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Australasian Pharmaceutical Science Association

APSA Annual Conference
Working together toward better health outcomes

1-4 December 2019
Monash University, Parkville Campus, Melbourne

Scientific Program

BioLingus
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Sunday 1 December 2019

10:00-19:30	**Registration desk open** Sissons Foyer, Ground Floor, Building 401 (outside Cossar Hall)

Pre-conference workshops

10:30-12:30	**Pharmacoepidemiology workshop - part 1** **An introduction to using Electronic Medical Records and routine administrative data to improve medication safety**
	Room: Collaborative learning space 1 (CLS1)
	Chair: Dr Jenni Ilomaki, Monash University
	Presenter: A/Prof Edward Lai, National Cheng Kung University
12:30-13:00	**Lunch** Consultation suite 1

13:00-15:00	**Pharmacoepidemiology workshop - part 2** **Designing a pharmacoepidemiological study to investigate a drug safety signal**	**Education workshop**
		Supported by:
	Room: Collaborative learning space 1 (CLS1)	**Room:** Collaborative learning space 2 (CLS2)
	Chair: Dr Jenni Ilomaki, Monash University	**Chair:** Dr Vivienne Mak, Monash University
	Presenter: Prof Olaf Klungel, Utrecht University	**Topic 1: Designing and implementing online training for OSCE Simulated Patients and Examiners: The Good and The Bad** Dr Vivienne Mak & Ms Thao Vu, Monash University
		Topic 2: Human Patient Simulation - Tips and Traps James Townshend & Fiona Miller, Griffith University
		Topic 3: Simulated patient role-plays with mental health consumers: can students actually provide Mental Health First Aid post-training? Dr Sarira El-Den, The University of Sydney

15:00-15:30	**Afternoon tea** Consultation suite 1
15:30-17:30	**PSA workshop - Medicines safety**
	Room: Collaborative learning space 1 (CLS1)
	Facilitators: John Jackson & Dr Amy Page, Monash University
17:45-19:00	**Conference opening**
	Room: Lecture theatre 1
	Welcome to Country by a Wurundjeri traditional landowner **Conference Welcome** Prof Simon Bell & Dr Natalie Trevaskis, Monash University **Principal sponsor address** Yves Decadt, BioLingus
	Keynote presentation
	Chairs: Prof Simon Bell & Dr Natalie Trevaskis, Monash University
	Working together – practice, education & research - 100 Prof Giovanni Pauletti, St Louis College of Pharmacy
19:00-20:30	**Welcome reception** Cossar Hall
	 Supported by:

Monday 2 December 2019

Time			
08:30-16:30	**Registration desk open** Sissons Foyer, Ground Floor, Building 401 (outside Cossar Hall)		
09:00-10:00	**PSA Lecture - Pharmaceutical Society of Australia sponsored Lecture**		
	Room: Lecture theatre 1		
	Chair: A/Prof Chris Freeman, President, Pharmaceutical Society of Australia		
	Pharmacoepidemiology as a tool for post-approval safety and effectiveness assessment - 101 Prof Olaf Klungel, Utrecht University		
10:00-10:25	**Morning tea** Cossar Hall		

10:30-12:30	**Symposium 1:** Global efforts to enhance medicine safety - 102	**Symposium 2:** Working together for safe and effective medicines use in residential aged care - 103
	Room: Lecture theatre 1	**Room:** Lecture theatre 3
	Chair: Dr Renly Lim, University of South Australia	**Chair:** Dr Mouna Sawan, The University of Sydney
	Global efforts to eliminate substandard and falsified medicines A/Prof Phaik Yeong, University of Oxford	**Pharmacists in aged care homes: A new interdisciplinary model of aged care** Dr Sam Kosari, University of Canberra
	The impact of generic medicine substitution on patient safety and adherence A/Prof Pauline Lai, University Malaya	**Optimising pain management in residential aged care: implications for pharmacy practice** Dr Felicity Veal, University of Tasmania
	Assessment of medical use of tramadol in low income countries and the potential impact of international scheduling Dr Agnes Vitry, University of South Australia	**Development, validation and application of the Medication Regimen Simplification Guide for Residential Aged Care (MRS GRACE)** Esa Chen, Monash University
	Fight back! - Strategies developed by pharmacists against substandard and falsified medicines Prof Giovanni Pauletti, St Louis College of Pharmacy	**Pharmacists working in aged care facilities: what's needed to make it a reality?** A/Prof Chris Freeman, Pharmaceutical Society of Australia

Time			
12:30-13:25	**Lunch** Cossar Hall		
12:40-13:25	**Jones Tulloch Pharmaceutical Consultants and Patent Attorneys lunchtime workshop** *(attendees to bring lunch from Cossar Hall into workshop)*		
	Supported by: Jones Tulloch — Pharmaceutical Consultants & Patent Attorneys		
	Room: Lecture theatre 2		
	Patents in the Pharmaceutical sector Dr Ellen Reid, Jones Tulloch Pharmaceutical Consultants and Patent Attorneys		

13:30-15:00	**Oral presentations 1:**		
	Ageing and polypharmacy	**Global Health**	**New roles and technologies for pharmacy**
	Room: Lecture theatre 1	**Room:** Lecture theatre 3	**Room:** Lecture theatre 2
	Chair: Cindy Xiao, Monash University	**Chair:** Jamie Lam, Monash University	**Chair:** Xiaohan Sun, Monash University
13:30-13:45	**Carers' and patients' health information seeking behaviour in cognitive impairment in older adults – a systematic review** - 104 Ardalan Mirzaei, The University of Sydney	**Antimicrobial prescribing patterns and its appropriateness in medical patients at a tertiary teaching hospital** - 110 A/Prof Sasheela Ponnampalavanar, University of Malaya	**A metabolomics-based approach to prediction of Drug Induced Liver Injury (DILI)** - 116 Dr Darren Creek, Monash University
13:45-14:00	**Qualitative evaluation of an intervention to simplify medication regimens for people receiving home care services** - 105 Georgina Hughes, University of South Australia	**Medicines information services in Vietnamese hospitals: results from a national survey** - 111 Trung Hieu Trinh, The University of Sydney	**New Medicines Support Service (NMSS) for patients initiating treatment for COPD** - 117 Dr Johnson George, Monash University
14:00-14:15	**Prevalence of adverse drug reactions in hospital among older patients with and without dementia** - 106 Marisa Sakiris, The University of Sydney	**Psychometric properties of the Urdu version of Health Literacy Questionnaire** - 112 Ahsan Saleem, University of Queensland	**Exploring current and potential roles in sports pharmacy** - 118 Alison Hooper, University of Newcastle

Time			
14:15-14:30	Proton pump inhibitor prescribing in older patients on admission and discharge from hospital - 107 Aymen Alqurain, University of South Australia	Validity of the Canadian medication safety self-assessment tool for long-term care® for use in Australian nursing homes - 113 Ramesh Sharma Poudel, University of Technology Sydney	Impact of a patient-centred educational exchange (PC3EE) with stroke survivors' on their adherence to secondary prevention medications and clinical outcomes - 119 Judith Coombes, University of Queensland
14:30-14:45	Prevalence and determinants of adverse drug reactions associated with opioid medications in older patients - 108 Aymen Alqurain, University of South Australia	Potentially suboptimal prescribing of medicines for older Aboriginal Australians in remote areas - 114 Dr Amy Page, Monash University	Pharmacy in the community: Factors influencing New Zealand pharmacists extending their patient-facing roles - 120 Dr Caroline Morris, University of Otago
14:45-15:00	Medications and Frailty: International Consensus Principles for Clinical Practice, Research and Education - 109 Shin Liau, Monash University	Global Leaders In Development (Glide): A module across three international pharmacy schools - 115 Dr Andreia Bruno-Tome, Monash University	To determine the knowledge of community pharmacy clients regarding mental health and mental health support services - 121 Dr Vijay Suppiah, University of South Australia

15:00-16:30	**Poster presentations (including afternoon tea)** Cossar Hall

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16:30-18:00	**APSA AGM**	**Career development workshop**
	Room: Lecture theatre 1	**Room:** Collaborative learning space 1 (CLS1)
		Chairs: Sarah Turpin-Nolan & Cheng Sun, Monash University
		Presenters: Prof Paul J Fielder, Preclinical and Translational PKPD and OMNI Biomarker Development Dr Nilushi Karunaratne, Monash University A/Prof Sue Kirsa, Australian Pharmacy Council

18:30-Late	**APSA 2019 student dinner** Charles Weston Hotel Beer Garden, 27 Weston St, Brunswick

Tuesday 3 December 2019

08:30-17:00	**Registration desk open** Sissons Foyer, Ground Floor, Building 401 (outside Cossar Hall)
09:00-10:00	**Debate**
	Room: Lecture theatre 1
	Chair: Dr Suzanne Caliph, Monash University
	Social vs technical sciences - which should be increased in our curricula? - 122
	Panellists: Dr Edwin Tan, University of Sydney Dr Betty Exintaris, Monash Institute of Pharmaceutical Sciences Dr Andreia Bruno-Tome, Monash University Dr Dan Malone, Monash University
10:00-10:25	**Morning tea** Cossar Hall

10:30-12:30	**Symposium 3:** **Pharmaceutical Science education – preparing students for beyond 2030 - 123**	**Symposium 4:** **Social accountability as a framework for achieving better health outcomes - 124**	**Oral presentations 2:** **Respiratory and infectious diseases**
		Supported by: NAPE National Alliance for Pharmacy Education (The University Of Queensland, The University of Sydney, University of South Australia, Monash University)	
	Room: Lecture theatre 1	**Room:** Lecture theatre 3	**Room:** Lecture theatre 2
	Chairs: Dr Vivienne Mak & Dr Jennifer Short, Monash University	**Chairs:** Bronwyn Clark & A/Prof Sue Kirsa, Australian Pharmacy Council	**Chair:** Andrew McArthur, Monash University
	Topic 1: Curriculum redevelopment: transformative change in teaching and learning of pharmaceutical science within a pharmacy degree - challenges, successes and lessons learned Prof Tina Brock, Monash University Dr Vivienne Mak, Monash University Steven Walker, EHR Go	**Social accountability and Indigenous health** Assoc Dean Leanne Te Karu, Otago University	**Ciprofloxacin nanocrystals liposomal powders for controlled drug release via inhalation - 125** Isra Khatib, The University of Sydney **Identification of suitable polymorphic forms of rifampicin for inhaled high dose delivery - 126** Prakash Khadka, University of Otago

	Topic 2: Core concepts Prof Thomas Anthony Angelo, University of North Carolina Prof Paul White, Monash University	Social accountability and person-centred care Prof Debra Rowett, University of South Australia	Studies on the activity of nicotine-loaded chitosan nanoparticulate dry powder inhaler formulation - 127 Dr Nazrul Islam, Queensland University of Technology
			Meropenem-ciprofloxacin combination dosage regimens against Pseudomonas aeruginosa for patients with altered pharmacokinetics via mechanism-based modelling and the hollow-fibre infection model - 128 Akosua Agyeman, Monash University
	Topic 3: Pharmacy education for the 21st century graduate: The new work reality A/Prof Kirstie Galbraith, Monash University Dr Jennifer Short, Monash University	Social accountability and collaborative interprofessional health care A/Prof Neil Cottrell, University of Queensland	Synergistic ceftazidime plus tobramycin combination dosage regimens against hypermutable Pseudomonas aeruginosa - 129 Jessica Tait, Monash University
			Fluorescent enzyme substrates for the rapid detection of pathogenic bacteria - 130 Savannah Reali, The University of Sydney
	Topic 4: Entrustable Professional Activities (EPAs) – linking education with practice Simon Furletti, Monash University / Pharmacy Improvement Centre	Social accountability and fitness-to-practise Dr Erica Sainsbury, The University of Sydney	A systematic review on risk factors and associated outcomes of hospital readmission in COPD - 131 Maria Njoku, University of Tasmania
			Validation and Implementation of a National Survey to Assess Antimicrobial Stewardship Awareness, Practices and Perceptions amongst Community Pharmacists of Australia - 132 Tasneem Rizvi, University of Tasmania

12:30-13:25	**Lunch** Cossar Hall
12:30-13:25	**APSA core concepts lunch** *(Lunch will be served in the room)* Which core pharmaceutical science concepts are the most critical for our students to learn - and for us to teach and assess?
	Room: CLS7A
	Chairs: Prof Paul White, Monash University & Prof Thomas Anthony Angelo, University of North Carolina

