues.

Aim. This study aimed to assess the feasibility of community pharmacy based TB case detection.

Methods. Case detection protocol implementation in three Pakistani districts in a non-random selection of pharmacies followed by the review of routinely maintained prospective records of patients referred from these private community pharmacies to General practitioner (GP) clinics.

Results. The study engaged 500 community pharmacies for referring presumptive TB patients to GP clinics. The community pharmacies-referral network identified 537 presumptive TB cases for the period January-December 2017. This contribution was (9%) of all new TB cases identified in these districts through all other public and private venues.

Discussion. These findings were consistent with other high burden TB countries that have engaged community pharmacies in early detection of missing TB patients in the community. Identified barriers and facilitators to implementation and cost effectiveness of pharmacy models for TB case detection should be considered if the model were to be scaled up.

Isolation, identification and biological activity of compounds from Snake Vine (*Hibbertia scandens*)

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Introduction. Australian Aboriginal communities depend upon natural materials available in their lands to treat many illnesses. Unfortunately, some of these traditional medicines and/or their method of use have been lost because of poor documentation. Plants form part of ancient remedies that are used by Aboriginal people to heal ailments due to their antibacterial and antiviral activities [1]. Snake Vine (*Hibbertia scandens*) is an example of a traditional Australian medicinal plant which has been used locally to treat sores and rashes because of its antiseptic properties. There are few studies on this plant and its beneficial effects.[1, 2].

Aims. The aim of this study was to chemically profile the different extracts of leaves and roots of *H. scandens*, determine the cytotoxic properties of raw extracts, elucidate the structure of the bioactive components isolated from active extracts from plant roots, and synthesize new analogues of the active components with greater cytotoxic activity.

Methods. HPLC and LCMS were used to profile crude extracts, and 2D NMR and HRMS were used to identify components; different derivatives were synthesized and the MTT assay was used to evaluate the cytotoxicity of extracts, fractions and analogues.

Results. The dichloromethane extract of *H. scandens* displayed the greatest cytotoxic effect in comparison with other extracts. This extract fractions which showed the greatest cytotoxic effect were characterised. Novel analogues of the most active components were synthesized and tested.

- [1] Packer, J., *et al.*, Antimicrobial activity of customary medicinal plants of the Yaegl Aboriginal community of northern New South Wales, Australia: a preliminary study. *BMC Res. Notes*, 2015, **8**, 276.
- [2] Packer, J., *et al.*, An ethnobotanical study of medicinal plants used by the Yaegl Aboriginal community in northern New South Wales, Australia. *J. Ethnopharmacol.*, 2012, **139**, 244-255.

Clinically relevant epithelial lining fluid concentrations of meropenem with ciprofloxacin provide synergistic killing and resistance suppression of hypermutable *Pseudomonas aeruginosa* in a dynamic biofilm model

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Introduction. Treatment for acute exacerbations of chronic *Pseudomonas aeruginosa* (Pa) infections in patients with cystic fibrosis (CF) is highly challenging due to prevalence of hypermutable Pa, biofilm formation and significant increase in multidrug-resistance.

Aims. We evaluated the impact of ciprofloxacin (CIP) and meropenem (MER) as monotherapy and in combination against hypermutable Pa strains in the dynamic *in vitro* CDC biofilm reactor (CBR).

Methods. Hypermutable PAOΔ*mutS* strain (MIC_{CIP} 0.25 mg/L, MIC_{MER} 2.0 mg/L) and hypermutable clinical CF isolate CW44 (MIC_{CIP} 0.5 mg/L, MIC_{MER} 4.0 mg/L) were investigated for 120 h in the CBR simulating MER and CIP pharmacokinetics in epithelial lining fluid (ELF) of patients with CF based on population pharmacokinetic models and ELF penetration. Treatments were A: CIP (t_{1/2,ELF}=2.9 h, penetration_{ELF}=85%) 0.4 g 8-hourly as 1 h infusions; B: MER (penetration_{ELF}=30%) 6 g/day continuous infusion (CI); C: MER (penetration_{ELF}=60%) 6 g/day CI; A+B; A+C and a growth control. Colony forming units (CFU) of total and resistant planktonic and biofilm bacteria were determined. CIP and MER were quantified by LC-MS/MS.

Results. With PAOΔ*mutS*, treatments A, B and C produced $\leq 2.8 \log_{10}$ CFU/mL killing of planktonic bacteria at 7 h followed by regrowth close to control with replacement by CIP- and MER-resistant bacteria (growing on 1.25 mg/L CIP- and 10 mg/L MER-containing agar) at 120 h. A+B and A+C produced $\sim 4 \log_{10}$ CFU/mL killing and suppressed regrowth; resistance suppression was greatest with A+C. For CW44, only A+C produced synergy and resistance suppression of planktonic bacteria from 48 h onwards. With biofilm bacteria, both isolates achieved initial killing $\leq 1.6 \log_{10}$ CFU/cm² at 7 h with monotherapies, followed by regrowth to control values with amplification of resistant bacteria. With CW44, only A+C achieved synergistic killing and suppressed regrowth and resistance over 120 h.

Discussion. High, clinically relevant ELF exposure to MER given as CI in combination with CIP was required to suppress regrowth and resistance amplification in planktonic and biofilm growth. This combination warrants further studies.

Medication Management Post-Bariatric Surgery: A Scoping Review

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Introduction. Bariatric procedures are an increasingly prevalent treatment for morbid obesity, inducing structural changes that can alter the absorption of orally administered medication in patients already at risk of polypharmacy. There is a lack of clinical guidelines to inform medication management post-surgery.

Aims. This scoping review aimed to explore pharmacokinetic changes in patients post-bariatric surgery.

Methods. Medline, Embase, IPA and Scopus were searched for articles relating to bariatric surgery and pharmacokinetics published between 1998 and 2019. Pharmacokinetic studies of pre-post design were included, and the Newcastle-Ottawa Scale was used to assess the risk-of-bias.

Results. The electronic search retrieved 2108 articles, of which 21 articles were included after systematic screening. Changes in absorption were reported in all included studies across 29 drugs. In 11 studies, this change was reported as statistically significant ($p < 0.05$), while six reported a statistically insignificant change.

Discussion. Bariatric procedures alter the absorption of medications and several mechanisms are implicated to be responsible. More drugs exhibit a shorter T_{max} and higher C_{max} after surgery than otherwise, however changes in AUC are multivariable. Long-term monitoring is required for bariatric surgery patients for clinical changes in their response to medications, and concern is greatest for drugs with narrow therapeutic indexes.

An aerogel-based medicated nasal pack

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Introduction. The incidence of epistaxis (nose bleeding) has a bimodal age distribution with the more than 50% of cases occurring in children under 10 and adults over 50 years old. In addition, the number of intranasal operations required for rhinitis, sinusitis and nose reconstruction is rapidly increasing. Nasal pack is a primary device in management of epistaxis and facilitating postoperative wound healing; therefore, demand for this product is growing. However, current nasal packs do not achieve the desired outcomes for the patients in terms of efficacy of the treatment and comfort to the patient. Therefore, development of a novel nasal pack is required.

Aims. This research aims to develop a degradable nasal pack capable of delivering anti-fibrinolytic, anti-inflammatory and antibiotic drugs to the wound site.

Methods. Nasal packs were prepared by lyophilizing k-carrageenan and blend of k-carrageenan and other food hydrocolloids hydrogels. The drug free and medicated aerogels were characterised for their imbibition and expansion, pore size and pore volume, drug release kinetics, mechanical properties, mucoadhesion and antimicrobial properties.

Results. The medicated aerogels exhibited high fluid absorbency, good mucosal adhesion indicating their potential use in mucosa-localised drug delivery and sustainable release of drugs and degradation for the required therapeutic period.

Discussion. The k-carrageenan colloid produced a stable hydrogel network and very low dense solid structure after freeze-drying. The desirable release profiles for each drug were obtained by blending k-carrageenan with locust bean gum, gelatin or agar, suitable for the drug and required release period.

Molecular dynamics simulations for the aqueous phase behaviour of C₁₂E₆

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Non-ionic surfactants containing polyethylene oxide (PEO) head groups are widely used in drug formulations, paints, cosmetics, textiles and detergents. In our research, we are interested in PEO surfactants as excipients in lipid-based drug formulations. Molecular dynamics (MD) simulation is a useful tool for obtaining atomic scale information, which helps to understand the colloidal structure formation of these PEO surfactants. However, many existing force fields do not reproduce the experimental phase behaviour of PEO molecules due to poor parameterisation of oxy functional groups and vicinal ethylene oxide groups, thus MD simulations with PEO molecules lag behind. The present study was carried out to identify whether the recently released GROMOS force field, 2016H66 developed to model the 'gauche effect' of PEO molecules adequately model PEO surfactants. In this work, we performed extensive MD simulations using 2016H66 force field to model the aqueous phase behaviour of the simple non-ionic surfactant, hexaethylene glycol monododecyl ether (C₁₂E₆) and then compared the simulated phase behaviour with experimental observation. From these simulations, we found that 2016H66 force field reproduced the experimental phase behaviour of C₁₂E₆/water systems. In conclusion, our study showed that spontaneous aggregation of PEO surfactants into different colloidal structures can be successfully modelled with 2016H66 force field.

A novel cervical lymph cannulation method to evaluate lymphatic clearance of immune cells, lipids and other molecules from the brain

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Introduction. The lymphatic system comprises vessels and nodes involved in fluid balance, lipid absorption and immune regulation. Historically the brain was considered devoid of lymphatic vessels. Recently, immune cells and tracers were found to drain from the brain via meningeal lymphatic vessels that connect to the deep cervical lymph vessels and nodes in the neck. Additional studies have proposed involvement of lymphatics in neuroinflammatory diseases, including multiple sclerosis and Alzheimer's disease. Further investigation into relationship between lymphatics and neuroinflammation is warranted, requiring new methods to evaluate lymphatic clearance from brain.

Aim. To develop a cervical lymph cannulation method in rats and characterise cervical lymph composition.

Methods. Anaesthetised Sprague-Dawley rats were cannulated at the cervical lymph trunk and carotid artery for lymph and blood collection. Samples were analysed for immune cell, lipid and protein composition using flow cytometry or commercial kits.

Results and Discussion. The most abundant cells in cervical lymph were CD4⁺ T lymphocytes (59%) and CD45R⁺ B lymphocytes (21%), consistent with other lymph sources. Triglyceride concentration (0.3 ± 0.0mg/ml) was comparable to liver lymph but lower than that in non-fasted mesenteric and thoracic lymph, likely due to transport of dietary lipids. Lymph:plasma protein ratio was 0.32 ± 0.04 which is similar to other lymph sources but lower than in liver lymph (0.68).

Conclusion. A novel method was successfully developed to collect cervical lymph draining from brain in rats. Future studies can utilise this method to investigate the interplay between neuroinflammation and lymphatic outflow of immune cells, fluid and other molecules from the brain.

Altered oral absorption of drugs in a mouse model of familial Alzheimer's disease

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Introduction. While there is significant knowledge about altered expression and function of drug transport proteins at the blood-brain barrier in Alzheimer's disease (AD), less is known about drug transporter expression and function at other biological barriers in this disease. We have previously reported altered expression of drug efflux transporters in intestine, liver and kidneys isolated from a mouse model of familial AD, however whether this impacts on the oral absorption of compounds remains to be investigated.

Aims. This study assessed whether the intestinal *ex vivo* transport and *in vivo* oral absorption of compounds differed as a result of AD pathology.

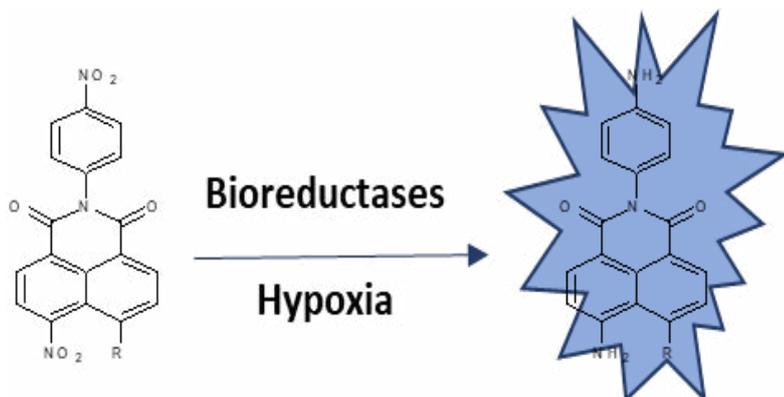
Methods. Duodenum was freshly isolated from 8-month female WT and APP/PS1 mice and mounted onto Ussing chambers. 0.5 µCi of each radiolabelled compound (i.e. caffeine, diazepam or digoxin) or valsartan (20 µg/mL) was added into the donor chambers. At the designated time points, 200 µL of sample was collected from receptor chambers and the concentration of compounds quantified. In addition, WT and APP/PS1 mice were orally administered either caffeine, diazepam, valsartan or digoxin. At each post-dose time point, plasma samples were collected and the concentrations of each compound were measured using developed LC MS/MS assays.

Results. Both *ex vivo* and *in vivo* studies demonstrated that the permeability/oral absorption of the transcellular markers caffeine or diazepam did not differ significantly between WT and APP/PS1 mice. The average amount of ³H-digoxin (P-glycoprotein substrate) absorbed across the duodenum from WT or APP/PS1 mice over a 2 h period was found to be 0.85% and 0.20%, respectively. While 0.48% of the applied dose of valsartan (multidrug resistance-associated protein 2 substrate) appeared in the receptor chamber across the duodenum from WT animals, minimal valsartan permeated the duodenum from APP/PS1 mice. In line with the *ex vivo* data, plasma exposure to digoxin and valsartan following oral dosing appeared to be significantly lower in APP/PS1 animals (P <0.05).

Discussion. These results showed that while passive diffusion does not appear to be modified, the absorption of P-gp and MRP2 substrates may be reduced, suggesting greater barrier properties of the duodenum in AD.

Dinitro naphthalimides: a fluorescent probe for tumor hypoxia imaging

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Introduction. Solid tumours are generally characterized by defective microvessels and inadequate oxygenation. This hypoxic tumour microenvironment (TME) directly correlates with cancer treatment resistance and disease progression. Hence it is critical to visualize hypoxic TME.

Aims. To synthesize a turn-on hypoxia detection probe based on the bioreductive environment in cancer cells.

Methods. Two hypoxia sensitive nitro-derivatives were synthesized and their structures were confirmed by spectral studies. The ability of the probes to get reduced in the presence of nitroreductase enzyme was investigated. The MTT assay to assess the cytotoxicity of the probes in MCF-7 cells and their hypoxia sensitivity in MCF-7 cells were examined.

Results. The synthesized nitro-derivative displayed excellent reducible ability under both chemical and biological environments which was accompanied by a distinct bathochromic shift with a large fluorescence enhancement at a wavelength of 550 nm after reaction with nitroreductase enzyme in presence of nicotinamide adenine dinucleotide as the electron donor. The probe was not toxic to normal cells and exhibited turn-on fluorescence in hypoxic cells. The probe also exhibited significant specificity to the enzyme.

Discussion. The synthesized probe could undergo bioreduction in presence of nitroreductase enzyme turning-on the fluorescence. The probe could successfully differentiate normoxic cells from hypoxic condition. Hence the molecule could be a potential candidate for optical imaging and detection of hypoxia in cancer and could also be utilized for probing other ischemic diseases.

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The training and educational requirements of community pharmacy staff to deliver minor ailment services- a systematic scoping review

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Introduction: Community pharmacists offer a range of clinical professional services to provide primary and preventative health care. Minor ailment services (MASs) encourage self-care and the delivery of minor ailment care under the guidance of a community pharmacist. MASs are supported by community pharmacy staff, including medicine counter assistants (MCAs), pharmacy technicians and pharmacy students.

Aims: To explore the evidence of training, education and assessment requirements associated with MAS delivery that community pharmacy staff need to fulfil to develop appropriate skills and knowledge in the provision of MASs.

Methods: A scoping and grey literature review was conducted to identify literature from inception to 31 March 2019, using electronic databases (including Pubmed, International Pharmaceutical Abstracts (IPA), EMBASE, CINAHL and Scopus). English literature related to the training and educational requirements of community staff that deliver MASs were included.

Results: n=66 records met the inclusion criteria. This is the first review involving all community pharmacy stakeholders including pharmacists, MCAs, technicians and students; and any evidence of MAS education, training and assessment processes to deliver MASs. There are variations in the training and educational requirements associated with MAS delivery and training is not standardized. Existing education, training and assessment processes varied in terms of content, cost and assessment processes and focused on clinical care components. No standards exist to guide service delivery. Limited training was available for community pharmacy staff, particularly regarding service delivery aspects. Most existing training included clinical components only. There was a notable lack of MAS training for MCAs.

Conclusion: In order for community pharmacists and pharmacy staff to be effective MAS providers, a coherent and comprehensive training approach needs to be implemented. MAS providers need to be proficient with consistent and relevant skills to enhance service delivery and patient health care. This may ultimately enhance healthcare outcomes and promote MAS utilization.

The implementation and assessment of Mental Health First Aid training among university students: a systematic review

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Introduction. Mental Health First Aid (MHFA) training is relevant for university students, who are at higher risk of developing mental illness. While MHFA has been shown to improve self-reported knowledge, attitudes and behaviours of diverse populations, previous reviews of MHFA have yet to capture all studies involving university students.

Aims. To explore the evidence regarding the implementation and assessment of MHFA training among university students, globally.

Methods. MEDLINE, Pre-MEDLINE, CINAHL, EMBASE, ERIC and PsycINFO were searched for relevant publications from January 2000 to April 2019. Duplicates were removed and titles and abstracts were screened in EndNote. The full-text of the remaining records were assessed for eligibility and agreement was reached between all authors. Data are presented on the the students' enrolled disciplines, graduate and year levels, training types offered, and assessment methods used.

Results. Twelve eligible records were identified across Australia, the US and the UK. Standard MHFA was most commonly described (n=6), followed by healthcare-tailored (n=4) and Youth MHFA (n=2). Nine studies involved students enrolled in health disciplines across all year and graduate levels, of which four involved pharmacy students. In ten studies, participants completed self-reported assessments of knowledge, literacy, confidence, skills application, stigma, and intentions. Only two studies described assessments involving students' actual behaviours, through simulated patient role-plays, post-training.

Discussion. There is a lack of research on other versions of MHFA training (e.g. Blended MHFA for Tertiary Students) for university students enrolled in disciplines other than healthcare, across the 25 countries where MHFA is available. Findings of this review also reinforced the reliance on self-reported assessments to measure the outcomes of MHFA training, warranting further research exploring actual, observed behaviours.

Final foundation residency portfolio reviews – Feedback from a two-site review process

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Introduction. In 2017 the Society of Hospital Pharmacists (SHPA) launched the SHPA Foundation Residency Program, which encouraged the development of a portfolio of evidence to demonstrate a pharmacist's impact. Two accredited SHPA Foundation Resident training sites collaborated to develop a multi-site portfolio review process.

Aims. To review feedback from resident pharmacists and reviewers on the feasibility and success of a two-site review process

Methods. The consensus for review of the portfolio was for the following process - the resident submitted their portfolio for review by two assessors, one from each site and at least one having been through the process of collating and submitting an advanced practice portfolio. Assessors were to review the portfolio and feedback to the resident regarding completion of mandatory residency requirements and future development plans. To evaluate the success of the dual portfolio review process, feedback was collected from both the residents and assessors.

Results. The residents' feedback regarding the aspects of the process they found most useful included - confirmation that they had completed the residency program; receiving feedback that was specific, realistic, constructive, unbiased and beneficial; receiving a learning plan on how to address competencies in their portfolios which were almost met. The challenges described included - unclear expectations from the residency matrix document on what would not be achievable or expected by a resident; delayed feedback; lack of clarity around the process.

The assessors agreed the portfolios submitted were of a high standard. Portfolios that were submitted with a self-assessment were easier to review. However, a major challenge was the time required to review each portfolio and feedback to the resident.

Discussion. For this process to sustainably continue, some structure and training on the foundation residency portfolio review and completion process is required. Both sites agreed that it was a valuable activity to ensure thorough and unbiased feedback and future development plans could be provided to the residents by experienced practitioners.

Experiences with using Gloop® medication lubricant: What do Australian aged care facility healthcare workers think?

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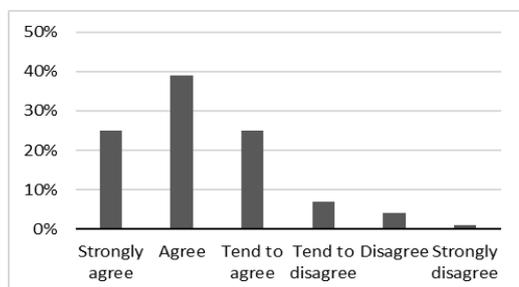


Fig. 1. Responses to the statement: "Gloop is an effective method to facilitate pill-swallowing in residents" (n=170)

Introduction. Gloop is the only registered medical device available in Australia that is designed as medication lubricant to help people who find it difficult to swallow their pills whole, including those with dysphagia (swallowing difficulties).

Aim. This survey study evaluated the extent of use and usefulness of Gloop in medication administration practices in aged care facilities (ACFs) based on the experiences of healthcare workers.

Method. Healthcare workers of varying professional levels in ACFs across Australia who are involved in medication administration were invited to participate in a structured online survey.

Results. A total of 355 healthcare workers completed the survey. Overall, 48% (170/355) of the respondents had used Gloop. Of those who had never used Gloop before, almost one-third of these (58/185) had heard about the product. The majority of respondents that have used Gloop believed it to be an effective method to facilitate pill-swallowing (Fig. 1). Easier medication administration (48%), reduction in the need to crush pills (34%), and better medication compliance (33%) were reported as the main benefits of using Gloop.

Discussion. Using Gloop may facilitate the process of medication administration for healthcare workers and improve residents' compliance with medications. Potential risks associated with modifying medications such as drug toxicities or increased adverse effects, may also be avoided with Gloop when the need for crushing medications is resolved. Further studies are needed to confirm the clinical effectiveness of Gloop.

The role of religion, spirituality and fasting in coping with type II Diabetes among Indian Australians: a qualitative study

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Introduction: Australia has a high proportion of migrants, with an increasing migration rate from India. Type II diabetes is a chronic condition common amongst the Indian population. Self-management and coping with diabetes are influenced by a number of factors, including religion.

Aims: To explore how Australian Indians coped with type II diabetes through religion and spirituality.

Methods: Semi-structured interviews were conducted with a convenience sample of 23 Indian migrants. All interviews were audio-recorded, transcribed verbatim and thematically analysed.

Results: Most participants were males (n=18) and followed Hinduism (n=18). Thematic analysis results in three broad themes: the role of spirituality and religion in coping with diabetes, religious beliefs and insulin use and religious fasting. Most reported believing in God, and coping with diabetes through receiving blessings or prayers, including "tawiz" (a locket or amulet containing verses from holy books) given by religious leaders. Hindu participants reported coping with diabetes by using meditation and yoga. Participants were concerned about the use of insulin if it was produced from pigs or cows, as the source of insulin conflicted with their respective religious convictions. Some Participants tended to fast because of their religious beliefs and not because it could be advantageous in managing their diabetes. None of the participants who fasted reported any adverse effects to their diabetes management from fasting.

Conclusion: Religion and spirituality play important roles in how the participants coped with diabetes. Religious beliefs and fasting could have an impact on medication and diabetes self-management.

Reviewing the quality of trials of biologic disease modifying antirheumatic drugs supporting PBS listing from 2006 – 2018

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Introduction. Autoimmune musculoskeletal diseases such as rheumatoid arthritis, ankylosing spondylitis, and psoriatic arthritis and inflammatory bowel diseases (IBD) have a considerable impact on patient by reducing the ability to work and perform everyday tasks; there is also substantial expenditure by the government on medicines. Biological disease modifying anti-rheumatic drugs (bDMARDs) are a class of medicines used to treat these conditions. Use is increasing with huge costs to the Australian government via subsidy on the national Pharmaceutical Benefits Schedule (PBS). Medicines are subsidised on the PBS based on evidence of efficacy in clinical trials. However, the quality and strength of the trials supporting the approval on the PBS is still yet to be evaluated.

Aims. This study aims to examine strength of evidence of trials of bDMARDs used to support decisions for subsidy in Australia as provided in PSDs: effectiveness, safety, quality of trials, and risk of bias.

Methods. PBS Public summary documents for relevant bDMARDs were extracted from the PBS website. Clinical trials used in PBS applications for subsidy were extracted from PSDs. Information from each trial was extracted: patient cohort, patient numbers, randomisation, concealment, type of trial etc. Each trial was assessed for risk of bias using the Cochrane risk of bias tool.

Results. Between 2006 to 2018 across 5 indications and 9 bDMARD medicines, 53 trials were identified. Across those trials, the median number of patients enrolled for the trials was 368, with interquartile range being from 200 to 619 patients. Around 50% of the trials were performed under an intention to treat statistical analysis. Majority of trials had a high risk of bias particularly when considering role of pharmaceutical companies for funding and sponsorship.

Discussion. The characteristics of the trials varies greatly across both specific medicines but also across within indications. This can have important implications for decision making by physicians and patients, and also if methods for evaluating the quality of trials should be put into consideration during the PBS approval process.

Sex-based differences in the lymphatic pharmacokinetics of therapeutic monoclonal antibodies

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Introduction Monoclonal antibodies (mAbs) are an increasing therapeutic drug class for cancer and other diseases. Despite their growing use multiple mAbs exhibit a sex-based difference in pharmacokinetics which is concerning as this may affect therapeutic success and the severity or frequency of adverse effects. It is hence necessary to identify the underlying source of this variability. Lymphatic exposure is an established parameter of mAb pharmacokinetics that has not previously been explored as a potential contributing factor of the sex-based variability in mAb pharmacokinetics.

Aims. This study aimed to evaluate whether rats can be used as a preclinical model to identify pharmacokinetic sex-differences in humans. Whether a sex-difference is also observed in lymphatic pharmacokinetics and a potential underlying causal factor of the sex-differences seen in human pharmacokinetics.

Methods. Cetuximab (mAb exhibiting 25% lower clearance in women) was intravenously administered to male and female rats with blood samples serially collected for 30 h and lymph continually collected throughout the study. The plasma-concentration-time profiles were compared with non-lymph cannulated rats and the total amount of drug recovered in lymph calculated.

Results. The sex-difference in cetuximab pharmacokinetics previously observed in humans was unable to be replicated in rats. Despite this, female rats showed two times the lymphatic recovery compared to male rats. This was also observed in the plasma concentration-time profiles of the lymph cannulated rats. The sex-based difference in lymphatic pharmacokinetics was also independent of lymph flow rate which did not differ between the sexes.

Discussion. The presence of a sex-based difference in the lymphatic pharmacokinetics of cetuximab in the absence of a sex-based difference in plasma pharmacokinetics initially suggests that lymphatic trafficking is not affecting the mAb plasma concentrations in rats. However, since the effect of lymphatic mAb recovery on plasma pharmacokinetics is already established it is more likely that the greater concentration of cetuximab in female lymph is due to female rats having a twice as leaky vasculature with the lymphatic-recycling system restoring plasma concentrations to be similar between sexes.

Smoke and Mirrors: What do persistent pain patients think of medicinal cannabis?

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Introduction. It is evident that public support towards cannabis use for medicinal purposes has changed, In Australia, recent polls show that public support has increased over time, with majority of Australians believing cannabis should be legalised for medicinal purposes.

Aims. This study aims to explore the attitudes and perceptions of persistent pain patients to medicinal cannabis and its integration into routine medical treatment for persistent pain.

Methods. 25-item online survey disseminated through social media, was designed to query persistent pain patient's perceptions on medicinal cannabis. A mixture of quantitative and qualitative methods have been used to analyse the responses.

Results. 61% of respondents believe that medicinal cannabis is more effective for chronic pain compared to current treatment options. 77% of participants would try medicinal cannabis if it was readily available to them and almost half of participants (44%) indicated that self-directed online research helped to inform their decision on the efficacy of medicinal cannabis.

Discussion. This research highlights the attitudes of persistent pain patients in Australia on the use of medicinal cannabis. It shows the desire of this patient group to have access to medicinal cannabis as a treatment option for their chronic pain, which they believe to be more effective than current options.

Prevalence of adverse drug events and adverse drug reactions in hospital among older patients with dementia: a systematic review

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Introduction. Older people with dementia are high users of acute care services. There is a high prevalence of adverse drug events (ADEs) and adverse drug reactions (ADRs) among older inpatients with dementia, potentially leading to negative health outcomes including further cognitive decline, delirium and falls.

Aims. This systematic review aimed to quantify the prevalence of ADEs and ADRs in older inpatients with dementia.

Methods. A systematic search of observational studies was performed in Embase, Medline, PsycINFO, International Pharmaceutical Abstracts, Scopus and Informit from inception to May 2019. Articles published in English that reported the prevalence of ADEs or ADRs in hospital patients aged 65 years or older with dementia were included. Two authors reviewed titles and abstracts and all eligible full-text articles. Relevant information relating to ADEs, ADRs and dementia were obtained from each article.

Results. A total of five articles were included. Only one study reported the prevalence of ADEs to be 81.5%, defined using the Naranjo algorithm. Four studies assessed the prevalence of ADRs, ranging from 12.7% to 24.0%, assessed using various methods. One study defined ADRs according to the World Health Organization-Uppsala Monitoring Centre (WHO-UMC) criteria, two studies employed the WHO definition and one study did not explicitly define ADRs. The most frequently reported drug classes implicated in ADRs were psychotropic, antihypertensive and analgesic drugs, implicated in up to 60.0%, 20.0% and 18.0% of ADRs respectively.