13:30-15:00	**Oral presentations 3:**		
	Pharmacy education	**Pain and the brain**	**Improving health outcomes**
	Room: Lecture theatre 1	**Room:** Lecture theatre 3	**Room:** Lecture theatre 2
	Chair: Dr Kayley Lyons, Monash University	**Chairs:** Sifei Han & Meihua Luo, Monash University	**Chair:** Cheng Sun, Monash University
13:30-13:45	**"Overloaded with information": A qualitative study on health information consumers with chronic disease - 133** Israa Khaleel, University of Tasmania	**Intra-articular injection of macromolecular immunotherapy drugs is a novel method to target the lymphatics that drain inflamed joints - 139** Alina Lam, Monash University	**Clinical intervention communication between pharmacists and prescribers in a hospital setting: a scoping review - 145** Jessica Lam, The University of Sydney
13:45-14:00	**Public feedback on the Australasian Integrative Medicine Association Guiding Principles for Letter Writing: a mixed-methods study - 134** Janet Nguyen, The University of Sydney	**Variation in plasma levels of glucosamine with chronic dosing: a possible reason for inconsistent clinical outcomes in osteoarthritis - 140** Chhavi Asthana, University of Tasmania	**A realist review of medication reviews by primary care pharmacists for patients discharged from hospital to the community - 146** Dr Karen Luetsch, University of Queensland
14:00-14:15	**Education and training programs equipping pharmacists to enter into a General Practice setting – A systematic review - 135** Anna Groen, University of Technology Sydney	**Pioglitazone increases blood-brain barrier expression of fatty acid-binding protein 5 and docosahexaenoic acid trafficking into the brain - 141** Yi Ling Low, Monash University	**Adverse effects associated with increased adherence to medications - 147** Prof Greg Kyle, Queensland University of Technology
14:15-14:30	**Integrating Science and Practice (iSAP): A clinical decision-making program for pharmacy students - 136** Carmen Abeyaratne, Monash University	**Real-world consumers' questions and concerns on DMARDs - 142** Hiba El Masri, University of Queensland	**Medication prescribing quality in Australian primary care patients with chronic kidney disease - 148** Dr Woldesellassie Bezabhe, University of Tasmania
14:30-14:45	**Educating and assessing an integrated curriculum in Pharmacy - 137** Mei Yi Toh, The University of Sydney	**Do deprescribing interventions improve quality of life and prevent death acceleration in elderly with life-limiting illness and limited life expectancy? - 143** Shakti Shrestha, University of Queensland	**Pharmacokinetic sex-differences for PEGylated-liposomal doxorubicin in cancer patients may not be observed in relatively healthy individuals: Preliminary evidence in rats - 149** Christopher Subasic, University of Queensland
14:45-15:00	**A comparison of pharmacist competency frameworks to competency frameworks of other health professionals engaged in health coaching - 138** Harjit Kaur Singh, RMIT University	**Copper complexes modulate the expression and function of P-glycoprotein at the blood-brain barrier - 144** Jae Pyun, Monash University	**Factors associated with the risk of falls in older patients taking opioid medications - 150** Aymen Alqurain, University of South Australia

15:00-16:30	**Poster presentations (including afternoon tea)** Cossar Hall

19:00-23:00	**ASPA 2019 Conference dinner** The Brunswick Mess Hal, 400 Sydney Rd, Brunswick

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DATE
Tuesday 24–Friday 27 November 2020

Wednesday 4 December 2019

Time			
08:30-15:00	**Registration desk open** Sissons Foyer, Ground Floor, Building 401 (outside Cossar Hall)		
09:00-10:00	**APSA Lecture**		
	Room: Lecture theatre 1		
	Chair: Dr David Shackleford, Monash University		
	Addressing Health Inequity: developing and delivering moxidectin for neglected tropical diseases - **151** Mark Sullivan, Medicines Development for Global Health		
10:00-10:25	**Morning tea** Cossar Hall		
10:30-12:30	**Symposium 5:** Peptide therapeutics – challenges and opportunities to improve health outcomes - **152**	**Symposium 6:** Using Pharmaceutical Benefits Scheme Data to inform practice and policy - **153**	**Symposium 7:** Early Career Researcher session
	Supported by: **LONZA** Pharma & Biotech		
	Room: Lecture theatre 1	**Room:** Lecture theatre 3	**Room:** Lecture theatre 2
	Chair: Dr Natalie Trevaskis, Monash University	**Chair:** Dr Johnson George, Monash University	**Chairs:** A/Prof Joseph Nicolazzo, Monash University
	Orally delivered constrained peptides as equivalents of injectable antibody drugs A/Prof Mark Smythe, University of Queensland	**Case asthma: Medication adherence as a predictor for stepping up asthma treatment** Dr Jenni Ilomaki, Monash University	**Evaluating the acceptability and feasibility of an ethical framework for the sale of complementary medicines** - **154** Dr Adam La Caze, University of Queensland
	Non-invasive, sublingual delivery of GLP-1 agonists for type 2 diabetes A/Prof Ken Pang, Biolingus and Walter and Eliza Hall Institute Australia	**Case contraceptives: The use of long-acting reversible contraceptives (LARCs) in Australia** Dr Luke Grzeskowiak, University of Adelaide	**Rapid down-selection of antivirals and antiseptics against WHO priority viruses** Dr Gough Au, CSIRO - **155**
		Case Opioids: The Australian opioid epidemic Dr Samanta Lalic, Monash University	**Effect of an electronic medical record design modification on laxative co-prescribing among hospitalised patients taking opioids: a before-and-after study** - **156** Shania Liu, Prince of Wales Hospital
		Case adverse drug reactions: The use of Pharmaceutical Benefits Scheme data to identify novel adverse drug reactions Dr Lisa Kalisch Ellett, University of South Australia	**Opioid analgesic education for clinicians reduces discharge prescribing among opioid-naïve surgical patients** - **157** Ria Hopkins, Monash University
	In vitro & In vivo performance criteria of the enTRinsic™ dosage form and lipid multi-particulates for targeted oral peptide delivery Hywel Williams, Lonza Pharma & Biotech	**Debate** Real world data – the new gold standard for evidence-based medicine? **Chair:** Prof Simon Bell, Monash University	**Pharmacological Treatment Dynamics in People Using Metformin or Sulfonylurea for Type 2 Diabetes Mellitus** - **158** Stephen Wood, Monash University
	Mimicking bariatric surgery with peptide therapeutics A/Prof Rinki Murphy, University of Auckland	**Panellists:** Dr Gillian Caughey, University of Adelaide Prof Danny Liew, Monash University Prof Carl Kirkpatrick, Monash University Dr Leigh Farrell, Certara	
12:30-13:25	**Lunch** Cossar Hall		
13:30-15:00	**Room:** Lecture theatre 1		
	Chair: Dr Stephanie E Reuter Lange, APSA		
13:30-14:30	**APSA medal presentation**		
14:30-15:00	**Conference awards and close**		

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Pharmaceutical Science

Monday 2 December 2019, 15:00-16:30

202	**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** Mrs Hajira Bilal, Monash University, Australia
203	**Medication Management Post-Bariatric Surgery: A Scoping Review** A/Prof Betty Chaar, University Of Sydney, Australia
204	**An aerogel-based medicated nasal pack** Mrs Hamideh Gholizadeh, Auckland University Of Technology, New Zealand
206	**A novel cervical lymph cannulation method to evaluate lymphatic clearance of immune cells, lipids and other molecules from the brain** Miss Thu Hoang, Monash University, Australia
234	**In vitro performance of single unit dose dry powder inhalers (SUD-DPIs) for global health initiatives** Mr Andrew McArthur, Monash University, Australia
238	**Understanding the basis for sex differences and inter-individual variability in the pharmacokinetics of therapeutic monoclonal antibodies** Mr Christopher Subasic, University Of Queensland, Australia
240	**More than 20 years since Sandimmune® and Neoral®: How to develop a cyclosporine lipid-based formulation using the tools of today?** Dr Dallas Warren, Monash Institute of Pharmaceutical Science, Australia

Tuesday 3 December 2019, 15:00-16:30

201	**Isolation, identification and biological activity of compounds from Snake Vine (Hibbertia scandens)** Mrs Roaa Alreemi, The University Of Sydney, Australia
205	**Molecular dynamics simulations for the aqueous phase behaviour of C12E6** Mrs Amali Guruge, Monash University, Australia
207	**Altered oral absorption of drugs in a mouse model of familial Alzheimer's disease** Dr Liang Jin, Monash University, Australia
208	**Dinitro naphthalimides: a fluorescent probe for tumor hypoxia imaging** Miss Rashmi Kumari, Manipal Institute of Technology, India
215	**Sex-based differences in the lymphatic pharmacokinetics of therapeutic monoclonal antibodies** Mr Christopher Subasic, University Of Queensland, Australia
233	**Expression profiling of fatty acid-binding proteins and fatty acid transport proteins in microglia** Miss Yi Ling Low, Monash Institute Of Pharmaceutical Sciences (MIPS), Australia
235	**Stability of formulations for use in a randomised controlled trial of caffeine citrate to prevent intermittent hypoxaemia in late-preterm neonates** Mrs Elizabeth Oliphant, University of Auckland, New Zealand
237	**Helping patients swallow their tablets: characterisation of commercial medication lubricants for use in dysphagia** Ms Marwa Abu Malouh, The University of Queensland, Australia
239	**Synthesis and characterization of hypoxia responsive nanoparticles for cancer therapy** Dr Dhanya Sunil, Manipal Institute of Technology, India
241	**Demonstration of the first known 1:2 host-guest encapsulation of a platinum anticancer agent within a macrocycle** A/Prof Nial Wheate, The University Of Sydney, Australia

Pharmacy Education

Monday 2 December 2019, 15:00-16:30

210	**The implementation and assessment of Mental Health First Aid training among university students: a systematic review** Ms Sarah Choong, The University Of Sydney, Australia
242	**Early outcomes of a volunteer peer teaching program in pharmacy** Miss Aisha Imam, Monash University, Australia
244	**The role of study strategy and motivational constructs in academic performance of pharmacy students** Dr Megan Waldhuber, Monash University, Australia

209	**The training and educational requirements of community pharmacy staff to deliver minor ailment services- a systematic scoping review** Ms Mariyam Aly, University Of Technology Sydney, Australia
211	**Final foundation residency portfolio reviews – Feedback from a two-site review process** Mrs Judith Coombes, School Of Pharmacy, University Of Queensland, Australia
243	**Helping children taking their medication: a social media analysis** Dr Manuel Serrano Santos, Queensland University Of Technology, Australia

Pharmacy Practice

Monday 2 December 2019, 15:00-16:30	
200	**Engaging community pharmacies in the detection of missing Tuberculosis patients through Public-Private Mix intervention in Pakistan** Mr Hadi Almansour, University Of Sydney, Australia
212	**Experiences with using Gloup® medication lubricant: What do Australian aged care facility healthcare workers think?** Ms Marwa Abu Malouh, The University of Queensland, Australia
214	**Reviewing the quality of trials of biologic disease modifying antirheumatic drugs supporting PBS listing from 2006 – 2018** Miss Abigail Mejia, University Of Queensland, Australia
216	**Smoke and Mirrors: What do persistent pain patients think of medicinal cannabis?** Dr Yasmin Antwertinger, Queensland University of Technology, Australia
218	**Pharmacist's perspectives of and attitudes towards medicinal cannabis** Dr Anna-marie Babey, University Of New England, Australia
219	**Pharmacists' understanding and attitudes toward deprescribing** Mrs Anna Barwick, University Of New England, Australia
220	**Views on facilitators and barriers related to pharmacy technician professional development** Mr Aaron Cheong, Griffith University, Australia
222	**Attitudes towards smoking cessation application among Thai undergraduate smokers** Miss Phantara Chulasai, Chiang Mai University, Thailand
224	**Perspectives of residential care facilities' staff on the utility of the Goal-directed Medication review Electronic Decision Support System (G-MEDSS)** Dr Mouna Sawan, The University Of Sydney, Australia
226	**Are Jordanian Pharmacists: "Experts but not Professionals"?** Miss Leen Fino, The University Of Sydney, Australia
228	**Regulatory safety warnings of cardiac harms: a comparison of four international regulators.** Ms Ashleigh Hooimeyer, The University of Sydney, Australia
230	**Prevalence of clinical inertia in the treatment of patients with type 2 diabetes mellitus, at a Thai tertiary care hospital** Miss Piranee Kaewbut, Chiang Mai University, Thailand
232	**Patient determinants to medication non-adherence** Prof Greg Kyle, Queensland University Of Technology, Australia
246	**Strong bugs need strong drugs: Does Tuberculosis needs therapeutic drug monitoring?** Dr Yogendra Mishra, Westmead Hospital, Australia
248	**Recruitment and retention of pharmacists in rural and remote areas of Australia: a scoping review** Dr Kehinde Obamiro, University of Tasmania, Australia
250	**Does initiating medicine for dementia change statin use? A population-based study** Ms Leonie Picton, Monash University, Australia
252	**A wave of change: Provision of oral cytotoxic agent pharmaceutical care in community pharmacy** Dr Anna-marie Babey, University Of New England, Australia
254	**Nicotine vaping products as a smoking cessation aid: A survey among pharmacy staff and customers in Brisbane, Australia** Mr Daniel Asfaw Erku, The University of Queensland, Australia
256	**The association of illness perception on medication adherence in hypertensive Middle Eastern refugees and Migrants in Australia** Mrs Wejdan Shahin, Rmit University, Australia
258	**Evaluation of the utilisation of erythropoietin stimulating agents and immunosuppressants in chronic kidney disease patients** Miss Isabelle Kitty Stanley, The University Of Queensland, Australia

260	**Reflections on a Systematic review of effective sustained deprescribing interventions at near-End of Life: The forgotten ideal candidates** Dr Paulina Stehlik, Bond University, Australia
262	**Post-operative use of slow-release opioids: Translation of acute pain management guidelines to clinical practice** Miss Adeline Tan, University Of Sydney, Australia
264	**Association between statin use and fall-related hospitalizations from aged care facilities: a case-control study** Ms Kate Wang, Monash University, Australia
266	**Attitudinal factors influencing antibiotic supply without prescription for common infections by community pharmacy staff: a cross-sectional national survey in Sri Lanka** Mr Shukry Zawahir, The University of Sydney, Australia