Discussion. Our findings suggest that ADEs and ADRs are common in older inpatients with dementia. However, only one study documented ADEs and there was variability in approaches to ADR assessment. A greater understanding of ADEs and ADRs, as well as tailored assessment tools, will promote prevention of ADEs and ADRs in people with dementia.

Pharmacist's perspectives of and attitudes towards medicinal cannabis

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Introduction. Despite ongoing debate surrounding the therapeutic benefits of medicinal cannabis, legislation legalising its use was introduced in Australia in February 2019. Pharmacists, as medication specialists, are now responsible for the storage and supply of medicinal cannabis, and consequently, their support will be essential for the successful introduction and management of medicinal cannabis products in Australian health care.

Aims. Assess the attitudes and perceptions of pharmacists regarding the legislation and the impact they believe it will have on the pharmacy profession.

Methods. Pharmacists from the Australian cities of Newcastle and Lake Macquarie were identified using convenience sampling and invited to participate in face-to-face interviews using a mixed qualitative/quantitative semi-structured questionnaire. Qualitative questions underwent manual thematic analysis. Quantitative demographic data was used to determine whether emerging themes and opinions corresponded with the age, sex and/or years of experience of participants. Ethics approval for this project was granted by the University of New England (UNE) Human Research Ethics Committee (approval number HE17-201).

Results. There was strong support for the medicinal cannabis legislation, despite the fact that less than half of interviewees had read the legislation or knew where to find it. Concerns were raised regarding the limitations of specialist-only prescribing and the lack of availability of medicinal cannabis products, primarily because these factors would negatively affect patient access. Although the majority of pharmacists did not perceive that dispensing medicinal cannabis would adversely affect rapport with patients or put the pharmacist or the pharmacy at risk, some individuals expressed concern about the possibility of patients turning to illicit cannabis due to the aforementioned problems with availability.

Discussion. Overall, pharmacists supported the legalisation of medicinal cannabis and were cautiously optimistic about its use; however, there was concern about the lack of time prior to the legislation passing to establish an appropriate infrastructure to manage these preparations.

Pharmacists' understanding and attitudes toward deprescribing

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Introduction. Recent estimates suggest that 250,000 Australians are hospitalised each year due to medication errors, inappropriate use or interactions, costing \$1.4 billion in annual expenditure. Deprescribing, the process of intentionally stopping a medication, reducing its dose or substituting for another agent by a prescriber in conjunction with a patient, aims to improve a patient's health or reduce the risk of side effects. Pharmacists may facilitate the deprescribing process due to their medication knowledge and skills, although their understanding and attitudes toward deprescribing have not been adequately investigated.

Aims. To explore community pharmacists' understanding of deprescribing and the perceived barriers and enablers to their involvement in the deprescribing process.

Methods. Semi-structured face-to-face and telephone interviews with Australian registered pharmacists were transcribed verbatim to identify common themes using a qualitative approach. Recruitment and interviewing continued until data saturation was reached. Themes were analysed using NVivo 12 software. Ethics approval was granted by the University of New England Research Committee (HE19-136,7) in July 2019.

Results. Sixteen community pharmacists from Western Australia, Victoria and New South Wales were enrolled in the study over a 6-week timeframe. All participants understood the concept of deprescribing, with many suggesting deprescribing should be a shared responsibility between health professionals and patients. Barriers identified included patient and prescriber resistance to deprescribing, uncertainty about professional scope and a lack of remuneration for the required time and staff commitment. Enablers included remuneration tied to professional service, building relationships with prescribers and active engagement of professional pharmacy organisations to support the deprescribing process.

Discussion. Pharmacists are well-positioned and knowledgeable about medicines and deprescribing. Pharmacist involvement in deprescribing can be encouraged and supported through adequate funding, professional organisations and collegiality. It is currently hindered by resistance, uncertainty and a lack of time and finances.

Views on facilitators and barriers related to pharmacy technician professional development

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Introduction. With hospital pharmacists increasingly focused on clinical roles, pharmacy technicians are expected to support pharmacists by streamlining their workload, for example, collating pathological results and chart reconciliation. Such role/s require further training and professional development. However, unlike pharmacists, Australian pharmacy technicians are not obligated to undertake continuing professional development. Hence, the current perceptions of the preferred pharmacy technician training frameworks within the profession is unknown.

Aims. To explore the facilitators for, and barriers towards, pharmacy technicians undertaking further training and professional development, from the perspective of both technicians and pharmacists.

Methods. Semi-structured interviews were conducted with 15 pharmacy technicians and 10 pharmacists from a private and public hospital in South-East Queensland during October 2017-August 2018. Interviews (averaging 40 minutes), were audio-recorded, transcribed verbatim and quality checked by a second researcher. Using a qualitative software NVivo®, the general inductive approach was used for data analysis.

Results. All participants except for one technician were interested and supportive of further training opportunities for pharmacy technicians. Reported facilitators included organisational support, such as dedicated time or funding to complete training, support from colleagues, career progression and increased remuneration. Other reported facilitators were increased autonomy and credibility; and greater job security. Barriers included training cost and time, lack of organisational support, personal disinterest, and the lack of specific courses available for pharmacy technicians. The perception of time varied across settings; inadequate time to complete training was more prevalent within the public setting. Compared to pharmacists, technicians preferred less structure to their training with an emphasis on mentorship.

Discussion. This study has provided valuable information when considering or developing future training opportunities for pharmacy technicians. Hospital pharmacies should capitalise on the thirst shown by pharmacy technicians for greater knowledge and responsibility, thereby driving future change within the profession.

Evidence and the policy process: codeine up-scheduling in Australia

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Introduction. There has been little research on how policies affecting pharmacy practice in Australia are developed, and it is important to address this gap, particularly regarding the expansion of pharmacists' roles beyond medication supply and management, and the regulation of 'contentious' and complex pharmaceutical products. In Australia, over-the-counter codeine-containing analgesics were up-scheduled to Prescription Only status in February 2018 to decrease opioid-related misuse and harms. This was a highly politicised decision and widely debated in the media.

Aims. To understand the process of developing policies that affect pharmacy practice and the role of evidence, by investigating how the decision to up-schedule codeine-containing analgesics was developed.

Methods. This study is a retrospective policy analysis, utilising case study research methodologies. A document analysis of government white papers, Hansard, public submissions, and news reports is being conducted. This will inform the purposive sampling for interviews with key stakeholders. Data analysis will be guided by the Advocacy Coalition Framework, which suggests that individuals with shared beliefs form coalitions, compete in the use and interpretation of evidence, and in the subsequent translation of beliefs to action.

Results. Preliminary findings indicate that the different types of evidence considered in the decision included: research evidence by clinical and drug policy experts; public submissions from patients, health professionals, and industry; and economic evaluations. However, the analysis also suggests that different stakeholders sought to influence the policy process through employing arguments based on their belief and understanding of problems and solutions surrounding the codeine up-schedule. For example, many consumers and community pharmacists argued that most consumers would be unnecessarily disadvantaged, and other solutions would better address issues of harm; many doctors argued that restricting access would reduce harms and encourage development of long-term pain management strategies.

Discussion. This study will provide insights into how decisions affecting medicines scheduling in Australia are developed, and the institutional, political, and cultural factors that influence the development of policies affecting pharmacy practice. Findings may drive more appropriate/realistic uses of evidence to create better health outcomes.

Attitudes towards smoking cessation application among Thai undergraduate smokers.

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Introduction. The smoking rate of undergraduate students identified in Thailand has continually increased. These students are considered the largest population who accesses to the Internet via their smartphones. Therefore, smartphones application tends to have a potential in enabling undergraduate students to quit smoking successfully.

Aims. This study aimed to investigate Thai undergraduate smokers' attitudes towards smoking cessation application.

Methods. A self-administered online questionnaire was employed to collect data from undergraduate smokers studying in four universities in Chiang Mai Province, Thailand, from December 2018 to February 2019.

Results. Of the 494 participants, the majority were male (51.0%) and the average age was 21.4 ± 1.3 years old. Almost all participants were daily smokers (92.9%) whereas very few of them intended to quit smoking (4.4%). The participants mainly used iOS phone (59.5%), spent 11-20 times on their smartphone daily (53.2%), and spent not more than 15 minutes per session (45.2%). None of them used to employ smoking cessation application previously. Regarding smoking cessation application, the characteristics that most of the participants considered as very important were user-friendly operation (76.7%), appropriateness of interface colors (46.1%), smooth and stable operation (45.3%), and reasonable cost on installation (43.7%). In addition, the features that most of them considered as very important were information about smoking drawbacks (72.5%), information about quitting smoking tips and methods (43.1%), and user-smoking-quit-date allowance (42.1%). While information about quitting smoking benefits (84.4%), information about coping with nicotine withdrawal symptoms (68.2%), information about coping with craving (64.4%), private counselling room (56.1%), cessation diary (47.8%), progress on track smoking cessation (44.5%), and encouraging messages sent to them (41.3%) were considered as important.

Discussion. The results could be employed to be guidelines in designing and developing the cessation application for undergraduate students later.

Consumer over-the-counter medicine request behaviours: a cross-sectional exit survey of Australian pharmacy consumers

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Introduction. Self-care and, subsequently, self-medication for the management of minor ailments is an increasing trend worldwide. A common method of self-care for such ailments is to visit a community pharmacy seeking over-the-counter (OTC) medicines. To obtain a better understanding of this practice and ensure the quality use of OTC medicines, it is necessary to explore current consumer behaviour.

Aims. To characterise the OTC medicine request behaviour of Australian pharmacy consumers and to explore factors that may predict consumer behaviour.

Methods. A survey consisting of multiple choice, Likert scale, and open-ended questions was developed to explore the characteristics of consumers and their OTC requests, and consumer satisfaction with their visit to the pharmacy. Bachelor of Pharmacy students administered the survey to consumers exiting the pharmacy during routine clinical placements between October 2018 and May 2019. Consumers who had purchased or requested an OTC medicine, could read and write in English, and were over 18 years of age were eligible to participate. Data were analysed descriptively and comparatively, including a binary regression model to identify predictors of symptom or direct product requests.

Results. Fifty-nine students recruited 605 eligible consumers from 51 unique pharmacies, mostly in metropolitan Sydney (n=48). Respondents were predominantly female (n=353, 58%), 20-29 years of age (n=202, 33%), and university-educated (n=266, 44%). Sixty-five percent of requests (n=395) were for a product, requested by brand or drug name or self-selected, while 35% were symptom-based requests (n=210). Most were for the respondent's own use (n=457, 76%). One-third (n=197) of requests were for respiratory conditions. Prior use of the medicine purchased/requested, and a higher level of education were significant predictors of a direct-product request ($p<0.05$, $R^2=0.22$). Satisfaction scores ranged from 2-5 out of 5 (0 = not at all satisfied, 5 = extremely satisfied), with a median of 5.

Discussion. Prior use and a higher level of education appear to influence the decision to directly request a product. Consumer satisfaction with their experience at the pharmacy was high. Future work should adapt the survey to a representative sample to further explore these factors and/or identify additional factors.

Perspectives of residential aged care facilities' staff on the utility of the Goal-directed Medication review Electronic Decision Support System (G-MEDSS) to identify and record residents' medication related goals of care

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Introduction. People living in residential aged care facilities (RACFs) are prescribed a high prevalence of medications and potentially inappropriate medications. To arrive at a shared decision on prescribing and deprescribing it is important to establish goals and preferences for medications with residents and their representatives. The Aged Care Quality Standards now require that the residents' goals be identified, documented and communicated to the team and this includes use of medications. GMEDSS is a computerised clinical decision support system (CCDSS) that includes validated deprescribing tools and documentation of patient care goals.

Aims. Explore RACF staff views on the utility of G-MEDSS to identify and record residents' therapeutic goals and preferences.

Methods. A qualitative study was conducted in four RACFs. Semi-structured interviews or focus groups were conducted with 19 participants, representing various types of clinical and care staff.

Results. According to staff, the use of a CCDSS, such as G-MEDSS, was useful as it facilitated resident (including people with dementia), and caregiver engagement to obtain comprehensive information about the residents' goals and medication concerns. RACF staff noted that a CCDSS can be integrated in the medication management care plan at the time of admission to document resident medication goals that be accessible to all RACF staff and other members of the health care team including pharmacist, to guide the management of medications for people with and without dementia. Staff perceptions of the increased workload and that some residents and caregivers would have limited involvement in discussions were barriers to the adoption of a CCDSS.

Discussion. Integration of a CCDSS into practice, accompanied with staff training and education, has the potential to improve goal-directed pharmaceutical care, including informing recommendations in Residential Medication Management Reviews by accredited pharmacists.

Framing and scientific uncertainty in nicotine vaping product regulation: An examination of competing narratives among health and medical organisations in the UK, Australia and New Zealand

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Introduction. Evaluating the different policy framings and associated claims in policy debates can help us to understand how the government defines and approaches nicotine vaping products (NVPs) related policies.

Aims. The aim of this study was to compare the policy positions of health and medical organisations across Australia, New Zealand, and the UK as they relate to sale and supply of nicotine vaping products (NVPs) and evaluate factors that have informed the differences in policy recommendations among these countries.

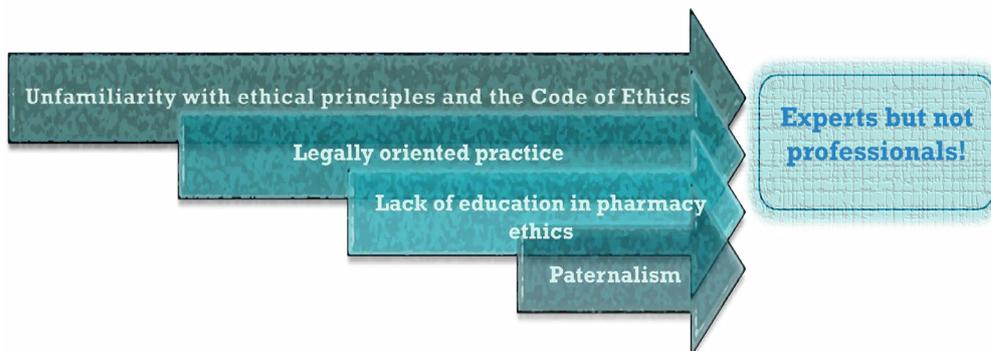
Methods. We used mixed methods to analyse data from position or policy statements published by health and medical organisations regarding NVPs (n=30) and consultation documents submitted to government committees regarding policy options for the regulation of NVPs (n=26). Quality assessment of included documents was conducted using the six-item Joanna Briggs Institute Critical Appraisal Checklist for Text and Opinion Papers. Qualitative data were coded using NVivo 12 software and analysed using thematic analysis.