Tuesday 3 December 2019, 15:00-16:30

213	**The role of religion, spirituality and fasting in coping with type II Diabetes among Indian Australians: a qualitative study** Mr Akram Ahmad, The University Of Sydney, Australia
217	**Prevalence of adverse drug events and adverse drug reactions in hospital among older patients with dementia: a systematic review** Miss Marissa Sakiris, The University Of Sydney, Australia
221	**Evidence and the policy process: codeine up-scheduling in Australia** Ms Kellia Chiu, The University Of Sydney, Australia
223	**Consumer over-the-counter medicine request behaviours: a cross-sectional exit survey of Australian pharmacy consumers** Mr Jack Collins, The University of Sydney, Australia
225	**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** Mr Daniel Asfaw Erku, The University of Queensland, Australia
227	**Off-label medications: a mixed-method analysis of pharmacist and stakeholder perceptions of collaboration and practice** Mrs Susan Gray, University Of Queensland, Australia
229	**International big data to investigate medication safety in neurodegenerative diseases: the NeuroGEN initiative** Dr Jenni Ilomaki, Monash University, Australia
231	**A qualitative study exploring factors influencing the three phases of medication adherence in ADHD** Mr Muhammad Umair Khan, The University Of Sydney, Australia
245	**Physicians views on cardiovascular disease risks prevention services by pharmacists** Mr Hadi Almansour, University Of Sydney, Australia
247	**Risk factors and associated outcomes of hospital readmission in COPD** Ms Maria Njoku, University of Tasmania, Australia
249	**Polypharmacy in older Australians: A population based study (2006-2017)** Amy Page, Monash University, Australia
251	**Are we appropriately screening and treating preoperative anaemia in major elective bowel surgery?** Mr Edgar Poon, The University Of Queensland, Australia
253	**Assessing the effectiveness of an interprofessional collaborative osteoporosis screening program (IPC-OSP) in a Malaysian primary care setting: Preliminary findings** Miss Anisha Sandhu, Monash University Malaysia, Malaysia
255	**Reporting the evidence for implementation of professional services to community pharmacy: a systematic review** Dr Carl Schneider, The University of Sydney, Australia
257	**Impact of medication errors on nursing home residents: a systematic review** Mr Ramesh Sharma Poudel, University of Technology Sydney, Australia
259	**Are community pharmacists "referring" patients to the GP for antibiotics? Preliminary results from a pilot study.** Dr Paulina Stehlik, Bond University, Australia
261	**Roles and challenges in PRN psychotropic medication administration by residential aged care facility nursing staff** Dr Vijay Suppiah, University Of South Australia, Australia
263	**Resources for assessing the impact of culture on medication adherence** Mrs Natasha Taufatofua, University Of Queensland, Australia
265	**"I became a pharmacist to help people": factors affecting Australian community pharmacist service provision** Ms Faith Yong, University Of Technology Sydney, Australia

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Working together – Practice, Education & Research

Giovanni M Pauletti[1], Department of Administrative Sciences, St Louis College of Pharmacy, Cincinnati, Ohio, United States

New scientific discoveries, combined with significant changes in health care systems, offer exciting opportunities for professionals focusing in pharmaceutical sciences and practice. To adequately prepare the workforce for this expanded scope of practice, curricular revisions attempt to equip our graduates with skills necessary to practice now and in the future. This presentation highlights the role of education as a key driver and enabler of change in pharmaceutical sciences and practice. It will further underline the necessity for collaborative partnerships in order to successfully implement the desired objectives and accomplish better outcomes for patients.

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Pharmacoepidemiology as a tool for post-approval safety and effectiveness assessment

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Randomised controlled trials (RCT) are the scientific standard for evaluation of intended effects of drug therapies (efficacy). However, RCTs are not always feasible and results are often not generalizable to patients and healthcare in daily clinical practice. Despite extensive testing before marketing approval, variability in drug response (both efficacy and safety) remains common when medicines are used in daily clinical practice, i.e. in real life. Adherence, quality of prescribing and dispensing, disease severity, and biomarkers (incl. genetics) are important factors that may explain variability in drug response. Better understanding of the variability in medicines' use and patient outcomes, both from a clinical, policy and methodological viewpoint is needed to increase the benefit-risk ratio of therapeutics for individual patients and for public health in general. Patients, healthcare providers and policy makers need robust evidence of safety and effectiveness of medicines in clinical practice. The main alternative to RCTs are observational studies, however, prescribing of drugs in clinical practice is not random and especially new drugs are often prescribed to selected patients. Therefore, patients receiving new drugs are often incomparable to patients receiving standard drugs with regard to prognosis (confounding by indication). Prognostic incomparability of treatment groups is one of the key threats to validity of observational studies on intended effects and predictable adverse effects of drug therapies. Advancement in pharmacoepidemiologic methodologies over the past decades has provided an extensive toolbox for the valid assessment of drug safety and effectiveness in the post-approval phase.

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Symposium 1: Global efforts to enhance medicine safety

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Access to safe, quality and effective medicines is crucial for achieving good health outcomes. Yet globally we are constantly faced with challenges such as counterfeit medicines, substandard generic products, limited access to quality medicines, and medicines with low bioavailability which increase the risks of side-effects and toxicity.

There are many issues that hamper efforts to improve access to medicines and to eliminate poor quality medicines; there are also enormous efforts by researchers, educators, regulators and healthcare professionals globally to deliver safe and quality medicines to patients. This proposed symposium will bring together national and international speakers with a range of expertise and experience in delivering safe and quality medicines.

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Symposium 2: Working together for safe and effective medicines use in residential aged care

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More than 270,000 Australians receive residential aged care each year. The development of services that allow people to remain living in their own homes longer means that residents are increasingly older, frailer and have more complex health needs on admission. In particular, the ongoing Royal Commission into Aged Care Quality and Safety has highlighted the need for new multidisciplinary approaches to ensure safe and effective medicines use.

This symposium will highlight recent research, explore new models of practice and discuss policy implications. The symposium includes a moderator and presenters from four universities and five states/territories of Australia. The symposium includes the policy perspective of the Pharmaceutical Society of Australia, and a panel discussion in which the audience will be invited to participate.

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Carers' and patients' health information seeking behaviour in cognitive impairment in older adults – a systematic review

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Introduction. Cognitive impairment is an increasing disease burden commonly affecting the elderly, and extending to their carers, who experience physical, emotional, psychological and financial burdens when supporting patients. Health information helps in easing some of this burden, however, little is known about the health information seeking behaviour of carers and patients with cognitive impairment.

Aims. To explore the health-information seeking behaviour of patients (with cognitive impairment) and their carers.

Methods. A systematic review of the literature was conducted using PsycINFO, Cochrane Database of Systematic reviews, Web of Science, EMBASE, CINAHL, AMED, PubMed, and Scopus for all years until 28/02/2019. The inclusion criteria were studies reported in English that focused on cognitive impairment, including dementia and Alzheimer's disease, and information seeking, by a patient or carer. Data extraction was performed by one author and checked by a second author.

Results. A total of 254 articles were identified. After removal of duplicates, followed by title screen, abstract screen, and full text screen, 19 articles were included. The studies were conducted mostly in the United States (n=8) and the United Kingdom (n=3). A total of 2926 participants were studied. Understandably, carers were the majority of the study participants. Websites and social forums were the primary sources of health information. Carers tended to search mainly for information on disease state management and personal support. They mainly sought information as part of coping strategies, whereas patients sought information to overcome uncertainty and to feel in control of their condition.

Discussion. Patients and carers seek information to help with coping and management of cognitive impairment. However, more research is needed about patients' information seeking behaviour. As carers may be the primary seekers of information due the cognitive decline of the patients, healthcare professionals need to consider to how best to meet the information needs of both group.

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Qualitative evaluation of an intervention to simplify medication regimens for people receiving home care services

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Introduction. Older people often have complex medication regimens. Medication regimen simplification is a promising strategy to increase the capacity of older people to self-manage their medications. The aim of this study was to qualitatively explore the acceptability and delivery of an intervention to simplify medication regimens for people receiving community-based home care services and examine enablers and barriers to recruitment.

Methods. This analysis was part of a wider mixed methods evaluation of a pilot and feasibility study, in which 25 participants received a pharmacist-led intervention comprising medication reconciliation, assessment of the person's capacity to self-manage medications, and identification of opportunities for medication regimen simplification. Data collected from semi-structured interviews with stakeholders 4 months post-study entry were thematically analysed.

Results. Nine interviews (median duration 35 minutes) were undertaken with 12 stakeholders, including 6 study participants, 4 nurses, an informal caregiver and a pharmacist. Resistance to change associated with potential loss of autonomy in medication management impacted willingness to participate in the pilot and feasibility study. Interaction between research nurses and participants in their home was highly valued although some questionnaire items were perceived as difficult to answer, confusing or repetitive. The pharmacist-led intervention was well accepted by participants and delivered as planned, although it proved challenging to limit the service and hence final recommendations to discrepancies identified during medication reconciliation and opportunities for simplification. Interviewees emphasised the importance of multidisciplinary collaboration in intervention delivery and identified potential strategies to facilitate information sharing.

Discussion. Stakeholders valued the simplification intervention and supported wider implementation. More extensive promotion to all stakeholder groups, along with greater emphasis on supporting individuals to maintain independence with medication management, could improve appreciation of study benefits and facilitate participation in future trials.

Reference. Sluggett JK, et al. BMJ Open 2019, 9(7): 1-12.

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Prevalence of adverse drug reactions in hospital among older patients with and without dementia

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

Aims. This study aimed to compare ADRs in older inpatients with and without dementia. A secondary aim was to compare ADR prevalence defined according to two approaches.

Methods. This retrospective cohort study included 2000 patients ≥75 years admitted consecutively to six Sydney metropolitan hospitals from 1st July 2016. Dementia was defined by diagnosis in electronic medical records. ADRs were defined according to two approaches: International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM) and classification by a research pharmacist (subgroup of consecutive patients, n=600).

Results. In the cohort of 2000 patients, 25.9% (n=517) had dementia. The mean age was 86.0 ± 5.8 years. A total of 13.0% (n=260) patients had an ADR, defined by ICD-10-AM. Among those with dementia, 8.3% (n=43) had an ADR, whilst 14.6% (n=217) of those without dementia had an ADR ($p<0.001$), defined by ICD-10-AM. The commonest drug classes implicated in ADRs were antithrombotics in the whole population (n=68, 26.2%) and amongst those without dementia (n=57, 26.3%) and analgesics (n=14, 32.6%) amongst those with dementia. Among a subset of 600 patients, 12.5% (n=75) and 61.8% (n=371) of patients had an ADR defined by ICD-10-AM coding and research pharmacist classification respectively.

Discussion. Preliminary results show a high prevalence of ADRs, with lower prevalence observed among inpatients with dementia, defined by ICD-10-AM. In a subset of the cohort, a much higher prevalence of ADRs was recorded defined by a research pharmacist than with ICD-10-AM coding.

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Proton pump inhibitor prescribing in older patients on admission and discharge from hospital

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Introduction. Proton pump inhibitors (PPI) are commonly prescribed to older patients to treat or prevent peptic ulcer disease or to manage gastroesophageal reflux. To avoid adverse effects and drug-drug interactions, PPIs should be used appropriately.

Aims. To compare the pattern of PPI prescribing from admission to discharge, assess their appropriateness and identify factors associated with their prescription at hospital discharge.

Methods. Patients (aged ≥ 75 years) admitted to the Royal Adelaide Hospital between September 2015 and August 2016 and taking ≥ 5 medications were included. Total number of prescribed medications (NPM) and Charlson Comorbidities Index (CCI) were documented. PPI appropriateness was assessed according to the American College of gastroenterology guidelines. The association between patient characteristics and discharge PPI prescription was computed using logistic regression and results were presented as odds ratios (OR) and 95% confidence intervals (CI).

Results. Of the 1012 patients included, PPI prescribing increased from 48% at admission to 51% at discharge. At admission, users of PPI were more likely to have a history of gastroesophageal reflux disease (48% vs 14%, $P < 0.001$) and prescribed more gastro-toxic medications (76% vs 68%, $P = 0.003$) compared to non-users. At discharge, a total of 102 patients were newly prescribed a PPI or had their dose increased, whereas 26 had a dose reduction or PPI cessation. Overall, 67% of PPI users at admission and 78% at discharge were prescribed a dose which was considered inappropriate according the recorded indications. PPI use was associated with increasing CCI (OR = 1.3, 95% CI 1.2 – 1.4), NPM (OR = 1.2, 95% CI 1.1 – 1.2) and total number of gastro-toxic medications (OR = 1.2, 95% CI 1.1 – 1.4).

Discussion. The prevalence of PPI prescribing increases at discharge and the dose is often inappropriate. Careful assessment of clinical conditions and adhering to evidence-base guidelines are essential for appropriate PPI use.

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Prevalence and determinants of adverse drug reactions associated with opioid medications in older patients

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Introduction. Adverse drug reactions (ADRs) associated with opioid medications in older patients is of particularly concern due to their frequency, severity and the increase in opioid prescribing over the past two decades.

Aims. To identify the pattern of pre-admission opioid prescribing, causes for admission, the concurrent medications and common comorbidities in elderly patients with polypharmacy who were admitted to an acute care facility.

Methods. Patients (aged ≥ 75 years) admitted to the Royal Adelaide Hospital between September 2015 and August 2016 and taking ≥ 5 medications were included. From their recorded pre-admission data, Drug Burden Index (DBI) and Charlson Comorbidities Index (CCI) were calculated. The association between pre-admission opioid prescribing and concurrent medications, cause of admission and comorbidities was computed using logistic regression, and the results presented as odds ratios (OR) and 95% confidence intervals (95% CI).

Results. Of the 1012 patients included, 269 (27%) were prescribed opioids, with oxycodone accounting for 40% and codeine 30% of these prescriptions. Opioid users were more likely to be admitted for infection (24% vs 18%, $P = 0.02$) or falls (26% vs 18%, $P = 0.006$) and were more often co-prescribed laxative medications (32% vs 12%, $P < 0.001$) compared to non-users. Opioid users were more likely to have a documented diagnosis of osteoporosis (50% vs 17%, $P < 0.001$) and pulmonary disease (36% vs 28%, $P = 0.02$), and were more often co-prescribed hypnotics (26% vs 14%, $P < 0.001$), antiepileptics (19% vs 8%, $P < 0.001$) and systemic corticosteroids (8% vs 4%, $P = 0.004$). logistic regression showed that pre-admission opioid prescribing was associated with falls (OR = 1.6, 95% CI 1.2 – 2.4), fractures (OR = 1.9, 95% CI 1.1 – 3.3) and laxative use (OR = 2.4, 95% CI 1.7 – 3.4).