Results. An overwhelming majority of health bodies, charities and government agencies in the UK and New Zealand portrayed NVPs as a life-saving harm reduction tool. In contrast, the fear of addicting non-smoking youth to nicotine, a perceived lack of clear and convincing evidence of safety and efficacy and the potential to undermine tobacco control progress continues to define attitudes and recommendations towards NVPs among Australian health and medical organisations. Although the profoundly divided views among stakeholders seem to arise from disagreements over the level and credibility of evidence, the source of most of these disagreements can be traced back to the fundamental differences in the framing of the NVP debate, and varied tolerability of risk trade-offs associated with NVPs.

Discussion. A frame-reflective policy conversation where policy makers and stakeholders from both sides of the arguments are engaged in a meaningful discussion could be a solution to the hostile debate and policy controversy surrounding these products. These discussions should ensure that both intended and unintended consequences of the proposed policies are given due consideration.

Are Jordanian Pharmacists: “Experts but not Professionals”?

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Introduction. Pharmacy practice nowadays is patient-centred practice, which implies a closer participation in patient's needs and wellbeing. As a result, pharmacists have diverse decisions to make on handling different situations, ranging from simple matters to major ethical dilemmas. Little is known about Jordanian pharmacists' handling of ethical dilemmas and there is a paucity of research conducted in the area of pharmacy ethics in Jordan.

Aims. This study aimed to explore the manner in which ethical dilemmas were handled by pharmacists, the resources used and their attitudes towards them.

Methods Semi-structured interviews were carried out, using four scenarios, with 30 registered pharmacists in Jordan. The transcribed interviews were thematically analysed for emerging themes.

Results. Four major themes were identified: Legal Practice; Familiarity with the Code of Ethics; Personal and Religious Values; and Professionalism. Findings showed that ethical decision-making in pharmacy practice in Jordan was decisively influenced by pharmacists' personal moral values, legal requirements and managed by exercising common sense and experience. This pointed to large gaps in Jordanian pharmacists' understanding and application of basic principles of pharmacy ethics and underlined the need for professional ethics training, incorporating pharmacy ethics courses in pharmacy undergraduate curricula, and professional development courses.

Discussion. This study highlighted that paternalism, personal values and legal obligations are the major drivers influencing decision making processes of Jordanian pharmacists and a concerning trend of lack of respect for patient autonomy, which is a major gap in the ethical reasoning of Jordanian pharmacists. This illuminated the need to increase Jordanian pharmacists' literacy in professional ethics.

Off-label medications: a mixed-method analysis of pharmacist and stakeholder perceptions of collaboration and practice.

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Background. Effective medication managers in a changing landscape, pharmacists must be patient-centric and accepted within collaborative care models.

Aims. To utilise the increasing use of 'off-label' metformin in gestational diabetes (GDM) to inform how pharmacists and other health stakeholders view pharmacists' medication management roles in evolving practice change; to identify barriers and enablers for collaboration and knowledge exchange.

Method: An observational mixed method study used cross-sectional surveys (27 prescribers, 50 diabetes educators (DEs) and 128 pharmacists) and interviews (8 women with GDM) to triangulate how knowledge and attitudes of Australian health professionals, particularly pharmacists, influenced perceptions of inter-professional collaboration and off-label medication decision-making. Concepts explored included pharmacist confidence handling ambiguous prescribing in vulnerable cohorts, and stakeholder perceptions of pharmacist's role in GDM care.

Results. Only 48.5% of pharmacists faced with an off-label metformin prescription for a pregnant woman felt comfortable dispensing the medicine. Of the remainder, 7% would refuse to dispense, while 41% would contact the prescriber and suggest insulin. However, empirical acceptance developed with hospital inter-professional collaboration and indication familiarity. While pharmacists were generally positive towards collaboration with prescribers, prescribers had little confidence in pharmacists' contribution to medication decisions. DEs observed competency differences, favouring hospital over community pharmacists. Women expressed concern for general practitioner and pharmacist hesitation about metformin in pregnancy.

Discussion. Limited opportunities for inter-professional collaboration and education, geographical isolation and time pressure, leave community pharmacists and general practitioners less familiar with evolving treatments. New collaborative and information exchange pathways need to be developed to address this disparity.

Regulatory safety warnings of cardiac harms: a comparison of four international regulators.

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Introduction. Often there is limited information about rare and long-term adverse events when a medication is initially approved for marketing. This can be due to small sample sizes and limited duration of pre-market randomized controlled trials. Medicines regulators use safety advisories to warn consumers and health professionals about emerging harms in the post market phase.

Aims. To provide an overview of advisories warning about cardiac harms issued by the Australian Therapeutic Goods Administration (TGA), Health Canada (HC), the United States Food and Drug Administration (FDA), and the United Kingdom Medicines and Healthcare products Regulatory Agency (MHFA) from January 2010 to December 2016.

Methods. This was a retrospective study analysing the content of safety advisories on cardiac harms. Safety advisories were defined as a communication to prescribers and/or the public about a potential or confirmed drug safety risk. An initial descriptive analysis was performed, followed by more detailed content analysis. The content analysis extracted information on evidence cited, seriousness of the harm, and actions recommended to prescribers and consumers.

Results. A total of 164 advisories were identified which fulfilled the selection criteria for this study. Of these, 57 (34.8%) were issued by MHFA, 40 (24.4%) by FDA, 35 (21.3%) by TGA, and 32 (19.5%) by HC. There was a significant difference between the number of advisories issued by each country over this timeframe ($X^2 = 9.12$, $p = 0.028$). The most commonly reported adverse events were cardiac arrhythmias ($n=90$, 54.9%), coronary artery disorders ($n=41$, 25%), and cardiac disorders ($n=34$, 20.7%). The most commonly implicated drugs classes (by ATC classification) were alimentary tract and metabolism drugs ($n=40$, 24.4%) and nervous system drugs ($n=39$, 23.8%).

Discussion. There were some differences in frequencies and timing of the advisories by different regulators as well as differences in the types and amount of evidence cited. Ensuring uniformity in medicines safety information available to health professionals and the public allows for informed treatment choices and quality use of medicines.

International big data to investigate medication safety in neurodegenerative diseases: the NeuroGEN initiative.

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Introduction. Increases in the availability of administrative data have led to increased opportunities for big data research in pharmacoepidemiology, particularly in patient groups often excluded from RCTs. In 2018, >30 researchers from 8 regional areas participated into the first NeuroGEN meeting to explore data availability and identify potential joint research projects. The plans were further developed in the 2nd meeting in London, August 2019.

Aim. To investigate medication safety and effectiveness in people with neurodegenerative diseases in a globally representative population.

Methods. For each study, a common study protocol is developed which is then circulated among investigators in each regional area. After the review and feedback, a common data model will be developed that can be applied to each database. The principal investigator will develop an analytical framework which each group will use to analyse their own data and then report the results back to the principal investigator. Data will be presented for each region separately, and where possible, data will be pooled.

Results. Australian-based funding has been secured. Two pilot analyses have been undertaken in Australia and Hong Kong and two common study protocols have been circulated for the members for comments. A symposium in the Asian Conference for Pharmacoepidemiology will be held to introduce the NeuroGEN to the wider Asian research community in Kyoto, October 2019.

Discussion. NeuroGEN involves a large, globally representative sample with data for >100 million people. Common data protocol and model enable timely analyses of data across multiple databases.

Prevalence of clinical inertia in the treatment of patients with type 2 diabetes mellitus, at a Thai tertiary care hospital

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Introduction. Clinical inertia is one of the factors that contribute to poor outcomes for people with Type 2 Diabetes Mellitus (T2DM) (Pakasit et al., 2011). Clinical inertia has been identified as when a clinician fails to follow evidence-based treatment guidelines. However, a definitive definition is still disputed (Aujoulat et al., 2014). According to Paul et al. study, clinical inertia can result in diabetes complications for the individual treated but the studies are still scarce - especially outside developed countries (Paul et al., 2015).

Aims. To explore the prevalence of clinical inertia in treatment of T2DM patients in a tertiary care hospital in Thailand.

Methods. This was a cross-sectional study. Patients diagnosed with T2DM aged 40-65 years and received at least 1 oral anti-diabetic drug (OAD) were included. Included participants, T2DM outpatients who attended clinics in 2017, were assessed clinical inertia. The definition of clinical inertia was defined as T2DM patients who had HbA1C at least 7% and did not receive treatment intensification at index date or subsequent prescription. The index date was the first date in 2017 which patients tested HbA1C at least 7%.

Results. 994 patients were included. Among all patients, the mean age of patients was 55.55±6.09 years; median (IQR) duration of diabetes was 5(2-9) years; baseline HbA1C average was 8.40±1.32% and Charlson's comorbidity index (CCI) score was 1.15±0.36. According to the clinical inertia definition above, the prevalence of clinical inertia was 26.25%. Patients who were prone to clinical inertia are male, using 2 types of OADs and not using insulin.

Discussion. About one-fourth of T2DM patients experienced clinical inertia, which was still high. Factors associated with clinical inertia should be investigated in order to resolve this problem further.

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A qualitative study exploring factors influencing the three phases of medication adherence in ADHD

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Introduction. Adherence to medication is important to optimise medication outcomes in children and adolescents with attention-deficit hyperactivity disorder (ADHD). However, adherence can often be problematic given the complexities surrounding medication decision-making. Currently, there is limited understanding of the factors that influence parents' and adolescents' decisions to adhere at the three phases of adherence (initiation, implementation, and discontinuation).

Aims. This study aimed to explore the factors that influence parents' and adolescents' decisions to initiate, continue and discontinue medication for ADHD.

Methods. Five focus groups were conducted; three with parents (n=23) of children with ADHD, and two with adolescents diagnosed with ADHD (n=11), in different metropolitan areas of Sydney. Thematic analysis was used to analyse the data in the context of the necessity-concerns framework (NCF).

Results. Parents' decision to initiate medication was influenced by their negative beliefs about medication (such as fear of side-effects) and their desire to improve their child's education, learning and behaviour. Adolescents reported that they were not involved in the decision to initiate medications. At the implementation phase, parents struggled in balancing the need to medicate (improvements in learning and behaviour) and concerns (weight loss, delayed development) about the medication. The desire for self-expression influenced adolescents' daily adherence or persistence with medication. Benefits and side-effects were the common parental factors across both implementation and discontinuation phases of adherence.

Discussion. Parents were more likely to adhere at the three phases of adherence if their child's needs for medication were higher than their own concerns. Factors influencing adherence to ADHD medication differ between parents and adolescents, and between the three phases of adherence. Phase- and group-specific interventions are required to improve medication adherence in parents and adolescents with ADHD.

Patient determinants to medication non-adherence

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Introduction. Non-adherence to medication regimens is not fully understood due to the complexity and variables of chronic conditions.

Aims. To investigate how the World Health Organization (WHO) determinants of patient adherence affects Australia's major chronic conditions: cancer, diabetes, respiratory, hypertension, depression and coronary artery disease.

Methods. PubMed, EMBASE, CINAHL, IPA, and Science Direct were systematically searched for articles published between 01/01/2000 and 31/12/2018. The included articles were first divided by chronic condition. The qualitative results were then categorized by the WHO determinants of adherence. Data was analysed using Leximancer®, a text analysis tool, and a bubble plot to show where the density of research is published.

Results. A total of 38 articles were included in this systematic review. Almost 66% of these articles were qualitative studies that used focus groups and semi-structured interviews as their methodology. Hypertension was the most common chronic disease reported, and a variety of patient-related factors were identified from each chronic disease. Socio-economic factors, such as age and education level, remain inconsistent.

Discussion. The complexity of patient non-adherence likely has no single intervention to solve this challenge. Therefore, it is important to identify which factors influence the patient's non-adherence to develop a multifaceted intervention that targets these non-adherent behaviours.

Expression profiling of fatty acid-binding proteins and fatty acid transport proteins in microglia

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Introduction. Microglia play a major role in neuroinflammation. The overactivation of microglia leads to the excessive release of pro-inflammatory mediators, causing prolonged neuroinflammation, which is detrimental to brain health. A polyunsaturated omega-3 fatty acid, docosahexaenoic acid (DHA), has been shown to alleviate neuroinflammation by inhibiting the release of pro-inflammatory mediators from microglia. Therefore, the uptake of DHA into microglia is essential for reducing neuroinflammation. Cytoplasmic carrier proteins, fatty acid-binding proteins (FABPs), and fatty acid membrane transporters, fatty acid transport proteins (FATPs), are involved in DHA trafficking in other cell types, such as brain endothelial cells. Hence, FABPs and FATPs may also be involved in DHA trafficking into microglia, although whether they are expressed in microglia remains to be investigated.

Aims. This study focused on screening the mRNA and protein expression of FABP and FATP isoforms important for DHA uptake into microglia.

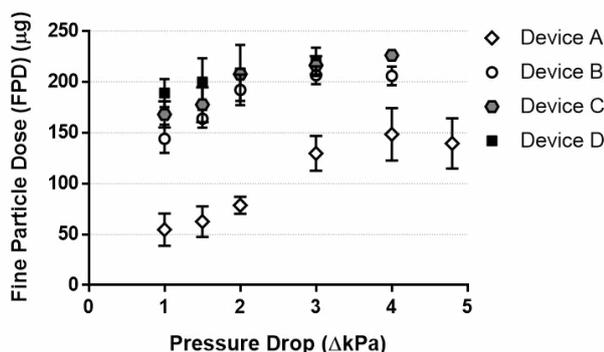
Methods. Using immortalised mouse microglia (BV-2) cells, quantitative reverse-transcriptase real-time polymerase chain reaction (RT-qPCR) and western blotting (WB) were used to quantitatively determine the mRNA and protein levels of the 10 known FABP isoforms (FABP1-9 and FABP12) and six known FATP isoforms (FATP1-6), respectively.

Results. Cytoplasmic carrier proteins, FABP3, FABP4, and FABP5 and fatty acid membrane transporters, FATP1 and FATP4 were highly expressed at both the mRNA and protein level in BV-2 cells. Amongst the cytoplasmic carrier proteins, FABP4 was most highly expressed at the mRNA level, followed by FABP3 and FABP5; while for fatty acid membrane transporters, FATP1 had a higher mRNA expression level as compared to FATP4.

Discussion. DHA is important for alleviating microglial-induced neuroinflammation. Therefore, it is crucial to understand the mechanism by which DHA is trafficked into microglia. The presence of FABP and FATP isoforms found in microglia suggests that cytoplasmic carrier proteins and fatty acid membrane transporters are involved in DHA uptake into microglia. Whether these proteins are involved in the microglial uptake of DHA and whether this is affected in neuroinflammation will now be investigated.

In vitro performance of single unit dose dry powder inhalers (SUD-DPIs) for global health initiatives

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Introduction. Patients in low and lower-middle income countries (LMICs) experience significant barriers to access to receiving quality medicines, particularly injectable uterotonics for the prevention and treatment of postpartum hemorrhage. A spray dried formulation of oxytocin administered via a SUD-DPI that avoids the need for refrigeration offers an opportunity to overcome these barriers. In contrast to other inhaled delivery options on the market, the application of a SUD-DPI is low cost and can sustainably meet the specific needs of patients experiencing life threatening PPH events in LMICs.