Discussion. Patients who were prescribed opioid medications at admission were more likely to present with falls and infection. Patients with pre-admission opioid prescribing have many characteristics which increase risk of opioid ADRs.

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Medications and Frailty: International Consensus Principles for Clinical Practice, Research and Education

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Introduction. Frailty is a geriatric syndrome associated with decreased physiological reserve and increased vulnerability to adverse events. Existing clinical guidelines provide few specific recommendations in relation to medication management for frail older people.

Aims. To generate international consensus principles for clinical practice, research and education related to medication management for frail older people.

Methods. A multidisciplinary consensus group was convened in Berlin, Germany, in October 2018. Using modified nominal group technique, participants worked in mixed discipline pairs to generate a list of key principles under the themes of clinical practice, research and education. The principles were consolidated and prioritised through a facilitator-led discussion until consensus was reached.

Results. The final consensus comprised of nine key principles for clinical practice, six principles for research, and four principles for education. Principles for clinical practice were sub-categorised as assessment, prescription, and monitoring.

Discussion. Principles for clinical practice included medication reconciliation, assessing medication understanding and capacity to self-manage a medication regimen, appropriate prescribing, deprescribing potentially inappropriate medications, regimen simplification, vigilance towards iatrogenic geriatric syndromes, regular medication review in the context of individual's beliefs and goals of care, multidisciplinary healthcare communication, and maintenance of an up-to-date medication list. Principles for research included encouraging inclusion of frail older people and consideration of frailty as an effect-modifier in clinical trials. Principles for education included ensuring early introduction to the concept of frailty and opportunities to engage both patients and health professionals to optimise and improve medication outcomes.

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Antimicrobial prescribing patterns and its appropriateness in medical patients at a tertiary teaching hospital

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Introduction. Patients admitted to medical wards are often prescribed antimicrobials inappropriately, leading to longer hospital stay, and an increase in morbidity and mortality.

Aim. To assess the appropriateness of antimicrobials prescribed and determine the compliance with guidelines.

Methods. A point-prevalence-survey was conducted from July-August 2019 at University Malaya Medical Centre (UMMC) in Kuala Lumpur, Malaysia. We included all medical inpatients aged ≥18 years, who were on at least one antimicrobial agent. Data was collected from the patient's electronic medical records and recorded using the National Antimicrobial Prescribing Survey tool developed by NCAS, Australia. Appropriateness was determined by an expert panel consisting of infectious disease specialists and pharmacist, through reference to a standardized decision matrix.

Results. A total of 298/598 (49.8%) patients were prescribed antimicrobials (mean=1.5 antimicrobials/patient) which resulted in 434 prescriptions. The commonest class of antimicrobials prescribed were penicillins (35.7%; 155/434), antifungals (12.9%; 56/434) and cephalosporins (12.4%; 54/434). Antimicrobials were most commonly prescribed for pneumonia (22.6%; 98/434), medical prophylaxis (8.5%; 37/434) and fungal infections (4.1%; 18/434). However, only 87.8% (381/434) antimicrobial prescriptions had a documented indication. The number of prescriptions assessed as appropriate were 58.2% (254/434). The reasons for the low level of appropriateness were the unnecessary use of broad-spectrum antimicrobials (38%; 65/169), use of antimicrobials for indications that did not require antimicrobials (24.9%; 42/169) and incorrect duration of antimicrobial use (14.8%; 25/169). Compliance to guidelines was 67.5% (293/434).

Discussion. In UMMC, appropriateness of antimicrobial use and compliance to guidelines among medical patients were lower compared to previous studies conducted in developed countries. In conclusion, targets for antimicrobial stewardship interventions should focus on education, improving documentation and compliance to guidelines.

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Medicines information services in Vietnamese hospitals: results from a national survey

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Introduction. In resource-limited settings, it is particularly important to explore the priorities for, as well as barriers to, development of health services. There has been limited development of medicines information services (MI) in Vietnam despite national guidelines.

Aims. To explore the current status of MI services for healthcare professionals (HCPs) and outpatients in Vietnamese hospitals.

Methods. In 2018, all hospitals which were under the direct administration of the Ministry of Health and all 63 Provincial Health Bureaus were invited to participate (n=1359). All national, provincial and district hospitals, as well as private hospitals and hospitals from other Ministries in Vietnam, were included. An online questionnaire about MI facilities, workforce and activities was used.

Results. There were 560 eligible responses from pharmacists in hospitals. The most common MI service was pharmacovigilance (91% of hospitals), and least common was providing MI for clinical case management (30%), nurse training (31%), and MI provision to patients (27%). Multivariate logistic regression analysis showed that the number of pharmacists and the geographical-economical area where hospitals were based had the strongest impacts on the likelihood of offering more MI services in hospitals. While the type of hospital (traditional medicine vs other hospitals) had some impact, hospital size, level, and type of hospital (general vs specialized) did not have significant impacts on the provision of MI services.

Discussion. The differences in workforce and location may contribute to differences in MI practice among hospitals. These findings are relevant for the implementation of a national MI strategy in Vietnam and other developing countries.

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Psychometric properties of the Urdu version of Health Literacy Questionnaire

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Introduction. Health literacy is the ability of an individual to access, understand and use health-related information and services in order to maintain a good health. The Health Literacy Questionnaire (HLQ), originally developed in Australia, explores nine dimensions of health literacy. HLQ has been translated into various languages including Danish and German, and used to measure health literacy profile of communities in Australia and overseas. Pakistani migrants are one of the fastest growing communities in Australia and they usually speak Urdu at home. There is a lack of information regarding the health literacy of Pakistani migrants in Australia.

Aims. This study aims to investigate the psychometric properties of the Urdu version of HLQ.

Methods. A forward-backward method of translation was followed to translate HLQ into Urdu. Data was collected online from 202 Pakistani migrants residing in Australia using checkbox® survey tool. Scale reliability was assessed and confirmatory factor analysis was performed to measure the structural properties of the Urdu version of HLQ.

Results. The psychometric properties of the Urdu version of HLQ were close to the original questionnaire. Composite reliability of scales ranged from 0.87 to 0.94. In the confirmatory factor analysis, the nine-factor model was fitted to the data with no cross-loadings or correlated residuals allowed. Given the restricted nature of the model, the fit was satisfactory: RMSEA=0.066 and SRMR=0.057.

Discussion. The Urdu version of HLQ showed good scale reliability and robust psychometric properties. This Urdu version of the questionnaire is now ready to be used to assess health literacy in Urdu-speaking migrants.

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Validity of the Canadian medication safety self-assessment tool for long-term care® for use in Australian nursing homes

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Introduction: Medication safety is the avoidance of medication error and preventable harm associated with medication use. The Canadian medication safety-self assessment (MSSA) tool for long-term care has been developed to assess medication safety in the nursing home setting and is routinely used to monitor medication safety in Canadian nursing homes. As the tool is developed, validated, and revised in the context of Canada, the usefulness of this tool for use in Australian nursing homes is unknown.

Aim: To determine the validity and applicability of the Canadian MSSA for assessing medication safety culture in Australian nursing homes.

Methods: A modified 2 round RAND/UCLA appropriateness method was conducted. The expert panel comprised 9 members with expertise in medication management in the Australian nursing home setting. The expert panel rated each of the 133 MSSA criteria in terms of importance for medication safety and applicability, in the Australian nursing home context using a 9-point scale. Criteria with panel agreement and a median score of 7-9 for importance for medication safety were considered to have face validity, and for applicability, were considered suitable for use on the Australian nursing home context.

Results: Almost all criteria (n=132) were considered to have face validity. The one criterion not considered important for medication safety was the use of barcoding for the identification of residents. 25 criteria were not considered applicable to the Australian nursing home setting. Criteria considered not applicable covered packaging and labelling of medications (n= 8), medications prescribing (n= 6), the use of information technologies (n= 5), as well as miscellaneous areas (n=6).

Discussion: The majority of criteria in the Canadian MSSA tool for long term care are valid and applicable for measuring medication safety culture in Australian nursing homes. Further research to determine the feasibility of using the tool in Australian nursing homes is needed.

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Potentially suboptimal prescribing of medicines for older Aboriginal Australians in remote areas

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Introduction. Aboriginal Australians are increasingly living longer. Older Indigenous people frequently have several chronic conditions, including diabetes mellitus and cardiac disease, particularly those living in remote areas, where chronic conditions and frailty develop at younger ages than in Indigenous Australians elsewhere. Effectively managing the medications for these conditions and symptoms is critical for reducing the risks of acute adverse events, functional decline, and premature mortality.

Aims. To investigate the prevalence of polypharmacy, under-prescribing and potentially inappropriate medicine use among Aboriginal Australians living in remote Western Australia.

Methods. A cross-sectional study set in six remote communities and the town of Derby in the Kimberley, Western Australia. The participants were Aboriginal people aged 45 years or more with complete medication histories. The main outcome measures were the proportions of patients with medicine histories indicating polypharmacy, potential under-prescribing of indicated medicines, or potentially inappropriate prescribing (including potential prescribing cascades or drug interactions).

Results. Complete medicine histories were available for 273 participants. The mean number of prescribed medicines was 5.1 (SD, 3.6). At least one form of suboptimal prescribing was identified for 166 participants (61%), including polypharmacy for 145 (53%), potential under-prescribing of at least one indicated medicine for 33 (12%), and potentially inappropriate prescribing for 54 participants (20%). Potential prescribing cascades or drug interactions were identified for 12 participants (4%).

Discussion. Potentially suboptimal prescribing affected more than half the participating older Aboriginal Australians from the Kimberley. If generalisable to other remote Indigenous Australians, the prevalence of polypharmacy, potentially inappropriate prescribing, and under-prescribing of indicated medicines is problematic, and suggests that older Indigenous people in remote areas are at risk of medicine-related harm.

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Global Leaders In Development (Glide): A module across three international pharmacy schools

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Introduction. Higher education is increasingly focused on instilling the concepts of global mindset and citizenship within students, but it is unknown how these apply to pharmacy or other health professional students. Faculty from PharmAlliance, a unique three-way partnership between schools of pharmacy at University of North Carolina at Chapel Hill, Monash University, and University College London, developed a three-week module for first- and second-year students that focused on global mindset, global citizenship, and global leadership.

Aim. To determine the impact of the module on student learning across the concepts of global mindset, citizenship, and leadership.

Methods. Fifty students completed a pre-post survey where they rated 15 statements on a five-point Likert scale that assessed the concepts of global mindset, citizenship, and leadership. Students were asked additional open-ended questions on the post-survey. Quantitative data was analysed by paired t-tests and qualitative data used grounded theory with a one-cycle open coding process.

Results. Pre-post scores increased significantly for four out of 15 statements and decreased significantly for two statements in the global mindset category ($p<0.05$). Concepts that stood out during the module included global awareness of non-communicable diseases, misconceptions about global health, and international collaboration. Students indicated that they will utilize these concepts by having more self-awareness, advocating for global health issues, and continuing to engage in global opportunities.

Discussion. This module may be a successful method for developing student's global mindset, sense of citizenship, and leadership skills while promoting international collaboration.

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A metabolomics-based approach to prediction of Drug Induced Liver Injury (DILI)

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Introduction. Drug-induced liver injury (DILI) refers to a variety of related disease states that arise from exposure to hepatotoxic pharmaceuticals. The incidence of DILI is reported to be between 13.9 and 19.1 per 100,000 patients annually. Out of all current anti-retroviral drugs used to treat HIV, 35% have been strongly linked to DILI. It is therefore important to develop a greater understanding of the mechanisms and metabolic perturbations associated with anti-retroviral exposure that lead to DILI. Metabolomics is a promising tool for investigating and developing an understanding of DILI and the mechanisms which could be responsible for specific forms of liver injury.

Aims. This study used metabolomics to reveal the impact of anti-retroviral drugs on hepatocyte metabolism.

Methods. In vitro cultures of HepaRG cells and primary human hepatocytes were treated with six common anti-retroviral drugs for 48-hours and harvested for metabolite extraction and Liquid Chromatography Mass Spectrometry (LCMS)-based metabolomics and lipidomics analyses. Additionally, CARS (Coherent Anti-stokes Raman Spectroscopy) microscopy was performed to assess the occurrence of lipid accumulation after a 48-hour exposure to anti-retroviral compounds.

Results. Metabolomics analysis showed altered levels of bile acids, including taurocholate, associated with several anti-retroviral compounds. Furthermore, there were significant changes observed throughout the lipidome with the levels of acylglycerides, and phospholipids, showing increases, and decreases, in lipid abundance, respectively. CARS microscopy allowed visualisation of lipid accumulation in the HepaRG cells following drug treatment.

Discussion. Drug-induced changes to metabolite levels provided insights into the mechanisms that are associated with specific forms of liver injury, such as bile acid perturbations related to cholestatic liver injury, and changes to lipid abundance may be indicative of steatotic liver injury. These data illustrate the role of metabolomics and lipidomics as promising tools for investigating and identifying mechanisms of DILI.

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New Medicines Support Service (NMSS) for patients initiating treatment for COPD

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Introduction. Medication adherence and inhaler technique are known to be suboptimal in patients with chronic obstructive pulmonary disease (COPD). Australian community pharmacists can play key roles in optimising COPD management through quality use of medicine initiatives.

Aims. To implement and evaluate a pharmacist-led new medicines support service (NMSS) to improve medicine use by patients newly initiated on inhaled medications for COPD.

Methods. A quasi experimental pilot study was carried out in Victorian community pharmacies. The NMSS comprised 4 meetings between each participant and a trained community pharmacist to review medication adherence, adverse events, inhaler technique, and promotion of patient self-management. Refill adherence, self-reported adherence (Tool for Adherence Behaviour Screening [TABS]), adverse events, impact of COPD (COPD assessment test [CAT], and symptoms (modified Medical Research Council [mMRC] dyspnoea scale) were measured at baseline, 1 week, and 1 and 3 months. Likelihood to recommend NPSS to others was assessed on a scale $0-10$ (not likely – highly likely).

Results. NMSS recipients (n=11; 55% men) had a mean±SD age of 76±9 years and a history of smoking (82%). Proportion of participants who demonstrated correct inhaler techniques (Respimat – 5; Ellipta – 4; MDI – 2) improved from 93% at baseline to 100% at 3 months. Refill adherence of COPD medicines at 3 months was good for 90% participants. Good adherence behaviours were self-reported on TABS by 36% participants at 3 months (vs 9% at 1 week); adherence at 3 months improved from 1 week in 55%. Adverse events (headache, after taste in mouth) were reported/suspected in one-third of participants at 1 week but reduced to 10% at 3 months. Improvements were seen at 3 months in comparison to baseline for both CAT (median [IQR] 10 [6.75 – 12.25] vs 14 [9 – 21]) and mMRC (1 [0 – 2] vs 2 [1 – 3]) scores. Recipients were highly likely to recommend the service to others (median 9.5 [IQR 8.75 – 10]).

Discussion. NMSS can be successfully delivered by community pharmacists. NMSS recipients were found to have improved medication adherence and inhaler technique, and fewer adverse events/symptoms of COPD. NMSS has the potential to become a routine community pharmacy service for better management of COPD and in turn optimal health outcomes. Cost effectiveness of NMSS needs to be established in large trials with longer-term follow-ups.

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Exploring current and potential roles in sports pharmacy

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Introduction. Pharmacists' roles in sporting culture and competition have a limited description in the literature. Roles have been reported in doping and anti-doping, injury management and prevention, and first aid. While several authors have produced guidelines for pharmacists who wish to provide health care to athletes, the guidelines do not draw on original research, and a systematic review on sports pharmacy had not previously been performed.

Aims. A systematic review was undertaken to evaluate current and potential roles for pharmacists in sports medicine. Key themes were identified in outcomes reported in included studies.

Methods. The systematic review was conducted in January 2019; EMBASE, MEDLINE, CINAHL, Scopus and the Cochrane Library were searched. Peer-reviewed, original research articles were considered for inclusion. Articles published in a language other than English were excluded. Quality appraisal was performed independently by two authors.

Results. Three key themes were identified from 11 eligible articles: (i) doping prevention and control; (ii) injury management and first aid; and (iii) gaps in educational and curricular opportunities. Pharmacists were enthusiastic about counselling athletes and were perceived as a good potential source of information about doping, even though they lacked knowledge and confidence in this area. Pharmacists' advice on managing sprains and strains was not always guided by current evidence, despite frequently being consulted by athletes. Limited opportunity for education in sports pharmacy was reported by pharmacists and pharmacy students.

Discussion. Pharmacists had a willingness and an aptitude to counsel athletes. Key barriers were a lack of knowledge and confidence, and limited educational opportunities. Future research is necessary, and aims to support pharmacists in this role.

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Impact of a patient centred educational exchange (PC³EE) with stroke survivors' on their adherence to secondary prevention medications and clinical outcomes.

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Introduction. Patients who experience a minor stroke have an increased risk of a further stroke within 90 days. Lipid lowering, antithrombotic and antihypertensive medications are routinely prescribed to reduce this risk.

Aims. To determine the impact of the PC³EE on adherence to lipid lowering, antithrombotic and antihypertensive medications at three months in stroke patients. Secondary outcomes included the impact on clinical outcomes.

Methods. Patients diagnosed with a minor stroke were randomised to receive either the PC³EE and usual care (intervention) or usual care (control) (Coombes et al 2018). The PC³EE was conducted at the bedside before discharge and by telephone at least 10 days after discharge. Adherence was determined using dispensing data from the Australian Pharmaceutical Benefits Scheme and the proportion of days covered (PDC) calculated.

Results. A total of 200 patients were enrolled and 94 intervention and 94 control patients obtained at least one class of medication over 3 months. The median (IQR) PDC percent for all classes of medications over 3 months was; intervention group 89.4% (76.7-100%) and control group 87% (66.5-99%) (p=0.15). At 3 months 176 patients were interviewed of whom 135 recalled that their blood pressure has been measured, 67 (72%) intervention group and 68 (81.9%) control group. A mean (SD) systolic blood pressure measurement of 125.6 (16.4) mmHg was self-reported by 38 intervention patients compared to 135.1(13.6) mmHg (p=0.01) for 36 control patients (p=0.01). Side effects to medicines were self-reported by 35(37.6%) intervention and 28(33.7%) control patients (p=0.59). Admission to hospital was self-reported by 18 (19.4%) of the intervention group compared to 28 (33.7%) of the control group (p=0.03).

Discussion. The PC3EE resulted in a non-significant difference in medication adherence in the intervention group when measured by prescription refill data from the day of hospital discharge, but may have impact on clinical outcomes, this requires further investigation.

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Pharmacy in the community: Factors influencing New Zealand pharmacists extending their patient-facing roles

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Introduction. Internationally, changes in pharmacy models of care, services and funding are occurring to make better use of the highly trained and skilled pharmacist workforce. This trend is reflected in New Zealand (NZ) with expanding roles for community pharmacists (CPs) in both the individual patient care and population health arenas. This role extension has the potential to contribute to improving health outcomes and reducing health disparities.

Aims. To understand current developments in community pharmacy services in NZ including the extent to which the expansion of roles is successfully occurring and what the enablers or barriers to this progress might be.

Methods. Forty semi-structured, audio-recorded interviews, conducted face-to-face or by telephone, were undertaken with a diverse range of pharmacists (n=41) from across the country in 2018. Interviews were transcribed verbatim, coded and analysed using a thematic approach.

Results. Data identified a range of factors influencing the extended services offered by participants. These were: perceptions of personal benefit (job satisfaction, commercial gain), and benefits for, firstly, the pharmacy profession (raising profile among consumers of the potential role of pharmacists) and, secondly, the wider community (reducing pressure on general practitioner appointments, contributing to population health, improving service-user well-being and health outcomes). While these factors transcended individual services, others were more specific to a particular extended role (e.g. the availability of contracts in the local geographical area affecting delivery of the national anticoagulant management service; proximity to a general practice influencing whether vaccination services are offered).

Discussion. Following a series of key informant interviews with primary care sector stakeholders and an e-survey of CPs, this is the third stage of a larger study exploring the contexts in which changes in community pharmacy services in NZ are occurring, the health and health service outcomes that are expected to result and the mechanisms producing change. The study findings to-date will be explored in greater contextual depth through community pharmacy case studies in the next phase of the research.

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To determine the knowledge of community pharmacy clients regarding mental health and mental health support services.

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Introduction. Mental health is one of Australia's national health priorities[1] with nearly half (45%) of adults likely to experience mental illness[2]. However, mental illness is still frequently misunderstood. The capacity of community pharmacists to be more active in this domain through educating and supporting clients has not been well explored.

Aims. To gain an understanding of community pharmacy clients' knowledge of mental illness and mental health promotion and to explore their perceptions of pharmacists' role in this sphere.

Methods. Face-to-face interviews were conducted with clients of three community pharmacies in metropolitan Adelaide (June to August 2019), with prior screening based on lack of dispensing history of "psych meds". Eligibility for interview was confirmed if no history of mental illness and no current involvement in care of a mentally ill person.

Results. A total of 161 pharmacy clients were interviewed. Average age of respondents was 70.6 years (25 to 92), with equal number of males and females. Sixty-two percent (n=100) believed that mental ill health is negatively perceived in the community, largely due to lack of education. However, others noted that instances such as celebrities speaking personally of mental illness supports a positive image. Respondents volunteered such as "withdrawn', "mood swings" and "a false front" as depression symptoms, but many did not recognise "weight loss"/"decreased appetite". Only those with previous familiarity with mental illness concurred with listed DSM V criteria. There was strong awareness of mental health promotion initiatives such as BeyondBlue but little personal involvement. Pharmacists' role in medication support was valued but there was scepticism of their current or potential role in mental health promotion.

Discussion. There is still stigma and misunderstanding of mental illness despite high profile campaigns and celebrity endorsement. Greater effort would need to be directed if pharmacists are to engage in mental health promotion.

1 Australian Bureau of Statistics (ABS) 2007, Cat. No. 3303.0, Canberra.

2 Australian Bureau of Statistics (ABS) 2007, Cat.No 4326.0, Canberra.

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Debate: Social vs technical sciences – which should be increased in our curricula?

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Our students are living the exciting era of massive opened information and technologies accessed and shared like never before! There is no argument about the ongoing need to reformulate and enhance our curricula to keep up with time and adequately prepare our undergraduates for job readiness. Contemporary undergraduate pharmaceutical education curricula are designed to provide students with technical (enabling) scientific fundamentals and applications, professional skills, values and behaviours necessary for their future career directions. In this debate, our esteemed educators will share their preferred views and opinions on which curricula components: professional skills vs. technical sciences should we increase in teaching our students to be future job-ready in their chosen professions of pharmacy and/or pharmaceutical sciences.

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Symposium 3: Pharmaceutical Science education – preparing students for beyond 2030

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Educators working closely with health practitioners, scientists and students to create curricular that better align with the demands of the 21st century workplace.

This symposium will bring together presenters who are working in pharmacy and pharmaceutical science education to discuss transformative curricular change. Graduate outcomes are the focus of the symposium – student-centred innovations that facilitate deep learning and the attainment of specific and demonstrable skills.

Given the market challenges and difficulties for hands on practical experiences throughout the course, technology to simulate these learnings in the classroom is important. Sufficient exposure to simulated experiential learning is crucial for both the social and professional context. Use of technology to simulate experiential learning in the classroom will allow students to build knowledge, improve cognitive proficiency and develop professional values and attitudes to ultimately achieve better health outcomes.

Participants will work together to discuss evidence-based ways to produce graduate pharmacists and pharmaceutical scientists with more effective skill sets and the ability to engender better health outcomes.

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Symposium 4: Social accountability as a framework for achieving better health outcomes

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In recent years, public safety has emerged as a core driver of health professional education and practice. While public safety is critical to the provision of optimal health outcomes, it focuses on harm prevention, and risks underplaying the importance of health professionals as advocates and actors in improving health care. Social accountability, a key element of the FIP needs-based pharmacy education model[1], has been proposed by the Australian Pharmacy Council as the underpinning principle for accreditation of pharmacy education programs. Social accountability encompasses the willingness and ability of pharmacists to deliver culturally safe and responsive person-centred care and assume responsibility for their decisions and actions, together with the obligation of education providers to deliver programs which promote the development of socially accountable practitioners. This symposium will demonstrate the superiority of social accountability in promoting the development of a pharmacy workforce which is not only capable of practising in the contemporary environment but also of adapting to meet emerging and as-yet unknown scopes of practice. It will also specifically outline four key areas where social accountability focuses on service of the community and individuals, in addition to preventing or minimising harms, in order to promote enhanced health outcomes.

[1]International Pharmaceutical Federation (FIP) (2014). Quality assurance of pharmacy education: the FIP Global Framework. 2nd edition. Accessed 05-Apr-18 at http://www.fip.org/files/fip/PharmacyEducation/Quality_Assurance/QA_Framework_2nd_Edition_online_version.pdf

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Ciprofloxacin nanocrystals liposomal powders for controlled drug release via inhalation

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Dry powder of Liposomal Ciprofloxacin Nanocrystals

Liposomes encapsulating ciprofloxacin nanocrystals
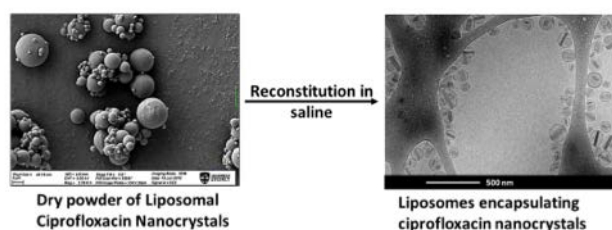
Introduction. In the past two decades, different inhaled antibiotics formulations were investigated for treating lung infections in cystic fibrosis patients.

Aims. This study was conducted to evaluate the feasibility of developing inhalable dry powders of liposomal encapsulated ciprofloxacin nanocrystals (LECN) for controlled drug release.

Methods. Dry powders of LECN were produced by freeze-thaw followed by spray drying. The formulations contained sucrose as a lyoprotectant in different weight ratios (0.75:1, 1:1 and 2:1 sucrose to lipids), along with 2% magnesium stearate and 5% isoleucine as aerosolization enhancers. The powder physical properties (particle size, morphology, crystallinity, moisture content), in vitro aerosolization performance, drug encapsulation efficiency and in vitro drug release were investigated.

Results. The spray dried powders were comprised of spherical particles with a median diameter of 1 μm, partially crystalline, with a low water content (2% mass) and did not undergo recrystallization at high relative humidity. When dispersed by an Osmohaler® inhaler at 100 L/min, the powders showed a high aerosol performance

with a fine particle fraction (% wt. <5 μm) of 66–70%. After reconstitution of the powders in saline, ciprofloxacin nanocrystals were confirmed by cryo-electron microscopy. The drug encapsulation efficiency of the reconstituted liposomes was 71–79% compared with the stock liquid formulation. Of the three formulations, the one containing a sucrose to lipids wt. ratio of 2:1 demonstrated a prolonged release of ciprofloxacin from the liposomes.