Aims. To evaluate the in vitro aerosolization performance of low-cost SUD-DPI options to effectively deliver a proprietary oxytocin dry powder formulation.

Methods. Low-cost SUD-DPIs were identified and evaluated for in vitro performance with a Next Generation Impactor (NGI) across four different pressure drops representative of patient use. Powder fractions were assayed for oxytocin content using a validated HPLC-UV method.

Results. Selected devices that had medium and low internal resistances (B, C and D) displayed higher and more consistent fine particle doses (FPD) across the chosen pressure drop range. Device A performed the worst and produced a much lower FPD despite having the highest internal resistance to airflow.

Discussion. Inhaler designs are trending towards higher resistance to airflow in order to increase the fine particle dose however, in this case the highest resistance device had comparatively poor performance characteristics. Devices B, C and D were more suited to an LMIC global health application due to their higher dosage of fine particles and improved consistency of dose delivered across all the tested pressure drops.

Stability of formulations for use in a randomised controlled trial of caffeine citrate to prevent intermittent hypoxaemia in late-preterm neonates

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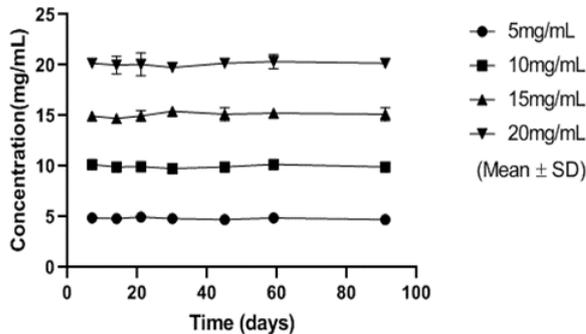


Figure 1: Concentration-time profile of caffeine citrate in aqueous solution

Introduction. The LATTE Dosage Trial is investigating the most effective dose of caffeine citrate for prevention of intermittent hypoxaemia in late preterm infants (placebo vs 5, 10, 15 or 20 mg/kg). To ensure blinding, babies must receive the same volume of medication (1 mL/kg), therefore, four different concentrations of study drug are required.

Aims. To establish the stability of caffeine citrate in an aqueous solution formulation at 5, 10, 15 & 20 mg/mL.

Methods. Test solutions were prepared in triplicate by dissolving caffeine citrate powder in water for irrigation to give concentrations of 5, 10, 15, 20 mg/mL. Caffeine concentration was measured by high performance liquid chromatography (HPLC) at 1, 2, 3, 4 and 6 weeks and 2 and 3 months. Chemical stability was defined as <10% change from expected concentration. Organoleptic properties and pH were also recorded at each time point. Solutions were cultured for common nosocomial pathogens at baseline and 7, 14, 21 and 28 days.

Results. Caffeine citrate solutions were chemically stable at all concentrations to 90 days (Figure 1). There were no visual or olfactory changes during the test period, and the pH did not vary by more than 0.35 pH units for any concentration across the study period. There was no growth of nosocomial pathogens at any timepoint.

Discussion. Caffeine citrate is chemically and physically stable in aqueous solution at concentrations between 5 and 20 mg/mL for at least three months. The proposed formulations are suitable for use in the Latte Dosage Trial, where the expiry will be 30 days, in accordance with standard extemporaneous manufacturing practice.

Helping patients swallow their tablets: characterisation of commercial medication lubricants for use in dysphagia

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Medication lubricant	IDDSI	
	24°C	4°C
Gloup Forte (vanilla)	4	4
Gloup Original (orange)	3	4
Gloup Low Sugar (raspberry)	3	4
Gloup Sugar Free (cherry)	3	4
Gloup Original (strawberry/banana)	3	4
MediSpend (lemon)	3	3
Severo (anise)	3	3
Slo Tablets (cherry)	3	3
Heyaxon (peach)	lumpy	
Magic Jelly (for adult, for dysphagia)	lumpy	
Swallow Aid (cherry)	sticky	

Introduction. Medication lubricants are designed to facilitate swallowing of tablets and capsules; they are placed on a spoon with the medication within it to aid swallowing. Gloup® is the only medication lubricant available in Australia. Gloup and other lubricant brands are available in other countries.

Aim. To assess and compare medication lubricants in terms of their safety and suitability for patients with dysphagia.

Methods. 12 medication lubricants were characterised according to the International Dysphagia Diet Standardisation Initiative (IDDSI) framework; apparent viscosity at shear rate 50 s⁻¹; yield stress by shear stress sweeps from 0.001-1000 s⁻¹; consistency using a Bostwick consistometer; and various texture features using a texture analyser.

Results. Gloup Forte was the only IDDSI level 4 medication lubricant when tested at room temperature. Other Gloup products were level 3, but thickened enough to classify as level 4 if tested at 4°C or if poured from the bottle instead of using the pump dispenser. MediSpend (NL), Severo (NL) and Slo tablets (GB) were IDDSI 3 according to the IDDSI Flow Test. Magic Jelly (JP) and Heyaxon (CN) contained lumps, and Swallow Aid (US) had exceptionally high viscosity, hardness, adhesiveness and gumminess, making these products unsuitable for people with dysphagia.

Discussion. People with dysphagia are at risk of aspirating food, liquid and medication into the lungs. Controlling the texture of meals and drinks is a core part of management of this condition. This research provides information to help selection of a medication lubricant of an appropriate thickness to suit individual dysphagia management plans.

Understanding the basis for sex differences and inter-individual variability in the pharmacokinetics of therapeutic monoclonal antibodies

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Introduction. Monoclonal antibodies (mAbs) are widely used in the treatment of cancer and other diseases. One limitation of antibody therapeutics however, is highly variable and unpredictable pharmacokinetics between individuals and sexes that can potentially impact on therapeutic success and the severity of adverse effects. There is therefore a critical need to identify underlying sources of inter-individual/sex differences in mAbs pharmacokinetics.

Aims. This study aimed to evaluate whether rats can be used as a model to identify pharmacokinetic sex-differences in humans, and the underlying source of inter-individual and inter-sex pharmacokinetic differences in monoclonal antibodies at the preclinical stage.

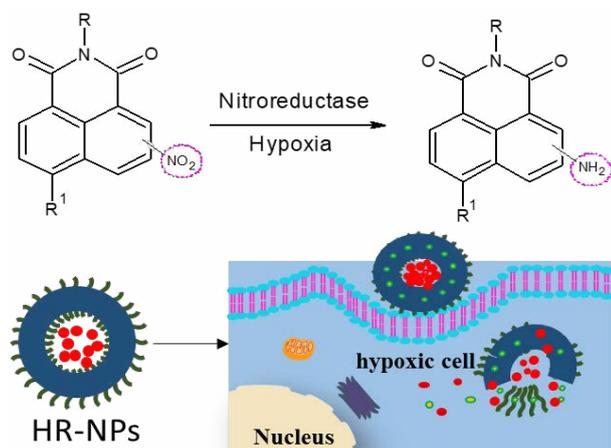
Methods. Cetuximab was intravenously administered to age- and litter-matched male and female rats and blood samples serially collected for up to 1.5 months. Pharmacokinetic parameters were correlated with pre-dose physiological variables, including fat-free mass, peripheral white cell and monocyte counts, lymphatic uptake, biodistribution in mononuclear phagocyte system organs, sex hormone levels and endogenous albumin and IgG levels, to identify possible sources of pharmacokinetic variability.

Results. The sex-difference in cetuximab pharmacokinetics previously observed in humans was unable to be replicated in rats. However, a high level of interindividual variation similar to that seen in humans was observed. Plasma clearance negatively correlated with monocyte count and spleen biodistribution and positively correlated with albumin concentration. Clearance did not correlate with any other measured which have previously correlated with cetuximab pharmacokinetics in a human population study.

Discussion. Rats are not an appropriate pre-clinical model for identifying sex-based differences in pharmacokinetic variability however may be used to study inter-individual variability despite some clearance mechanisms not being conserved between species. Correlational results suggest a greater efficacy of recycling versus degrading pathways within the monocyte however species-specific receptor affinities require this relationship to be studied further in isolated human monocytes.

Synthesis and characterization of hypoxia responsive nanoparticles for cancer therapy

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Introduction. Hypoxia is a pathological condition found in 60% of solid tumors with lower oxygenation level due to poorly adapted vascular network and improper blood flow. The formation of hypoxic areas is a key indicator to cancer progression towards metastasis and resistance to the various cancer treatments.

Aims. To synthesize and characterize drug loaded hypoxia-responsive nanoparticles (HR-NPs) for targeted anticancer drug delivery.

Methods. Newly synthesized and characterized hypoxia sensitive nitroimidazole is conjugated to chitosan to prepare HR-NPs as carriers for hydrophobic anticancer for site specific drug delivery to hypoxic tumors.

Results. The nitroimidazole probe was prepared via Suzuki coupling reaction and characterized using spectral techniques. The ratiometric probe can be selectively activated by nitroreductase (NTR) in presence of NADH and presents an evident change from green to yellow fluorescent emission in both solution phases and in cell lines maintained under hypoxia. The probe conjugated chitosan nanoparticles displayed a rapid drug release specifically to hypoxic cells and were less toxic to normoxic cells.

Discussion. The hypoxia based drug delivery mechanism was based on the NTR-catalyzed reduction of the hydrophobic nitro group of nitronaphthalimide to hydrophilic amino group, accompanied by the rapid release of the drug specifically to cancer cells.

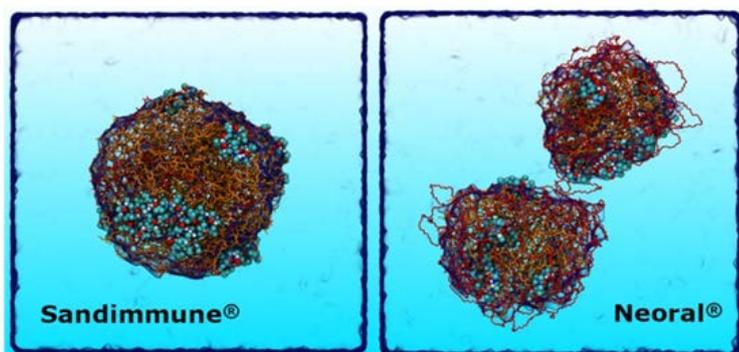
Thambi T et al (2014) *Biomaterials* 35:1735-1743

Zhang R et al (2016) *RSC Advances* 6:30268-30276

More than 20 years since Sandimmune® and Neoral®: How would we develop a cyclosporine lipid-based formulation using the tools of today?

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Introduction. The cyclosporine Sandimmune® vs. Neoral® story more than 20 years ago is still well known to those working in the lipid-based formulation (LBF) field. Sandimmune® LBF showed significant variability and a positive food-effect (1) while the newer LBF, Neoral® showed reduced variability and no food-effect. Here, we perform reflective analysis of Sandimmune® and Neoral® using molecular dynamics simulations (MDS).

Methods. MDS were performed using GROMACS 2016.3 on an in-house High-Performance Computing cluster. LBF models were based on published compositions for Sandimmune® and Neoral®. Simulations included LBFs in water, fasted state simulated intestinal contents (FaSSIF) and upon digestion in fed state simulated intestinal contents (FeSSIF).

Results. MDS results indicate that Sandimmune® is poorly dispersed in water, while Neoral® is better dispersed, forming smaller colloids. These results are consistent with laboratory tests, with MDS therefore confirming the superior dispersibility of Neoral® versus Sandimmune®. Sandimmune® dispersion greatly improves on digestion of the LBF in the “fed state” (FeSSIF) whereas there is only a slight improvement in the dispersibility of Neoral® on moving from fasted to fed state conditions.

Discussion. The MDS platform successfully modelled the performance of both Sandimmune® and Neoral® LBFs of cyclosporine specifically (i) the significant differences in Sandimmune®/Neoral® dispersibility and (ii) the significant improvement in Sandimmune® dispersibility when digested and lower food-effect risk with Neoral®. This study highlights how advanced formulation development tools such as MDS can be applied today to realize the rapid identification of concept formulations for small molecule and peptide API.

Mueller et al. Pharm. Res. (1994) 11(1) 151-155

Demonstration of the first known 1:2 host-guest encapsulation of a platinum anticancer agent within a macrocycle

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Introduction. The clinical use of platinum drugs is greatly compromised by their dose-limiting side-effects. This has prompted investigation into various drug delivery systems, to reduce off-target binding. Recently, macrocycles have garnered interest as drug delivery vehicles, and of particular relevance is the underexplored *para*-sulfonatocalix[8] arene (sCX[8]), because of its unique double pseudo-cavity structure.

Aim. To study the host-guest chemistry of sCX[8] with $[\text{Pt}(\text{H}_2\text{O})_2(\text{R},\text{R-dach})]^{2+}$, the active aquated component of the anticancer platinum drug oxaliplatin.

Methods. The ability of $[\text{Pt}(\text{H}_2\text{O})_2(\text{R},\text{R-dach})]^{2+}$ to bind to sCX[8] was examined by ¹H NMR and molecular modelling. A job plot was constructed to determine the sCX[8]- $[\text{Pt}(\text{H}_2\text{O})_2(\text{R},\text{R-dach})]^{2+}$ host-guest complex stoichiometric ratio. The effect of sCX[8] on the ability of $[\text{Pt}(\text{H}_2\text{O})_2(\text{R},\text{R-dach})]^{2+}$ to bind its target (DNA) was examined by guanosine 5'-monophosphate (5'GMP) NMR studies.

Results. $[\text{Pt}(\text{H}_2\text{O})_2(\text{R},\text{R-dach})]^{2+}$ formed a 1:2 host-guest complex with sCX[8], evidenced by marked upfield changes in chemical shift of drug ¹H NMR peaks and molecular modelling results confirmed a 1:2 host-guest complex. The 5'-GMP data was consistent with $[\text{Pt}(\text{H}_2\text{O})_2(\text{R},\text{R-dach})]^{2+}$ being encapsulated within sCX[8] while simultaneously bound at the 5'-GMP N7 site.

Discussion. Our results demonstrated that sCX[8] is capable of forming 1:2 host-guest complexes with the aquated form of oxaliplatin, presenting the unprecedented possibility of delivering two drug molecules simultaneously by a single macrocycle. Although the NMR spectroscopy results are consistent with deep encapsulation of the dach group within the hydrophobic cavity of sCX[8], the molecular modelling results instead suggest a surface binding model dominated by hydrogen bonds and electrostatic interactions. The results of this study demonstrate a potential for sCX[8] to act as a delivery vehicle for charged platinum drugs.

Early outcomes of a volunteer peer teaching program in pharmacy

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Introduction. Peer teaching programs have potential benefits for students (as learners and as teachers) and programs (in quality improvement). To explore this, in 2019, Monash University developed and piloted the Education and Learning Pharmacy Helpers (ELPHs) program.