Discussion. ciprofloxacin nanocrystal liposomal powders were prepared that were suitable for inhalation aerosol delivery and controlled drug release.

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Identification of suitable polymorphic forms of rifampicin for inhaled high dose delivery

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Introduction. Rifampicin is a first-line agent used to treat tuberculosis (TB) infection, which mostly affects the lungs but also affects other organs of the body. While drug targeting to the bacterial lesions in the lung remains a challenge, the maximum recommended oral dose of rifampicin is 10 mg/kg or 600 mg per day due to the possibility of systemic toxicity. Inhaled delivery of rifampicin powder has the potential to achieve a high concentration in the lungs and the blood at a lower dose. However, rifampicin exists in several polymorphic forms that have different solubility, dissolution and bioavailability. Therefore, it is important to study the differences between such polymorphs which may have different biological responses after inhaled delivery.

Aims. To characterize inhalable powder formulations of RIF polymorphs for their solid-state properties, in vitro aerosolization, aerosolization stability and dissolution and to evaluate their in vivo safety in rats.

Methods. Rifampicin powder formulations, prepared by spray drying and crystallization, were characterized for their solid state properties, in vitro aerosolization, aerosolization stability and dissolution. Safety to rat liver and lungs of selected formulations were evaluated by comparing serum alanine aminotransferase levels and lung histopathology respectively for intra-tracheal and orally administered groups.

Results. An amorphous, one dihydrate and two pentahydrate forms of inhalable rifampicin were prepared. All powder formulations had particle size smaller than 3.8 μm. The amorphous form showed highest aerosolization efficiency with fine particle fraction (FPF) of 73.6% while that of the crystalline forms was in the range of 48.0-55.2%. All formulations showed good aerosolization stability when stored at 15% and 53% relative humidity for 3 months. The amorphous and dihydrate forms showed rapid dissolution profiles compared to the pentahydrate forms of inhaled rifampicin. The amorphous form, after intra-tracheal administration to rats, was safe and led to significantly higher rifampicin concentration in plasma compared to the oral group.

Discussion. The amorphous and crystalline dihydrate forms are promising inhalable powder formulations of rifampicin for effective treatment of TB, based on their aerosolization efficiency, storage stability and safety in rats.

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Studies on the activity of nicotine-loaded chitosan nanoparticulate dry powder inhaler formulation

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Introduction. Currently available dosage forms for the management of nicotine addiction are inefficient due to the substantial required dose or serious withdrawal symptoms. Inhalation is an efficient therapy method which delivers drugs directly into deep lungs for systemic effect in short period of time.

Aim. To develop nicotine nanoparticles as dry powder inhaler (DPI) formulation for behaviour test in mice.

Methods. Nicotine hydrogen tartrate (NHT)-loaded chitosan nanoparticles were prepared using a W/O emulsion method and characterized using SEM, TEM, Mastersizer. Using a twin stage impinger (TSI) the aerosolization properties were determined. In vivo locomotor test (n=8 each group) in the photocell activity chambers was applied to evaluate the efficiency of nicotine nanoparticles compared with NHT by injection, and saline injection was as control.

Results and Discussion. The prepared nanoparticles were produced FPF of 30.6%, which is comparable to currently available DPI products. The drug rapidly released from the nanoparticles initially due to the rapid dissolution of surface adhered/entrapped drug, and gradually became slower because of the penetration of the PBS release medium into the nanoparticles and dissolution of the entrapped drug. The maximum cumulative release was found to be around 70% in 7 days. A dose-related response to nicotine was observed from locomotor activity test from injection, with a longest travelled distance seen at the dose of 0.5 mg/kg on NHT and nicotine nanoparticles, in comparison to saline control groups (P<0.05), indicating the greatest stimulation was produced at such dose. The higher dose caused hypoactive effects for mice confirmed by travelling a shorter total distance.

Conclusion. The prepared nicotine-loaded chitosan nanoparticles can achieve prolonged release of nicotine from nanoparticulate DPI formulations. The outcomes from mice locomotor activity test confirmed that the novel nicotine nanoparticles were active and comparable to injectable dosage form.

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Meropenem plus ciprofloxacin combination dosage regimens against Pseudomonas aeruginosa for critically-ill patients with altered pharmacokinetics via mechanism-based modelling and the dynamic hollow fibre infection model

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Introduction. Pseudomonas aeruginosa (Pa) infections represent a severe public health problem, leading to significantly high mortality rates. Suboptimal antibiotic concentrations at target sites can contribute to treatment failure with renally excreted antibiotics in critically-ill patients with augmented renal clearance (ARC).

Aims. To evaluate synergistic killing and resistance suppression for clinically relevant dosage regimens of meropenem (MER) and ciprofloxacin (CIP) against Pa in critically-ill patients with ARC (CL$_{CR}$ 250mL/min).

Methods. In vitro static-concentration time-kill (SCTK) experiments for MER and CIP alone and in combinations were investigated against a Pa isolate from a critically-ill patient. Mechanism-based modelling (MBM) using SCTK data and in silico simulations for different clinically relevant dosage regimens were conducted. Promising combination regimens were evaluated in a 10-day dynamic hollow fibre infection model (HFIM) simulating ARC. Total and resistant bacterial counts were determined and modelled based on the developed SCTK MBM.

Results. All CIP monotherapies in SCTK achieved >3log$_{10}$ CFU/mL killing in the first 5h followed by regrowth close to control counts by 72h. All combinations achieved >5log$_{10}$ synergistic killing and suppressed regrowth to <1log$_{10}$ over 72h. MBM indicated substantial subpopulation synergy. In silico simulations of clinical regimens predicted regrowth for all monotherapies and synergistic bacterial killing with regrowth suppression for combination regimens in ARC. HFIM results agreed well with the in silico predictions.

Discussion. SCTK data were successfully translated and validated in the HFIM via MBM. For the pharmacokinetics of critically-ill patients with ARC, approved regimens of MER and CIP in combination were required to suppress regrowth and resistance over 10 days. These combination regimens are highly promising for improved clinical effectiveness.

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Synergistic ceftazidime plus tobramycin combination dosage regimens against hypermutable Pseudomonas aeruginosa

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Introduction. Hypermutable strains of Pseudomonas aeruginosa are increasingly recognised as a major problem for antimicrobial therapy, especially in chronic respiratory infections of patients with cystic fibrosis (CF).

Aims. To characterise bacterial killing and the emergence of resistance of hypermutable P. aeruginosa for different dosage regimens of ceftazidime (CAZ) and tobramycin (TOB), in monotherapy and combinations.

Methods. A dynamic in vitro model (IVM) was used to examine the PAO mutS laboratory strain and clinical CF isolates CW8 (Figure) and CW30. The IVM simulated concentration-time profiles occurring in epithelial lining fluid (ELF) following administration of CAZ (3 and 9g daily intravenously via continuous infusion), TOB (5 and 10 mg/kg daily intravenously via 30min infusion 24-hourly; half-life, 3.5h), and their combinations. Time-courses of total and less-susceptible bacterial populations were determined. Mechanism-based mathematical modelling was performed.

Results. In the IVM, CAZ and TOB monotherapies provided some initial killing, however regrowth with resistance occurred by 72h. Against the clinical isolates, all combinations tested provided extensive initial killing (up to ~6 log$_{10}$ killing), synergistic killing from 24 h onwards and suppression of regrowth and resistance to below ~3.5 log$_{10}$ CFU/mL over 72 h. For PAO mutS, the highest daily doses of both CAZ (9 g/day, CI) and TOB (10 mg/kg) were required for suppression of regrowth over 72 h.

Discussion. Clinically relevant ELF concentration-time profiles of CAZ and TOB in combination substantially enhanced bacterial killing and prevented or reduced emergence of resistance against three hypermutable strains of P. aeruginosa.

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Fluorescent Enzyme Substrates for the Rapid Detection of Pathogenic Bacteria

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Introduction. Antimicrobial resistance (AMR) is a significant global health issue with the potential to completely alter the landscape of modern medicine. Emphasis is now being placed on the development of rapid diagnostics to inform antibacterial prescriptions and reduce the growing AMR burden. Fluorogenic media have been widely utilised for bacterial detection due to their high sensitivity and specificity, rapid turnaround time, ease of interpretation of results, and relatively low cost.

Aims. This study aimed to design novel fluorescent substrates specific for enzymes expressed by ESKAPE pathogens to aid in their rapid detection in clinical samples.

Methods. Enzyme substrate probes were synthesised by combining an enzyme-targeting amino acid with a fluorogen via a self-immolative linker molecule. The probes were then incorporated into solid or liquid media, which was inoculated with the bacterium of interest.

Results. Using MacConkey media supplemented with one such probe (Figure 1) we have been able to differentiate K. pneumoniae from other coliform bacteria, with positive (PPV) and negative (NPV) predictive values of 92 and 95%, respectively.

Discussion. Fluorescent bacterial detection is able to overcome the challenges of time, cost, sensitivity and specificity associated with traditional diagnostic platforms. Initial in vivo testing of the synthesised substrates showed promising sensitivity and specificity for the detection of K. pneumoniae. Further testing should be conducted against a wider range of pathogens to validate the method before clinical comparison to currently employed bacterial detection methods.

[1]   S. Reali, et al., RSC Advances, 2019, 9, 21486-21497

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A systematic review on 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.

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Validation and Implementation of a National Survey to Assess Antimicrobial Stewardship Awareness, Practices and Perceptions amongst Community Pharmacists of Australia

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Introduction: Antimicrobial stewardship (AMS) programs are well established in hospitals, yet such programs have not been widely implemented in the community. Understanding of the current practices and perceptions of community pharmacists about AMS may provide insights into the implementation of AMS in community pharmacies. Aims: To validate a questionnaire to measure community pharmacists' perceptions of AMS, and to explore barriers and facilitators of their involvement in community-based AMS initiatives. Methods: A 44-item survey questionnaire, comprising sections on demographics, AMS practices and perceptions of community pharmacists, and barriers and facilitators to AMS, was hosted online. Community pharmacists were recruited through social media pages of community pharmacist groups across Australia. Cronbach's alpha and exploratory factor analysis were used to measure the reliability and validity of the survey tool, respectively. Results: Three hundred and thirty community pharmacists started the survey, with 255 of them completing at least one or more questions. Pharmacists were more likely to contact General Practitioners (GP) (80% of the time or above) to make interventions regarding allergies, dosing and drug-interactions and less likely if they felt the choice of antibiotic was inappropriate (45%). Major barriers limiting pharmacists' participation in AMS were lack of access to patient's data (83.%) and lack of access to a standard guideline to implement AMS programs (72%). Almost all pharmacists (98%) reported that better collaboration with GPs will improve their participation in AMS. Discussion: The best AMS practices for community pharmacy in Australia, like in many other countries, are not yet defined; our study provides an insight into the practices, perceptions and awareness of community pharmacists regarding AMS that can help overcome challenges to the implementation of an effective AMS model in the community. Most of the perceptions of community pharmacists are towards changing the professional behaviours and systems for effective AMS activities. Organisations interested in AMS initiatives in community settings should consider addressing the barriers identified in the study so that community pharmacists can be engaged in such initiatives in a meaningful way.

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"Overloaded with information": A qualitative study on health information consumers with chronic disease

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Introduction. The enormous and growing amount of health information available, especially online, has exacerbated the issue of health information overload (HIO). Consumers who need lifelong management can be at risk of HIO while they search for, or deal with, a large volume of potentially conflicting or complicated health information from multiple sources. This study represents the initial exploratory phase of a mixed-method study to develop a fundamental understanding of HIO, and its potential causes and consequences, in consumers with chronic health conditions.

Aims. This research aimed to explore consumers' perceptions and experiences with HIO in the context of the management of type 2 diabetes and/or heart disease.

Methods. Semi-structured interviews were conducted with adults who had type 2 diabetes, heart disease or both, and had experienced HIO related to their disease management. Interviewing participants continued until we reached data saturation. The interviews were audio-recorded, transcribed verbatim and analysed thematically using the framework method of analysis.

Results. Outcomes of the fourteen interviews (female n=8 and male n=6) were summarised into three main themes, reflecting: 1) factors responsible for experiencing HIO, such as the quality of health consultation, amount and sources of information, and individual characteristics; 2) consequences that were manifested as negative psychological impacts, withdrawal behaviour toward health information and confusion; and 3) strategies managing HIO that included theoretical suggestions and actual coping strategies. The themes revolved around three basic virtues: health system, information nature and context, and consumers; for example, the focus on consumers was exhibited as personal factors (causes of HIO theme), psychological impacts (consequences), and coping strategies (management).

Discussion. Our findings will help in providing deep insights about the experience of HIO from the consumers' perspective, and facilitating the development of a national survey to identify the prevalence and predictors of HIO in such consumers.

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Public feedback on the Australasian Integrative Medicine Association Guiding Principles for Letter Writing: a mixed-methods study

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Introduction. Interprofessional communication (IPC) between healthcare practitioners (HCP) can optimise the safe delivery of patient-centred care. In response to calls from HCP, the Australasian Integrative Medicine Association (AIMA) established an interdisciplinary working group to develop an IPC Guiding Principles for Letter Writing that included letter templates for medical practitioners, pharmacists, nurses, allied health and complementary medicine practitioners. Development included stakeholder consultation on the draft document.

Aims. This study aimed to analyse the public consultation feedback; explore respondents' attitudes towards, and perceptions of IPC; and ascertain HCP needs and preferences for further education.

Methods. A mixed-methods study design was used to analyse the results from an online public consultation survey and paper questionnaires from AIMA IPC workshop participants. Quantitative and qualitative data from the two datasets were merged utilising the principles of triangulation to identify meta-themes.

Results. The 117 respondents (64 from the public consultation survey and 53 workshop participants) were representative of the Australian health care sectors and the lay community. Respondents strongly agreed that formal communication, such as letters of correspondence, between HCP is important (n=96/117; 82%), the content presented in the guiding principles document or workshop was informative (n=61/117; 52%) and easy to understand (n=49/117; 42%), and the letter templates were relevant to clinical practice (n=56/117; 48%). The key themes relating to IPC were the importance of continuity of care, clarity of communication, professionalism and ongoing education. Results from the two samples were congruent with no significant statistical nor qualitative differences identified.

Discussion. The AIMA IPC Guiding Principles for Letter Writing document was deemed valuable to HCP. Feedback from respondents will be used to revise the document prior to AIMA endorsement. The findings highlight the role of formal communication pathways in providing multidisciplinary care that is safe, coordinated, and patient centred, and the need for further IPC training and education.

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Education and training programs equipping pharmacists to enter into a General Practice setting – A systematic review

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Introduction. Internationally pharmacists are increasingly being integrated into primary health care settings as part of General Practice teams. Literature posits that pharmacists require additional skills and training in order to optimally perform the role.

Aims. To explore the available education and training designed to develop pharmacists' knowledge or skills to enable them to work in a General Practice setting.

Methods. Following the PRISMA guidelines, a systematic review was conducted using the following databases: EMBASE, MEDLINE, Scopus, Web of Science, CINHAL, IPA and ERIC. Research articles published in the English language without any other limitations placed on methodology or dates were deemed eligible for inclusion. The Mixed Methods Appraisal Tool (MMAT) was used to assess the quality of the studies.

Results. A total of 4871 articles were identified. After duplicates were removed and screening, 7 articles (5 qualitative and 2 quantitative descriptive studies) were identified and included. One study did not pass the screening question of the MMAT, one had a risk of self-reporting bias and one was not clear if the findings were adequately derived from the data. All other articles addressed the methodological quality assessment of the MMAT. Education content, setting, contact time and methods of assessment varied across all studies. A combination of work and classroom-based education provided by general practitioners and pharmacists already working in primary care is deemed as most beneficial in providing pharmacists an opportunity to place theory learnt in the classroom into context.

Discussion. There is paucity of published literature relating to the development and evaluation of education programs available for training pharmacists for the skills required to work in General Practice environments. The results of this study suggest that future training should concentrate on specific disease states, extended consultation skills, collaboration and liaison, medication management patient examination, care provision, drug information and education, coupled with systematic debriefing sessions at the cessation of the training course.

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Integrating Science and Practice (iSAP): A clinical decision-making program for pharmacy students

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Introduction. Integrating Science and Practice (iSAP) is an online learning tool designed by Monash University to assist students in various health science degrees (Williams et al, 2017). An iSAP case involves giving students a case scenario and professional issues and resources for them to create a clinical action plan. Following submission, students have access to an expert/practitioner response and write a comparative/reflective report.

Aims. To investigate: 1) How management plans for patients created by 3rd year pharmacy students vary compared to expert practitioners, and 2) How well these students self-assess their performance after viewing an expert response and how this relates to the performance on subsequent assessment tasks.

Methods. Participants: 3rd year pharmacy cohort, pilot study (n=30). Quantitative and qualitative methods used.

Results. Regarding management plans of students, they performed best on identifying medication related problems (MRPs) and prioritising MRPs. Students scored worst on developing monitoring and follow up plans for patients. Prioritising MRPs and providing a rationale for recommendations were areas students were poorest at self-assessing. Poorer performing students that were accurate self-assessors did better on exam questions than poorer performing students that were also poor at self-assessing. Accurate self-assessing had not impact on performance of better performing students.

Discussion. Pilot results suggests students are better at identifying and prioritising MRPs than creating monitoring and follow-up plans for patients. Being able to accurately self-assess is particularly important in order for students that do not perform well on assessments to help improve their clinical decision-making skills.

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Educating and assessing an integrated curriculum in Pharmacy

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Introduction. With the paradigm shift in a pharmacist's role from drug-focussed to patient-focussed, curricular integration is increasingly popular in pharmacy education as an approach to connect between theory and practice. Integrated curricula appear to be delivered in a variety of formats across pharmacy schools in Australia. However, little research has been conducted to explore this new way of curriculum design.

Aims. To explore the current implementation of integrated curricula in pharmacy schools across Australia, to better inform future pharmacy curriculum reviews.

Methods. Invitation emails were sent to the Head of School and/or Deputy Head of Pharmacy Teaching of 17 pharmacy schools in Australia. Semi-structured interviews were conducted either in person, via telephone call, video call or email correspondence with one to two nominated academics per pharmacy school. The interviews were audio recorded, where possible and transcribed verbatim. The interview transcripts were entered into NVIVO 12 which facilitated the process of thematic analysis.

Results. Out of the 17 pharmacy schools invited to participate, 15 academics representing 13 institutions were interviewed. Themes emerged include: various models of integration, complexity of the process of integration, application of knowledge in context, perception of diminishing depth of science, and recommendations for the future.

Discussion. Various models of integration exist within the pharmacy programs in Australia, however there is a lack of objective evidence to assess the models. Despite this, integrated courses have been widely implemented in pharmacy schools. Most academics believe that the integration of science and practice can improve students' ability to apply their knowledge in context, provided that the integrated curriculum is well-designed. However, the process of developing and sustaining an integrated curriculum is thought to be much more complex than that of a discipline-based curriculum. A recommendation for the future includes having two coordinators, one each from the science and pharmacy practice disciplines for each integrated unit of study, in order to address the challenge of potential imbalance between science and practice. Another suggestion is to make sure assessments are always integrated and aligned with the integrated content.

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A comparison of pharmacist competency frameworks to competency frameworks of other health professionals engaged in health coaching.

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Introduction. In recent times pharmacists' roles have shifted from drug distribution to the provision of health promotion and management services such as health coaching. A systematic review was done to evaluate the competencies of primary health care professionals who have successfully engaged in health coaching. The traditional competency frameworks for coaches established by the International Coaching Federation (ICF) and the European Mentoring and Coaching Council (EMCC) fail to consider the differences in expertise required amongst the diverse professions that carry out coaching. Therefore, specifically of interest to the pharmacy profession, it is important to confirm that competency frameworks for pharmacists support the role of pharmacists as health coaches.

Aims. To identify competencies of health professionals engaged in health coaching, and to determine if pharmacist competency frameworks encompass competencies required to health coach.

Methods. Databases were searched to identify scholarly papers on competencies of health professionals engaged in health coaching. The enabling competencies of health coaches were subsequently compared to the competency frameworks of pharmacists from Australia (AUS), Canada (CAN), New Zealand (NZ), the United Kingdom (UK) and the United States of America (USA).

Results. Nine key competencies enabling health coaching were identified. Comparisons of the health coaching competencies to the competencies established by the ICF and EMCC showed considerable overlap. The pharmacist competency frameworks from AUS, CAN and NZ all lacked one health coaching competency; "demonstrates confidence", while pharmacists from both the UK and the USA included all the identified health coaching competencies.

Discussion. The nine key competencies specific to the practice of health coaching align with the competencies established by the ICF and EMCC. The identification of competencies specific to health coaches paves the way for health coach training programs tailored specifically to health professionals, and to the increased uptake of health coaching by health professionals and consequently improved health outcomes for patients.

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Intra-articular injection of macromolecular immunotherapy drugs is a novel method to target the lymphatics that drain inflamed joints

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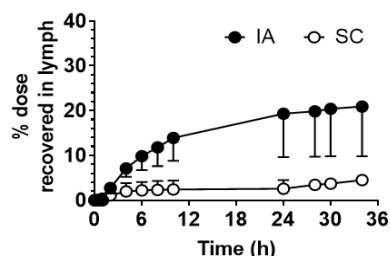
Introduction. Clinical outcomes for patients with inflammatory arthritis have greatly improved with the use of immunotherapy. However, some patients remain refractory and many experience side effects. Recent reports have indicated lymphatic involvement in arthritis. The lymphatics disseminate immune cells and are a site for immune activation. The lymphatics also clear fluid, immune cells and pro-inflammatory molecules from the joint. In arthritis, joint inflammation is exacerbated by impaired lymph vessel pumping and lymph node clogging.

Aims. Delivery of immuno- and lymph- modulating therapeutics to the lymphatics is desirable to target lymph-resident inflammatory cells, improve lymphatic function and potentially reduce side effects. In this study, we determined the potential to target macromolecular immunotherapy drugs to the joint-draining lymphatics by intra-articular (IA) or subcutaneous (SC) injection at or near the knee joint.

Methods. Immunotherapy drugs etanercept (anti-TNF) and rituximab (anti-CD20) were administered to male rats via intravenous, IA or SC injection at or near the knee joint. Serial plasma and lymph samples were collected from carotid artery and thoracic lymph duct cannulas. Drug concentrations were measured by ELISA.

Results. A substantial proportion of the etanercept and rituximab (~20%) dose were transported directly via the lymphatics after IA administration compared to SC (~5%). Plasma, lymph and draining lymph node concentrations, and absorption rate of the drugs were increased after IA versus SC injection.

Discussion. Lymphatic uptake of macromolecular immune-modulating drugs from the IA space may be more efficient compared to SC due to fewer barriers to diffusion and greater density of capillaries. IA injection therefore represents a novel mode of administration to target these treatments to the joint-draining lymphatics.

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Variation in plasma levels of glucosamine with chronic dosing: a possible reason for inconsistent clinical outcomes in osteoarthritis

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Introduction. Glucosamine, a primary component of cartilage, is widely used by patients with osteoarthritis (OA) to provide symptomatic relief, as well as to delay disease progression. However, clinical studies have reported inconsistent clinical outcomes. The current study hypothesised that the reported inconsistent clinical results could, in part, be due to variable bioavailability and elimination of glucosamine.

Aims. To determine steady-state plasma concentrations ($C_{ss\ min}$) of glucosamine in OA patients taking the supplement, to examine the variability among patients.

Methods. A total of 91 patients with OA (aged 42-89 years), who had been taking glucosamine (750 or 1500 mg/day) for at least one week, were recruited (70% were females). Blood samples were collected 24 hours after the ingestion of the previous dose of glucosamine to determine Observed $C_{ss\ min}$ (exogenous [Actual $C_{ss\ min}$] + endogenous [$GlcN_{end}$] glucosamine plasma concentration) and after a 5-day washout period to determine the $GlcN_{end}$. The plasma levels of glucosamine were determined using a newly-developed High-Performance Liquid Chromatography method. The Actual $C_{ss\ min}$ was calculated using the following equation: Actual $C_{ss\ min}$ = Observed $C_{ss\ min}$ – $GlcN_{end}$.

Results. There was a substantial (106-fold) variation, with a 45% coefficient of variation, between the Actual $C_{ss\ min}$ levels (3-320 ng/mL) in participants. No significant correlation of Actual $C_{ss\ min}$ was observed with standardised daily glucosamine dose (5-29 mg/Kg/day) or age, and there was no significant difference in Actual $C_{ss\ min}$ across genders, the two salts of glucosamine (hydrochloride and sulphate) or different brands.

Discussion. There was high variability in steady-state plasma concentrations of glucosamine with chronic dosing in patients with OA. No significant association was found between the levels and various dosing- and patient-related variables. The observed high variability could be due to inter-patient differences in the absorption and elimination of glucosamine. Therefore, the results support our hypothesis that variability in the pharmacokinetics of glucosamine could be a cause for inconsistent clinical outcomes in patients with OA.

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Pioglitazone increases blood-brain barrier expression of fatty acid-binding protein 5 and docosahexaenoic acid trafficking into the brain

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Introduction. Brain levels of docosahexaenoic acid (DHA), an essential cognitively-beneficial fatty acid, are reduced in Alzheimer's disease (AD). It was previously demonstrated in an AD mouse model that this is associated with reduced blood-brain barrier (BBB) transport of DHA and lower expression of the key DHA-trafficking protein, fatty acid-binding protein 5 (FABP5).

Aims. This study focused on assessing the impact of activating peroxisome proliferator-activated receptor-gamma (PPAR) on FABP5 expression and function at the BBB.

Methods. Using immortalised human brain endothelial (hCMEC/D3) cells as an in vitro model, the effect of three different PPAR agonists on FABP5 protein and mRNA expression, as well as FABP5 function were investigated. Using the most effective PPAR agonist, pioglitazone, the effect of this agonist on FABP5 protein expression and function was further studied using an in vivo model, male C57BL/6J mice.

Results. A 72 hour treatment with the PPAR agonists rosiglitazone, pioglitazone, and troglitazone increased FABP5 protein expression by 1.15-, 1.17-, and 1.23-fold in hCMEC/D3 cells, respectively, with rosiglitazone and pioglitazone also increasing mRNA expression of FABP5. In line with an increase in FABP5 expression, pioglitazone increased ^{14}C-DHA uptake into hCMEC/D3 cells 1.20- to 1.33-fold over a 2 minute period, and this was not associated with increased expression of membrane transporters involved in DHA uptake. Furthermore, treating male C57BL/6J mice with pioglitazone led to a 1.79-fold increase in BBB transport of ^{14}C-DHA over 1 minute, using an in situ transcardiac perfusion technique, which was associated with a 1.82-fold increase in brain microvascular FABP5 expression.