Aim. The aim of the ELPHs program was to enhance first-year (P1) student workshop engagement by identifying trends in student comprehension and normalising discussion of especially difficult concepts or concerns with near-peer mentors. We hypothesised that P1 students would be comfortable in approaching the ELPHs due to their common student experiences. We also predicted that third-year (P3) students serving as ELPHs would demonstrate mastery of previously learned concepts and stretch their communication skills.

Methods. Four P3 student ELPHs were recruited and trained to work alongside practitioner teaching associates (TAs) in P1 workshops in the Professional Practice and How the Body Works units. ELPHs were chosen based on their good academic standing, exceptional communication skills, and interest in education.

Results: The ELPHs participated in approximately 12 x 2-hour workshops. Prior to each workshop, ELPHs were required to attend a team preparation meeting with the week's lead academic and TAs. During each workshop, ELPHs provided student-centred assistance and support. After each workshop, ELPHs provided oral and written feedback (via an online survey) to the TAs, lead academic, unit coordinator and course director. Informal review suggested that P1 students, ELPHs, and staff found value in the program.

Discussion: Teaching skills are inherent to pharmacy practice, whether it be counselling patients, relaying medication-related problems and potential solutions to doctors, or sharing knowledge with other pharmacists (Burgess & McGregor, 2018). Preliminary results of the ELPHs program were positive and suggest wider implementation should be studied.

Burgess, A. & McGregor, D. Peer teacher training for health professional students: a systematic review of formal programs. *BMC Medical Education*, 18(263). DOI: 10.1186/s12909-018-1356-2.

Helping children taking their medication: a social media analysis

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Introduction. The administration of oral medication to children is a challenging process for parents of ill children at home, causing paediatric medication adherence to remain suboptimal ¹. In order to overcome medication refusal, parents and caregivers may turn to online resources and search engines for advice, contributing to health literacy related searches to be the 2nd most searched topic via Google.

Aims. To identify the most common online resources utilised by parents when searching information on the administration of medication to children and to describe the most common search topics.

Methods. Using Social Studio[□], we carried out a search of key terms that related to the administration of medication to children on online forums, blogs and social media platforms and then screened for specific threads. The sources identified were analysed using line-by-line open coding for emergent themes.

Results. A total of 671 sources primarily from forums, Twitter and comments on YouTube were obtained and screened down to 54 relevant entries. The majority of these were related to children with mental health issues and developmental conditions affecting children's behaviour.

Discussion: With the ever-increasing preference for, and impact of online resources in discussions about health and the decision-making process of parents, there is an urgent need to develop the online presence of pharmacists and other healthcare professionals' advice about paediatric medication, with a particular focus on education on mental health. Future research should focus on investigating the value of developing digital education skills of students in undergraduate Health courses as a way of promoting safer and evidence based online environments for caregivers of children.

Goh, X. T. W et al. (2017). A systematic review of factors that influence treatment adherence in paediatric oncology patients. *Journal of Clinical Pharmacy and Therapeutics*, 42(1), 1-7.

The role of study strategy and motivational constructs in academic performance of pharmacy students.

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Introduction. In several studies, students' study strategies, self-efficacy, and goal orientations are positive predictors of academic success. Less is known how this occurs in a pharmacy student population and whether it predicts OSCE performance.

Aims. This study aims to investigate how motivational constructs and study strategies reported by pharmacy students affect their course and OSCE performance.

Methods. Undergraduate pharmacy students in years 1-4 (P1-P4) in a Vertically Integrated Masters (VIM) programme will be surveyed with items covering five types of student factors: 1) self-reported unit study strategies; 2) self-reported OSCE study strategies; 3) achievement goal orientations; 4) self-efficacy for pharmacist activities (e.g. medication history); and 5) metacognitive conditional knowledge.

Results. Academic performance results will be obtained from Student Administration records. Results will be analysed using a structural equation model that will test a hypothesised model where superior study strategies and intrinsic motivation will positively affect academic performance.

Physicians views on cardiovascular disease risks prevention services by pharmacists

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Introduction. Cardiovascular diseases (CVD) are the leading cause of mortality worldwide. CVD development is contributed by several modifiable and non-modifiable risk factors; modifiable risk factors that can be prevented or reduced. Thus, identifying, assessing and managing modifiable risks/risk factors at early stages is essential. Pharmacists are highly accessible primary health professionals and can play a crucial role in screening for and managing these risks/risk factors in collaboration with primary care physicians, however such health prevention services are not established practice in Saudi Arabian pharmacies.

Aim. To explore the perceptions of physicians about the utility, uptake and preferred formats of CVD risk screening and management services by pharmacists in Saudi Arabia.

Methods. Qualitative semi-structured interviews were conducted, audio-recorded and transcribed verbatim in Arabic or English. All transcripts were thematically analysed after translation into English if required.

Results. A total of 26 physicians recruited from public hospitals and primary health care centres in Saudi Arabia were interviewed. Most were not aware of pharmacists' roles and activities in CVD risk prevention rather than medications supply. Though most were supportive of community pharmacy CVD risk screening services, they recommended physician-pharmacist collaborative models, extensive provider pharmacist training and strict oversight by the Saudi Ministry of Health/other official authorities to ensure service quality and sustainability, should implementation occur. Health care system reform was thought to be key in expanding and utilising private sector (i.e. community pharmacy) involvement in health care and many participants suggested incentivising providers and 'marketing' for patients' acceptance.

Conclusion. Physicians were positive about setting up a collaborative community pharmacist-physician CVD risk screening and management service model with the help of an authorised body within the Saudi Arabian health care system.

Strong bugs need strong drugs: Does Tuberculosis needs therapeutic drug monitoring?

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Introduction. Tuberculosis in Australia is a growing burden leading to considerable drain on public health budget. Therapeutic drug monitoring (TDM) of anti-tuberculosis drugs has been recommend by American Thoracic Society since 2016 but only included since this year in the updated WHO consolidated guideline for multi drug resistant tuberculosis (MDR-TB)

Aims. This study describes a case of MDR-TB from diagnosis to treatment. Based on currently available guidelines we evaluated whether this case could have benefitted from TDM if it would have been available.

Methods. The clinical management of a patient with MDR-TB was described and potential use of TDM was verified according to published TDM criteria e.g. lack of treatment response, gastro-intestinal complications, HIV/Diabetes, use of second line drug.

Results. This patient presented to our Emergency Department with symptoms of left cervical lymphadenopathy for about one month. After rapid diagnosis followed by admission to Infectious Diseases ward the patient was subsequently discharged for out-patient treatment supervised by the Chest Clinic. Based on drug susceptibility anti-tuberculosis drugs were introduced and supportive therapy was initiated.

The final regimen consisted of Linezolid 500mg, Clofazimine 100mg, Ethambutol 1000mg, Ethionamide 500mg, Capreomycin 1 gram and supportive therapy consisting of Pyridoxine 50mg daily, Ondansetron 8mg twice daily and Metoclopramide 10mg three times a day as required to manage nausea was also administered. Loratidine 10mg daily was given to manage allergic reactions.

Conclusion. Management of this patient with MDR-TB was difficult due to extensive resistance and gastro-intestinal complications. Multiple indications for TDM were present. We recommend implementation of TDM at our institution to better manage difficult to treat cases.

Risk factors and associated outcomes of hospital readmission in COPD

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Introduction: Despite the increasing attention given to all-cause readmission from COPD, there is a need to identify the prevalence, risk factors and associated outcomes of COPD-related readmission.

Aim: To systematically review and summarise the prevalence, risk factors and outcomes associated rehospitalization due to COPD exacerbation.

Method: The Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines were followed. Five databases were searched for studies that analysed risk factors and/or the associated outcomes of readmission in COPD. Studies defining readmission of COPD as more than one admission due to COPD/exacerbation of COPD were included. The study protocol was registered with the international prospective register of systematic reviews (2018: CRD42018102931).

Results: Fifty-seven studies from 30 countries met the inclusion criteria. The prevalence of COPD-related readmission varied from 2.6-82.2% at 30 days, 11.8-44.8% at 31-90 days, 17.9-63.0% at 6 months and 25.0-87.0% at 12 months post-discharge. There were differences in the reported factors associated with readmissions, which may reflect variations in the local context, such as the availability of community-based services to care for exacerbations of COPD. Hospitalisation in the previous year was the key predictor of COPD-related readmission. Comorbidities (in particular asthma), living in a deprived area and living in or discharged to a nursing home were also associated with readmission. Relative to those without readmissions, readmitted patients had higher in-hospital mortality rates, shorter long-term survival, poorer quality of life, longer hospital stay, increased recurrence of subsequent readmissions, and accounted for greater healthcare costs.

Conclusions: Hospitalisation in the previous year was the principal risk factor for COPD-related readmissions. Variation in the prevalence and the reported factors associated with of COPD-related readmission indicate the risk factors cannot be generalized, and interventions should be tailored to local healthcare environment.

Recruitment and retention of pharmacists in rural and remote areas of Australia: a scoping review

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Introduction. Despite reports suggesting a possible oversupply of pharmacists, there is currently an inadequate supply in rural and remote Australia. This can lead to a reduction in pharmacy services for an already vulnerable population.

Aims. To identify the strategies and factors associated with the recruitment and retention of pharmacists in rural and remote Australia.

Methods. Database searches of PubMed, CINAHL, ProQuest and Scopus were conducted. Full-text of relevant studies conducted in Australia, reported in English and published between the year 2000 and 2018 were retrieved. The record titles were independently screened by two investigators, after which, abstracts of disputed articles were collected for further evaluation. Where agreement could not be reached, a third independent investigator screened the residual articles for inclusion or exclusion.

Results. A total of nine articles which focused on the pharmacy profession were identified. Strategies that have been employed include the employment of sessional pharmacists in rural hospitals, development of an undergraduate pharmacy curriculum, enrolment of students from a rural background, establishment of rural pharmacy schools and extended rural placement. Factors associated with recruitment and retention were either personal, workplace or community factors.

Discussion. There is limited research focusing on the recruitment and retention of pharmacists. Given that pharmacies in rural areas are very accessible and often function as a one-stop health hub, additional personal, workplace and community support are required for rural pharmacists and pharmacy students undergoing placements in rural communities.

Polypharmacy in older Australians: A population based study (2006-2017)

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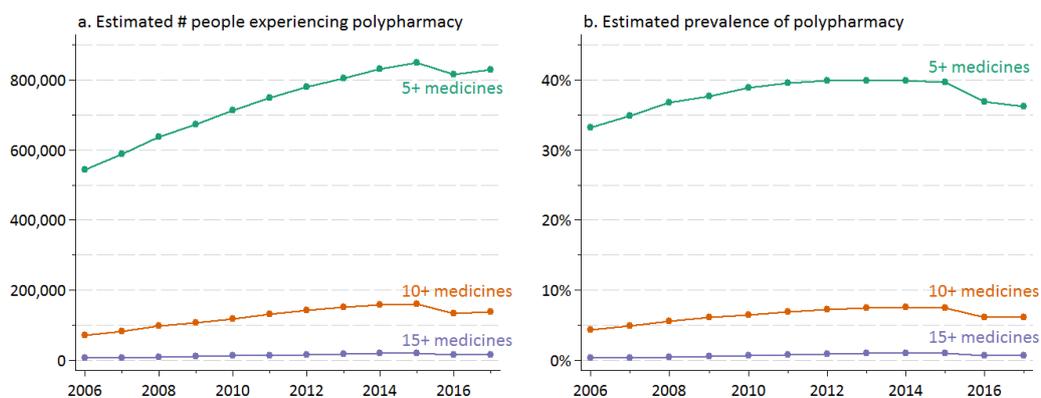


Figure 1

Introduction. Polypharmacy is associated with poor clinical outcomes including increased hospitalisation.

Aims. To estimate the prevalence of polypharmacy in Australians 70 years of age and older from 2006 to 2017.

Methods. An observational study using a random 10% sample of persons aged 70 or over dispensed a Pharmaceutical Benefits Scheme (PBS) listed medicines between 1 January 2006 to 31 December 2017. The main outcome measures were the number and percent of people experiencing continuous polypharmacy (dispensing five or more unique medicines in both 1 April – 30 June and 1 October – 31 December) in 2017; changes in continuous polypharmacy from 2006 to 2017.

Results. In 2017 we estimate 36% of older Australian aged 70 years and over experienced continuous polypharmacy; which we estimate to be 935,240 people (Figure 1). Rates of polypharmacy were highest in females (37%) and for people aged 80 to 89 years (45%). While the prevalence of older Australians experiencing polypharmacy increased by 9% in the period 2006 to 2017, the absolute number of older people affected increased by 52%.

Discussion. The prevalence of polypharmacy among older Australians remains high, with almost 1 million older people affected. The total numbers of older people experiencing polypharmacy increased much more substantially, due to increases in the ageing population. These estimates are likely to be conservative as they only include PBS subsidised medicines not over the counter, complementary medicines or private prescriptions. While polypharmacy can be appropriate in some people under specific circumstances, a large number of older people continue to experience it despite substantial work highlighting the potential harms and the importance of rationalising unnecessary medicines.

Does initiating medicine for dementia change statin use? A population-based study

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Aim. At the time of dementia diagnosis, goals of care are often reassessed. This is particularly for long term preventative medicines such as statins, where the potential harms may outweigh the potential benefits. This study aimed to examine changes in statin use after initiation of medicine for dementia.

Methods. A case-crossover study utilising data from the Australian Pharmaceutical Benefits Scheme (PBS) 10% random sample was conducted. Use of statins was investigated in the 12 months pre- and post-initiation (pre-period and post-period) of medicine for dementia. Individuals aged ≥ 65 years who had their first dispensing for dementia medicine from July 2006 to June 2017 and survived ≥ 12 months after their first supply were included. Conditional logistic regression was used to estimate odds ratios (OR) and 95% confidence intervals (CI) for statin use in the discordant pairs. Sub-group analyses were performed by age, sex and comorbidities.

Results. The cohort comprised 19,809 individuals with median age 81 years (interquartile range 76-86) and 61% were female. Statins were significantly less likely to be used after initiating medicine for dementia (OR 0.50; 95%CI 0.45-0.55). The OR for statin use in the post-period versus the pre-period decreased annually over the 11 years of the study (OR 1.21; 95%CI 0.84-1.75 in 2006-7 to OR 0.31; 95%CI 0.24-0.41 in 2016-17; p for interaction < 0.0001). The OR for women was lower than for men (OR 0.25; 95%CI 0.20-0.31 vs OR 0.39; 95%CI 0.31-0.49; p for interaction =0.0072). The ORs decreased with increasing age (OR 0.71; 95%CI 0.51-0.99 in those aged 65-74 years and OR 0.16; 95%CI 0.12-0.22 in those aged ≥ 85 years; p for interaction < 0.0001). The OR for people who paid the concessional rate for their medicine was lower than for those paying the general price (OR 0.27; 95%CI 0.23-0.33 vs OR 0.76; 95%CI 0.47-1.21; p for interaction < 0.0001).

Conclusion. Statins are more likely to be ceased than prescribed after initiating medicine for dementia, particularly in women and in people aged ≥ 85 years. This decrease is more evident now than prior to 2013. This may reflect changes in goals of care, or a lack of evidence for the safety and efficacy of statins in older people living with dementia.

Are we appropriately screening and treating preoperative anaemia in major elective bowel surgery?

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Introduction. Preoperative anaemia is associated with poor surgical outcomes, including increased transfusion rate. Patient Blood Management (PBM) is an approach developed to improve the redress of this issue. In addition, there is increasing use of iron infusion in the surgical setting, with associated adverse drug events including permanent skin discolouration and life-threatening hypophosphataemia.

Aims. To assess the appropriateness of anaemia screening and use of iron, and their impact on major bowel surgery associated with bleeding risk.

Methods. A pharmacist-led multi-disciplinary team retrospectively reviewed 559 patients admitted for elective major bowel surgery (DRG: G01/02 A/B/C) in a metropolitan tertiary hospital, January 2016 to December 2018. An electronic audit tool was designed to collect: patient demographics, any anaemia screening within six weeks of surgery, perioperative use of iron (oral or intravenous) and postoperative outcomes.

Results. Four hundred and sixty-two (82.7%) of 559 patients were preoperatively assessed for anaemia. Of these, 167 (36.2%) were classified as anaemic; and only 34 (20.4%) of this group received preoperative iron. However, quality of preoperative anaemia assessment was poor, with only 51 (11.0%) of tested patients having PBM recommended iron studies, including ferritin, performed. Most anaemia assessments (40.6%) were conducted within a day of surgery. This is insufficient for anaemia to be corrected. Four iron infusions were prescribed for patients without anaemia. The perioperative transfusion rate was significantly higher in the anaemic group compared to the non-anaemic group (OR: 3.19, P<0.05).

Discussion. This audit demonstrated that preoperative anaemia is poorly assessed and managed in major bowel surgery, potentially increasing surgical risk and health expenditure. Feedback to surgeons on the clinical impact of audit findings has improved their awareness of PBM guidelines. Pharmacists play a key role in improving surgical quality use of medicines.

A wave of change: Provision of oral cytotoxic agent pharmaceutical care in community pharmacy

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Introduction. Anti-cancer drug development has experienced a major shift over the past 15 years, driven by a 12-fold increase in the availability of oral cytotoxic agents (OCA) [1, 2]. The ability to dispense OCAs in the community has clear benefits; however, the shifting responsibility of pharmaceutical care to community pharmacists with limited experience in OCAs has raised concerns.

Aims. To characterise and assess the safe use of OCAs in community pharmacies, determine pharmacist attitudes and perceptions towards such practices and if deficiencies exist, explore the reasons for these shortcomings.

Methods. Pharmacists in the greater Sydney region were identified by convenience sampling and invited to participate in face-to-face semi-structured interviews regarding safe use of OCAs. Interviews were recorded and contrasted with current guidelines. Emerging themes and opinions were identified and evaluated for demographic trends. Ethics approval for this project was granted by the University of New England (UNE) Human Research Ethics Committee (approval number HE17-138).

Results. Analysis of the responses from 25 Sydney-based community pharmacists highlighted significant issues in obtaining adequate resources, guidance, and support to cope with the demands of dispensing OCAs and to meet pharmacy service provision standards. Less than one-third of pharmacists felt they understood the chemotherapy cycles and more than two-thirds had not received training on safe handling of OCAs.

Discussion. Community pharmacists are finding themselves ill-prepared to manage OCAs in accordance with hospital-focused standards due to limited resource issues and disconnected relationships with health care teams. There is a need to review OCA delivery in the community to ensure quality outcomes given that standards are non-specific to the community setting and that the existing funding mechanisms are predominantly based on supply and transactional activities.

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Assessing the effectiveness of an interprofessional collaborative osteoporosis screening program (IPC-OSP) in a Malaysian primary care setting: Preliminary findings

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Introduction: An interprofessional collaborative osteoporosis screening programme (IPC-OSP) was developed to screen postmenopausal women for osteoporosis as collaborative initiatives have demonstrated better success.

Aims: To assess the effectiveness of an IPC-OSP among postmenopausal Malaysian women

Methods: An RCT was conducted from January-August 2019 at a government clinic in Kuala Lumpur recruiting postmenopausal women ≥ 50 years who had not been diagnosed with osteoporosis. The sample size required was 120 in each arm with an effect size of 20% between control (C) and intervention (I) arms. Patients were allocated using a simple randomization process. They were assessed for their osteoporosis risk, counselled on prevention methods and referred to the doctor to order a bone mineral density (BMD) scan if at risk. The primary outcome measured was the number of patients that went for a BMD scan. Secondary outcomes measured were knowledge and satisfaction.

Results: 312/420 patients were recruited (response rate=74.3%); C=162; I=150. To date, only C=115, I=114 have completed the study. A total of 78/114 (68.4%) were sent for a BMD scan, 22/114 (19.3%) were low risk and 14/114 (12.3%) were lost to follow-up. A total of 22/78 (28.2%) were osteoporotic and 18/78 (23.0%) were osteopenic. No control patients were sent for a BMD via usual care. Median knowledge scores improved from baseline [C=50.0, I=50.0] to two months later [C=63.3, I=73.3 $p < 0.001$] for both groups but were significantly higher at month two for intervention patients. Satisfaction scores for both groups increased from baseline [C=64.5, I=64.5] to two months later [C=79.4, I=80.0, $p < 0.001$].

Discussion: This preliminary study found the IPC-OSP to be effective at screening patients with osteoporosis risk (C=0%, I=68.4%). This indicates that primary care doctors do not routinely screen postmenopausal women for osteoporosis. Knowledge scores improved post-intervention indicating that counselling was effective. Satisfaction scores improved in both groups indicating that patients appreciated increased collaborative input in their care.

Nicotine vaping products as a smoking cessation aid: A survey among pharmacy staff and customers in Brisbane, Australia

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Introduction. Nicotine vaping products (NVPs) are growing in popularity as a way to quit smoking. Pharmacies are a major source of information and guidance for consumers who are trying to quit smoking, but NVPs are not currently available as a nicotine replacement therapy (NRT).

Aims. This study examined (1) views of pharmacy staff regarding the relative safety of NVPs compared to NRTs and cigarettes, and (2) pharmacy customer use of NVPs, reason for use, and sources of information. We also examined views of both staff and customers regarding NVPs regulation in Australia.

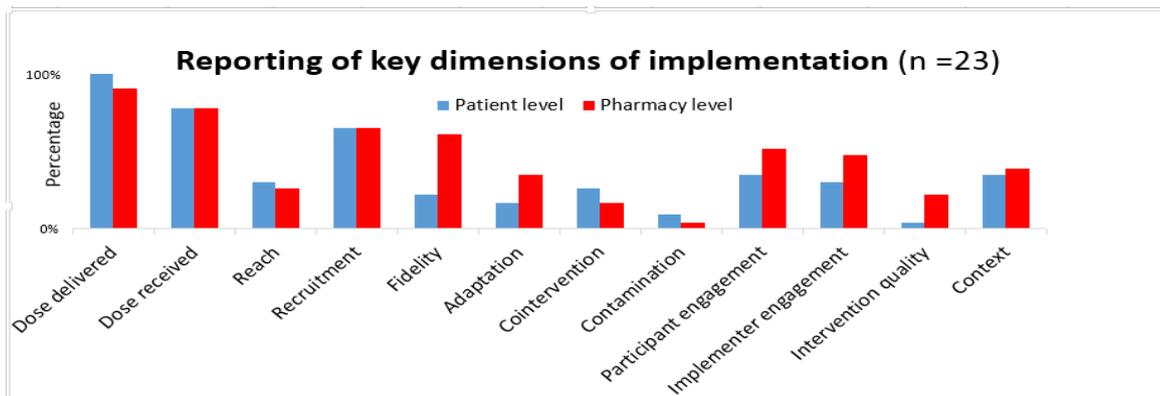
Methods. We conducted two cross-sectional surveys among pharmacy staff (64 pharmacists and 76 pharmacy assistants) and pharmacy customers (n=470) from the greater Brisbane region, Queensland, Australia. The self-administered questionnaires included closed- and open-ended questions that explore respondents' perception on relative harms of NVPs, NRTs and cigarettes, and knowledge of current NVP regulations as well as views on how they should be regulated. Preferred information sources and needs of both staff and customers were also assessed.

Results. Over 90% of pharmacy staff regarded NVPs without nicotine and NRTs as less harmful than cigarettes. This reduced to 72% for NVPs containing nicotine, with 24% of respondents believing they are equally as harmful as cigarettes. The majority of staff believed that NVPs with nicotine should be regulated as a medicine, either requiring a prescription (24%) or sold only by pharmacies (22%), though many believed that they should be regulated in the same way as cigarettes (27%). Almost a third of pharmacy customers (31%) had either tried NVPs in the past (16%) or were current users (15%) and depended on family/friends as a source of information (75.9%) rather than healthcare professionals (1.4%). Moreover, about 91% of staff believed that they need more information and guidance regarding NVPs in order to counsel customers and provide recommendations for or against use.

Discussion. In light of the growing popularity and use of NVPs, pharmacy staff need to be provided with continuous educational support to ensure that they provide unbiased and evidence-based information to customers.

Reporting the evidence for implementation of professional services to community pharmacy: a systematic review

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Introduction. Despite reports that over half the pharmacy workforce provide advanced professional services, there is inconsistency in the reporting how these services are implemented in community pharmacy. Inconsistency can lead to poor reproducibility of professional services implementation across settings.

Aims. The aim of this study was to investigate the reporting of service implementation in community pharmacies according to Cochrane guidance.

Methods. Relevant literature published within the last 10 years in English was identified via a systematic database search. Following screening, included studies were analysed in accordance with Cochrane guidance for assessing the evidence on intervention implementation, with 12 dimensions of implementation extracted for the service recipient – patient level (1) and service provider – pharmacy level (2). The StaRI checklist and risk of bias were also conducted.

Results. From a total of 6548 articles, 23 were included for analysis. The most common reported dimensions of implementation were 'dose delivered' and 'dose received' at both 'patient' and 'pharmacy' levels. The least reported dimensions were 'contamination', 'cointervention' and 'intervention quality' for implementation to pharmacies and 'intervention quality', 'contamination' and 'adaptation' for implementation to patients. Terminology for dimensions of implementation were inconsistently defined between studies.

Discussion. Key dimensions for implementation are inconsistently reported for studies describing pharmacist-delivered service implementation in community pharmacy. There is poor reporting of potential contamination. Inadequate reporting of key dimensions may affect the future adaptation of reported studies.

The association of illness perception on medication adherence in hypertensive Middle Eastern refugees and Migrants in Australia

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Introduction. Adherence to medications continues to rank as a major clinical problem in the management of patients with essential hypertension. Patients' behaviour of taking medications may influence by their subjective beliefs about illness. Common Sense Model is one of the patients behavioural models designed to explain illness perceptions. Different populations such as refugees, and migrants might represent different perceptions about the same illness, which may influence their medication adherence.

Aims. The study aims to evaluate the impact of illness perception on medication adherence, and to assess the differences between refugees and migrants, if existed, in medication adherence and illness perception.

Methods. A cross sectional study conducted, using a survey that links validated and reliable measurement of medication adherence, and illness perceptions.

Results. Refugees were significantly more likely to perceive illness negatively, than migrants from Middle East. Positive Illness perceptions, such as controllability, timeline, causes, and coherence were positively associated with medication adherence. Whereas, negative perceptions about consequences and symptoms, were negatively associated with medication adherence in both groups.

Discussion. Patients make sense of their symptoms by forming causal attributions about the illness, how long they think it will last, if it can be controlled or cured, and what consequences the symptoms will have. Healthcare providers should understand the differences between refugees and migrants regarding their illness perceptions and taking medication behaviour. Thus, provide specific and targeted health and medical advice for each independently. Consequently, achieve equity in healthcare, and augment medication adherence.

Impact of medication errors on nursing home residents: a systematic review

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Introduction. Medication errors frequently occur among nursing home residents. Previous studies estimate that up to 90 % of residents experience a medication error. However, while medication errors are frequent, little is known about the clinical impact of medication errors among nursing home residents.

Aim. This study aimed to review the existing literature on the impact and severity of medication errors in nursing homes to determine the clinical impact of errors in this setting.

Methods. A systematic search of Medline, Embase, and CINAHL for studies published between 1 January 1991 to 7th August 2018 examining the clinical impact of medication errors in the nursing home setting was conducted.

Criteria adopted from the World Health Organization Conceptual Framework for the International Classification for Patient Safety (WHO-ICPS) were used to classify the clinical impact of medication errors as mild, moderate, severe, or fatal. Factors associated with increased risk of medication error were classified as resident-, medication- or – system-related factors.

Results. Thirty-four studies were included in the review. We found considerable variation in the proportion of medication errors that led to resident harm (0.8% to 44.3% of all medication errors). Most medication errors caused mild harms (8 to 41% of all medication errors), and few errors (0.1-3.3% of all medication errors) were associated with severe or fatal harms. Increased medical complexity of resident, medication errors involving high-risk medications, repeated medication error, and errors during the transition of care were associated with increased risk of harm.

Discussion. As many as two out of every five medication errors leads to resident harm in the nursing home setting. While most errors result in mild harm, a small number are associated with severe harm and fatalities. Strategies to assess medication safety in the nursing home setting and identification of the safety issues across the different aspects of the medication management pathway are needed to decrease medication errors and related harms.

Evaluation of the utilisation of erythropoietin stimulating agents and immunosuppressants in chronic kidney disease patients

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Introduction. Chronic kidney disease (CKD) is typified by a progressive decline in renal function that often results in the need for transplantation. Erythropoietin stimulating agents (ESAs), used for anaemia management, and immunosuppressants, for prevention of transplant rejection, are high both cost medications integral to ongoing management of patients with CKD.

Aims. To characterise the expenditure and utilisation of ESAs (darbepoetin alfa, epoetin alfa, epoetin beta, epoetin lambda, and methoxy polyethylene glycl-epoetin beta) and immunosuppressants (mycophenolic acid, tacrolimus, cyclosporine, sirolimus, and everolimus) used in the Australian CKD population between 2010 to 2018.

Methods. Data on expenditure and the utilisation for each drug were obtained from the Pharmaceutical Benefit Scheme (PBS) and Highly Specialised Drugs (HSD) program. Utilisation data were provided as number of dispensing per year, which was then converted to the World Health Organisation's daily defined dose per 1000 population per day (DDD/1000/da) for each year. Temporal trends were then analysed.

Results. Over the study period, the utilisation of methoxy polyethylene glycl-epoetin beta and epoetin lambda rose by 13.7 and 81.4-fold, respectively. Contrastingly, the utilisation of darbepoetin alfa, epoetin alfa and epoetin beta declined by 6%, 42% and 70%, respectively. In 2018, tacrolimus, sirolimus, everolimus and mycophenolate utilisation was up 2.3, 1.2, 2.3 and 2.8 fold respectively, while cyclosporine utilisation was down 19%. Total Australian PBS expenditure across all ESAs examined remained virtually unchanged between 2010 and 2018 at near AUD\$128million, while total Australian PBS expenditure across all immunosuppressants examined increased 1.1 fold reaching just over AUD\$98million.

Discussion. Immunosuppressant usage and subsequent expenditure are steadily rising with increased numbers of Australians living with a transplant. While ESA usage overall has remained relatively unchanged over the time period investigated. This may be due to increasing concerns of the safety of ESAs during the study period offsetting the increasing number of people with chronic kidney disease.

Are community pharmacists “referring” patients to the GP for antibiotics? Preliminary results from a pilot study.

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Introduction. Antibiotic (AB) use drives resistance, which is predicted to cause up to 10 million deaths annually by 2050¹. To access AB, patients must visit the prescriber (GP), the GP must issue a script, and the community pharmacist (CP) must dispensed the script. There several reasons a GP visit may result in unnecessary AB, including patient expectations.² Interventions to minimise AB use have focused on the GP and patient behaviour rather than the CP. While CPs often refer patients to GPs for assessment, no work has explored CP contribution to GP visits that may result in AB.

Aims. To quantify CP referral rates to GPs for suspected AB-requiring infection.

Methods. CPs and GPs were recruited independently of each other using convenience sampling. CPs were asked to complete a prospective survey regarding all minor ailment encounters and GPs of all patient consultations. CPs recorded patient (self or proxy), gender and age, whether a referral was recommended, reason for referral, and where the patient was referred to. GPs recorded patient age and gender, reason for visit, and origin of patient referral including self-referral. Recruitment has started and is due to finish in Nov 2019.

Results. So far, we have recruited 5 pharmacies representing 169 minor ailment consultations and 16 GPs representing 320 patient consultations. CP data suggests that 29% (49/169) of all minor ailments were referred, of which 37% (18/49) were referred for AB, predominantly to the GP (15/18). GP data suggests that <1% (2/320) were referred by a CP. Of the 22% (71/320) of consultations for infection, most were self-referral (52/71) and none were referred by a CP.

Discussion. CPs refer one in ten minor ailment patients to GPs for AB; however, GP data indicates most patients self-refer. While this suggests new opportunities for CPs to minimise unnecessary GP visits for infection, reasons for these differences should be explored.

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Del Mar CB, et al (2017) *MJA* 2017;207(9):401-06.

Reflections on a Systematic review of effective sustained deprescribing interventions at near-End of Life: The forgotten ideal candidates

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Introduction. Older people in their last year of life, or near end of life (nEoL) are ideal candidates for deprescribing given the benefits of reduced adverse events and improved quality end of life. Reviews have identified effective interventions for deprescribing; however, like many other clinical areas, there has been little to no evidence synthesis focusing on nEoL. In conducting our systematic review (in older hospitalised patients nEoL, which deprescribing interventions result in sustained deprescribing?), we noticed a paucity of trials explicitly including or identifying patients at nEoL, despite this population group having the most to gain from deprescribing.

Aims. To describe our use of an operational definition based on the CrISTAL criteria in identifying patients in nEoL during evidence synthesis.

Methods. We searched MEDLINE, Cochrane Library, and Embase with no language or date restrictions. We included all studies with a control (RCTs, cohorts, case-control, interrupted time series). Studies without a control group and qualitative designs were excluded. On our first screen we included those that explicitly identified nEoL patients, we then re-screened using an operational definition.

Results. Of the 568 articles, only 1 study identified nEoL but was excluded due to study design. Using the operational definition, we were able to identify 10 articles for inclusion; only 2 provided sustained (>6 months post discharge) outcome measures.

Discussion. Little primary deprescribing research targets nEoL patients, and even fewer studies look at intervention sustainability. While an operational definition facilitated identification of nEoL patients in primary studies, our experience suggests a more proactive approach in targeting nEoL population in primary studies, especially to evaluate the sustainability of interventions, is required.

Cardona-Morrell M, Hillman K, (2015) *BMJ Support Palliat Care* 5:78-90.

Roles and challenges in PRN psychotropic medication administration by residential aged care facility nursing staff

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Introduction. Whilst psychotropic medications can be helpful in calming residential aged care facility (RACFs) residents during behavioural episodes, they are no longer recommended as first line therapy. The use of 'pro re nata' (PRN) psychotropic medication for managing neuropsychiatric symptoms in RACFs has been under scrutiny due to concerns regarding their inappropriate use. Recent legislative changes now require exhausting non-pharmacological approaches before administering psychotropic medicines to residents to minimise harm and respect residents' basic rights and freedoms.

Aims. To investigate the administration patterns of PRN psychotropic medications in RACFs and develop an understanding of nursing staff's clinical decision-making processes behind administering PRN medications.

Methods. Ethics approval was granted to interview nursing staff who have worked (> 6 months) at 3 RACFs. Interview questionnaire consisted of semi-structured questions relating to PRN medication administration at the 3 RACFs.

Results. Seventy-one nurses were interviewed. Documented use of PRN psychotropic medications at the 3 RACFs was low at 21.6% (n=32). Nurses reported first implementing personalised interventions such as offering food and drink, distracting with activities, or removing triggers to manage behavioural problems as listed in residents' Psychosocial Care Plans.

Discussion. Nurses reported a low level of administering PRN psychotropic medication, due to the strong documentation required to show evidence of non-pharmacological interventions tried without effect as listed in residents' Psychosocial Care Plans, and the Royal Commission into Aged Care Quality and Safety which has already reduced prescribing rates of psychotropic medication.

1. Royal Commission 2019, Restrictive Practices in Residential Aged Care in Australia: Background Paper, The Royal Commission into Aged Care Quality and Safety, Commonwealth of Australia, viewed 8 July 2019.
2. Dyer et al. (2018) An overview of systematic reviews of pharmacological and non-pharmacological interventions for the treatment of behavioral and psychological symptoms of dementia. *International Psychogeriatrics* 30:295–309.

Post-operative use of slow-release opioids: Translation of acute pain management guidelines to clinical practice

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Introduction: Dose titration with immediate-release opioids is currently recommended for acute post-operative pain. The Australian and New Zealand College of Anaesthetists and the Faculty of Pain Medicine released guidelines in March 2018 supporting its use in the treatment of acute pain in opioid-naïve patients, however the impact of these recommendations on clinical practice is currently unknown. This retrospective cohort study was conducted to compare opioid prescribing patterns before and after the release of these guidelines.

Method: Data was collected on 184 surgical patients (2017, n=78; 2018, n=106) admitted into Prince of Wales Hospital in November 2017 and 2018, which consisted of demographic data, opioid prescriptions and discharge opioid information. The main outcome is the number of prescriptions of slow-release opioids in 2017 versus 2018 after these guidelines were published. Confounding factors were accounted for using logistic and multiple regression as appropriate.

Results: A seven-fold decrease in slow-release opioid prescriptions was found during hospital admission (n=31, 40% vs. n=12, 11%; p<0.001) and an eight-fold decrease at discharge (n=20, 26% vs. n=9, 9%; p=0.02) post-publication. Orthopaedic patients were more likely to receive slow-release opioids (n=26, 61% vs. n=18, 15%, p=0.004, B=1.1±0.4), consistent with results from previous studies. Median pain scores at rest and during movement were not significantly different between the 2017 and 2018 study groups (at rest: 1.5 vs 1.3, p=0.56; during movement: 2.4 vs. 1.8, p=0.60). Additionally, only 23% of patients overall received an opioid cessation plan upon discharge.

Discussion: The decrease in slow-release opioid prescribing may be associated with the publication of recent acute pain management guidelines. Interestingly, this was not accompanied by a significant increase in pain scores, which may indicate that slow-release opioids confer minimal benefit.

Resources for assessing the impact of culture on medication adherence

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Introduction. Nonadherence is a contributor to the health disparities faced by patients from ethnic minority groups.¹ Health behavior theories are useful for eliciting, understanding and measuring beliefs about medicines and medication adherence. Further research is needed to better understand the ways in which culture influences illness beliefs, beliefs about medicines and medication-taking behaviour.

Aims. To examine the degree to which commonly used health behaviour theories provide an understanding of the influence of culture on medication adherence.

Methods. A narrative review of literature on health behaviour, medication adherence and culture was undertaken. Health behaviour theories useful for implementing evidence-based practice with good application in medication adherence were selected and reviewed for inclusion of cultural concepts and to identify constructs influenced by culture.

Results. This review explores the resources that health behaviour theories provide to understand the impact of culture on medication adherence. Individualism and collectivism, moral and collective agency, and subjective norms are concepts within health behaviour theories that provide useful conceptual resources to support culturally sensitive practice. Components of health behaviour models influenced by culture include self-efficacy, coping behaviours, illness and medication beliefs and these constructs are useful for comprehending the impact of culture on adherence behaviour. A better understanding of the influence of culture on medication-taking behaviour facilitates a more patient-centred, individualized and tailored approach for supporting medication adherence in diverse populations.

Discussion. Health behaviour theories provide resources for better understanding the impact of culture on medication adherence. We should utilize these resources in practice and assess medication adherence through a cultural lens to provide stronger, sustainable and more appropriate adherence interventions in ethnic minority populations.

Osborn CY. How can we reduce racial/ethnic disparities in diabetes medication adherence? *Diabetes Management*. 2012; 2(5):357.

Association between statin use and fall-related hospitalizations from aged care facilities: a case-control study

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Introduction. Statins are widely prescribed in aged care facilities but have been associated with muscle-related adverse events. The rate of falls in aged care facilities is up to three times higher than in community settings.

Aims. To investigate whether statin use is associated with fall-related hospitalizations from aged care facilities.

Methods. The study sample included 664 residents admitted to hospital between July 2013 and June 2015. Cases were residents admitted for falls or fall-related injuries. Controls were residents admitted for all-cause hospitalizations except indications associated with statins. Cases and controls were matched 1:1 by age (± 2 years), index date of admission (± 6 months) and sex. Adjusted odds ratios (aORs) and 95% confidence intervals (CIs) were estimated using conditional logistic regression for statin use in residents admitted for falls or fall-related injuries. Models were adjusted for history of falls, hypertension, dementia, functional comorbidity index, polypharmacy (nine or more regular pre-admission medications) and fall risk medications. Unmatched sub-analyses were performed for residents with and without dementia, and comparing high vs low/moderate intensity statin use.

Results. Overall, 43.1% of cases and 27.1% of controls used statins. Statin use was associated with fall-related hospitalizations (aOR=2.26, 95%CI 1.56-3.25). Statins were also associated with fall-related hospitalizations in residents with (aOR=2.34, 95%CI 1.33-4.11) and without dementia (aOR=2.31, 95%CI 1.47-3.65) after stratifying by dementia status. There was no association between statin intensity and fall-related hospitalizations (aOR=0.78, 95%CI 0.43-1.40).

Conclusion. Statin use is associated with fall-related hospitalizations from aged care facilities, in residents both with and without dementia. However, there is minimal evidence for a dose-dependent relationship between statin intensity and fall-related hospitalizations.

“I became a pharmacist to help people”: factors affecting Australian community pharmacist service provision

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Introduction. Professional pharmacy services are preventative healthcare initiatives, provided in the community pharmacy setting, which may alleviate the burden on medical practitioners and secondary care. Research into necessary macro and meso change for implementing these services has taken place, but the micro perspective of community pharmacist service providers may be key: despite ideological support, pharmacists cite increased stress as a barrier. A social science framework may assist in determining the causes of pharmacist strain.

Aim. To explore the role stresses, strains and utility of a framework in examining experiences of Australian community pharmacists who provide professional pharmacy services.

Methods. Semi-structured interviews with Australian community pharmacists in 2019 were transcribed and verified, then coded for content and framework analyses.

Results. All role strains, stresses and factors from the Community Pharmacist Role Stress Factor (CPRSF) framework were present in the data from 24 pharmacists. Two additional role stress factors were added: “Service quality” and “Workflow”. Services were associated with increased role conflict, administrative overload, low financial reward, and insufficient resources. Some pharmacists reported this strain was softened by increased satisfaction, community recognition, organisational support, improved patient interactional quality and health outcomes.

Discussion. Due to perceived overload and conflict between their multiple subroles, individual pharmacists may be weighing cost-benefit outcomes of workflow processes to minimise strain. This may be central to their service provision behaviour. However, consistent job demands incongruent with professional values may increase turnover intention. Instead, strain associated with pharmacist service provision could be lessened by organisational support consistent with quality patient care, e.g. training, adequate pharmacist staffing and counselling room installation. The CPRSF framework was found to be useful in describing the complex Australian community pharmacist role system.

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Attitudinal factors influencing antibiotic supply without prescription for common infections by community pharmacy staff: a cross-sectional national survey in Sri Lanka

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Introduction. Pharmacies in low- and middle-income countries are often the patient's first point of contact with the health care system. However, pharmacy practice in these settings has been characterized by inappropriate supply of medicines, including antibiotics.

Objective. This study investigated pharmacy staffs' attitudes towards antibiotic supply for common infections. **Methods.** A self-administered structured questionnaire on antibiotic supply and staff attitudes to antibiotic supply for common infections (common cold and cough, sore throat, diarrhoea, wound infections and urinary tract infections) was administered to 369 community pharmacy staff in Sri Lanka from Dec 2016 to Sep 2017. Data were analysed using descriptive analysis, exploratory factor analysis and inferential statistics.

Results. The response rate was 72% (210 (79%) pharmacists and 55 (21%) assistants responded). About 30% (80/265) reported that they had supplied antibiotics without a prescription for common infections, with approximately 40% of supply being for the common cold (15.8%), acute sore throat (13.6%) and diarrhoea (10.2%). A five-factor solution was obtained from the factor analysis, explaining 62.7% of the variance in attitudes to antibiotic supply. Pharmacy staff with more positive *beliefs about professional competency* (factor 1) related to their pharmacy training and experiences, were more likely to dispense antibiotics without a prescription for common cold (Adj. OR = 1.08; 95% CI: 1.01-1.15; $p=0.032$), wound infections (Adj. OR = 1.06; 95% CI: 1.00-1.13; $p=0.059$) and UTI (Adj. OR = 1.07; 95% CI: 0.99-1.15; $p=0.097$). Pharmacy staff who believed in the *effectiveness of antibiotics against common infections* (factor 2) were more likely to supply antibiotics for acute sore throat, the common cold, wound infections and UTI. Staff believed that promoting appropriate use of antibiotics was a shared responsibility among various stakeholders (factor 3) were less likely to supply antibiotics for diarrhoea. Other two factors, *Access and availability* (Factor 4) and *Appropriate and legal supply* (Factor 5) were not significantly associated with antibiotic supply without a prescription.

Conclusion. Supply of antibiotics without a prescription by Sri Lankan pharmacy staff was associated with beliefs about the effectiveness of antibiotics for common infections and beliefs about their own professional competency to provide antibiotics.