Discussion. Overall, this study demonstrated that PPAR can regulate FABP5 at the BBB and facilitate DHA transport across the BBB, important in restoring brain levels of DHA in AD.

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Real-world consumers' questions and concerns on DMARDs: a retrospective analysis of calls to a medicine call centre

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Introduction. Disease modifying anti-rheumatic drugs (DMARDs) have revolutionised the treatment of numerous autoimmune diseases. Previous literature suggested their use may generate patients' information gaps or concerns related to their perceived aggressive and harmful nature.

Aims. To understand real-world patients' information needs and concerns related to the use of DMARDs.

Methods. This was a quantitative analysis of DMARDs-related calls and a comparison with rest of calls (ROC). A comparison of callers and patients' demographics, enquiry types and callers' motivations between DMARD calls and ROC was performed using a t-test for continuous data and a chi-square test for categorical data. A thematic analysis was performed on electronically available questions.

Results. There were 1,547 calls involving at least one DMARD. The top three enquiry types involved questions about medicines safety: side-effects, interactions, and risk/benefit ratio. These constituted 55.6% of all enquiries and were significantly higher than in ROC (41.6%). The major consumers' motivations to information-seek were largely independent of medicines type: inadequate information, need of a second-opinion, and concern about a worrying symptom. The overarching themes emerging from the thematic analysis were: seeking clarification on potential side effect or reassurance on the use of a specified DMARD (24%), seeking information on potential interactions (23%), seeking information on a specific DMARD (19%), and seeking a therapeutic strategy (17%).

Discussion. This study demonstrates that consumers have many unanswered questions and considerable uncertainty regarding their DMARDs.

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Do deprescribing interventions improve quality of life and prevent death acceleration in elderly with life-limiting illness and limited life expectancy?

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Introduction. Elderly people with life-limiting illness (LLI) and limited life expectancy (LLE) are frequently prescribed medicines that are potentially inappropriate which are continued even in the last few months of their life. This is often associated with poor health outcomes including reduced quality of life and accelerated death. Therefore, it is essential to withdraw or reduce the dose of inappropriate medicine under the supervision of a health care professional, a process called deprescribing.

Aims. To investigate changes in quality of life and death acceleration after deprescribing interventions in elderly with LLI and LLE.

Methods. A systematic review was conducted; targeting studies on deprescribing interventions and their impact on the quality of life and death acceleration in participants aged ≥65 years with LLI and LLE; using PubMed, EMBASE, Cumulative Index to Nursing and Allied Health Literature, PsycINFO and Google Scholar; from inception to February 2019. Any significant decrease ($p<0.05$) or no significant change ($p≥0.05$) in the mortality after the intervention was considered as not accelerating death. The comparison was usual care or any head-to-head intervention. Eligibility, data extraction and quality assessment were independently performed by two reviewers followed by a narrative synthesis of data.

Results. Three studies with a total of 666 participants, comprising of two randomised controlled trials and one quasi-experimental study reported on mortality (n=3) and quality of life (n=2). The findings revealed that, there is generally a decline in mortality after intervention (I) when assessed at 12 months and this was either significant (I: 21.0% vs C: 45.0%, $p<0.001$) or not different to the control (C) (I: 26% vs C: 40%, $p=0.16$; I: 23.8% vs C: 20.3%, $p=0.36$ at 60 days), and quality of life scores were inconsistent (I: 32.0 vs C: 31.0, $p=0.94$; I: 7.1 vs C: 6.9, $p=0.04$).

Discussion. Our findings suggest that deprescribing interventions in elderly people with LLI and LLE do not accelerate death but the impact on the quality of life needs more clarification.

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Copper complexes modulate the expression and function of P-glycoprotein at the blood-brain barrier

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Introduction. Efflux transporters expressed on the luminal surface of brain endothelial cells act as biochemical barriers to xenobiotic insult and regulate the transport of molecules across the blood-brain barrier (BBB). P-glycoprotein (P-gp) is one of the main efflux transporters involved in the hindrance to central nervous system (CNS) drug delivery. P-gp also plays a major role in the transport of endogenous molecules such as amyloid beta (A) from the brain into the systemic circulation. The expression of P-gp is decreased in people with Alzheimer's disease (AD) which is suspected to decrease the clearance of neurotoxic A from the brain parenchyma. Biometals such as copper (Cu^{2+}), have been shown to be important for the regulation of many signalling pathways in neurons and these pathways are linked to P-gp expression. However, whether Cu^{2+} or other biometals are involved in the regulation of P-gp is yet unknown.

Aims. To increase brain endothelial levels of Cu^{2+} through the use of bis(thiosemicarbazone) (BTSC) complexes, Cu(ATSM) and Cu(GTSM), and assess the impact on P-gp expression and function at the BBB.

Methods. Expression of P-gp in immortalised human brain endothelial (hCMEC/D3) cells following treatment with 25 – 250 nM range of Cu(BTSC) for 24 hr was quantified by an optimised Western blot analysis. P-gp function was assessed with identical parameters through the uptake of a fluorescent P-gp substrate, rhodamine 123. Intracellular Cu^{2+} levels were quantified following treatment with the same parameters by inductively coupled plasma mass spectrometry (ICP-MS).

Results. Cu(ATSM) significantly enhances P-gp expression 2-fold and function by 25% at the 100 nM concentration compared to controls. Cu(GTSM) did not alter P-gp expression, however it was found to inhibit P-gp function by 30% of control. Both Cu(ATSM) and Cu(GTSM) were found to increase cytosolic Cu^{2+}. Whether the increase in Cu^{2+} attributes to biologically free or complex bound copper is yet to be determined.

Discussion. The upregulation of P-gp expression and function was unexpected as Cu(GTSM) was thought to release Cu^{2+} whereas Cu(ATSM) has previously been shown to only release Cu^{2+} under hypoxic conditions. Thus, it may indicate that P-gp expression is mediated by a Cu^{2+} independent mechanism which requires further investigation.

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Clinical Intervention Communication between Pharmacists and Prescribers in a Hospital Setting: A Scoping Review

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Introduction. Poor communication between health professionals may result in suboptimal therapy for patients. This can manifest in various ways such as prolonged patient length of stay, increased likelihood of preventable disability or death, adverse events and a reduction in patient health outcomes. To ensure that patients receive safe and high-quality healthcare, effective communication between pharmacists and prescribers is imperative. Current information on how pharmacists and prescribers communicate with one another and its implications on patient care in a hospital setting is limited.

Aims. To investigate the communication processes used for clinical interventions between pharmacists and prescribers in a hospital setting and assess its impact on the delivery of patient care and outcomes.

Methods. A scoping review (PRISMA-ScR) of literature published in English was conducted using Medline, EMBASE, CINAHL and IPA. A key term search strategy was employed using "pharmacist", "prescriber", "hospital", "communication" and "clinical intervention". Inclusion criteria were quantitative studies conducted in a hospital setting with a primary or secondary focus on communication regarding a clinical intervention with the involvement of a pharmacist and prescriber.

Results. The search strategy obtained 8832 hits, resulting in nine studies included for analysis. The communication processes explored in the nine studies included for analysis were computerized prescription order entry (CPOE) systems (n=1), smartphone application (n=1), face-to-face communication (n=1), telephone (n=2), email (n=2) and multimodal communication (n=2). There were two studies that assessed patient outcomes, one study found a 22.9% reduction in drug related problems (n=55/240) and the other study found an improvement in patient care and safety based on the pharmacist's perceptions.

Discussion. This scoping review was able to identify that there was limited evidence on the impact of communication on patient outcomes in a hospital setting. The review also demonstrated the need for additional research on multimodal communication to represent actual clinical practice as well as the contribution of affective characteristics to communication efficacy.

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A realist review of medication reviews by primary care pharmacists for patients discharged from hospital to the community

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Introduction: Medication reviews for people discharged from hospitals have shown varying results. It is unclear in which contexts, under which circumstances and for whom they may provide the most benefit.

Aims: To establish context, mechanisms and outcomes and design a program theory of how, when and why medication reviews performed by pharmacists in the community may benefit people discharged from hospital.

Method: Following RAMESES standards for realist reviews, a systematic search of multiple databases and government agencies for relevant documents describing pharmacists performing medication reviews post hospital discharge was performed. An initial realist program theory, detailing contexts and outcomes, was developed. Refinement to final program theory will be based on realist methods of establishing causation and include stakeholder consultation.

Results: The context and outcomes of medication reviews post hospital discharge can be investigated under three distinct aspects, pointing to numerous contextual factors for what makes them happen (e.g. funding, location, referrals, technology), what happens (i.e. nature of the intervention, timing, care pathways) and what happens after (e.g. follow-up, exchange, decision making/implementation). Configuration of context, interventions, mechanisms and outcomes under these domains establishes a final theory explaining causal principles of what makes medication reviews work or not.

Discussion: The initial program theory points to professional networks, models of care as potential frameworks facilitating outcomes. The explanatory power of the realist review will contribute to a deeper understanding of who, how and why someone may benefit and support the development of medication review programs, their implementation and related policy decisions.

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Adverse effects associated with increased adherence to medications.

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Introduction. Patients are often encouraged by healthcare providers to be as adherent as possible to their medications, under the pretence that as adherence increases, the better their disease state and outcomes will be. However, it is rarely asked if there are any instances wherein it is not advantageous to achieve and maintain adherence at 100%.

Aims. This systematic review was conducted to examine the current evidence regarding adverse outcomes associated with maintaining high adherence to a specific medication.

Methods. Electronic databases including EMBASE, Medline, Pubmed, PsychINFO, CINAHL, and Web of Science were used to find relevant literature. Studies examining differing levels of adherence and the subsequent development of negative outcomes were eligible for inclusion.

Results. From 43,985 studies identified, four met the inclusion criteria. The studies had to use a quantitative method to determine adherence and group patients by level of adherence. The outcome being evaluated had to have a negative impact on the patient's health or wellbeing. Specifically, the included articles revealed an increase in fractures, cancer, bleeding, and mortality in patients sustaining high levels of adherence as opposed to their less adherent counterparts.

Discussion. This systematic literature review has revealed there are instances in which maintaining high levels of adherence puts patients at increased risk of developing deleterious outcomes. Further research into investigating outcomes developed by highly adherent populations per individual medication is suggested.

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Medication prescribing quality in Australian primary care patients with chronic kidney disease

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Introduction. Drugs are commonly used in patients with chronic kidney disease (CKD) to treat an underlying cause, or prevent and manage its numerous complications and comorbidities.

Aims. This study aimed to examine the quality of prescribing in patients with CKD in Australian general practice. Methods: We evaluated Australian general practice data obtained from the NPS MedicineWise MedicineInsight dataset for patients with CKD and aged 18 years or older. We used 16 internationally validated prescribing quality indicators focused on medication need, choice and safety in patients with CKD, and we compared results for patients with and without concomitant diabetes.

Results: Among 44,259 patients with laboratory evidence of CKD stages 3-5, only 13,263 (30%) had documentation of a diagnosis of diabetes. Less than half of all patients (40.8%) with CKD stages 3-5 and aged 50 to 65 years were prescribed a statin. The use of an angiotensin-converting enzyme inhibitor (ACEI) or angiotensin receptor blocker (ARB) was higher in patients with concomitant diabetes (64.1%) compared with those without diabetes (51.5%; $P<0.001$), yet only 69.9% of the patients with diabetes and microalbuminuria were receiving an ACEI or ARB. There were 7,426 patients (16.8%) with CKD stages 3-5 potentially receiving non-steroidal anti-inflammatory drugs (NSAIDs), including 14.3% of those patients with an estimated glomerular filtration rate (eGFR) below 30 mL/min/1.73 m^2. Potentially inappropriate medication use was more common in CKD patients living in relatively disadvantaged socioeconomic areas, as well as in regional and remote areas.

Conclusions: We identified areas for possible improvement in the prescribing of preventive medications, as well as deprescribing of potentially nephrotoxic medication, in patients with CKD stages 3-5. Targets for intervention studies in Australian general practice could include the appropriate prescribing of recommended preventive medications in patients with CKD, such as an ACEI/ARB and statin, and deprescribing of NSAIDs in patients with concurrent ACEI/ARB therapy.

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Pharmacokinetic sex-differences for PEGylated-liposomal doxorubicin in cancer patients may not be observed in relatively healthy individuals: Preliminary evidence in rats

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Introduction. PEGylated liposomal doxorubicin (PLD; CaelyxÒ) is cleared faster in men with solid tumours or Kaposi's sarcoma compared to women with solid tumours and exhibits high inter-individual pharmacokinetic variability[1]. Currently however, causes of sex-based and inter-individual pharmacokinetic variability are unknown, but plasma clearance correlates in part with peripheral monocyte count, suggesting a role of the mononuclear phagocyte system.

Aims. Use the preclinical rat model to identify potential sources of pharmacokinetic variability for PLD and establish whether sex effects are a result of altered clearance of the loaded drug or liposome carrier.

Methods. Sprague-Dawley rats (8-9 weeks) were cannulated via the carotid artery, jugular vein, and/or thoracic lymph duct for serial blood sampling, IV infusion, and lymph fluid sampling respectively. Rats were given 2 mg/kg PLD IV (as doxorubicin equivalents) plus 1 µCi of ^{3}H-phosphatidylcholine labelled non-drug loaded liposome. Several potential predictive physiological and blood-based biomarkers of PLD pharmacokinetics were evaluated before dosing and plasma and urine were serially sampled over 5 days. Major organs were harvested after termination.

Results. Plasma pharmacokinetics of the drug was similar to the ^{3}H-liposome. With the exception of volume of distribution, no significant differences were found in pharmacokinetic parameters between sexes in healthy rats after accounting for body surface area, and pharmacokinetic variability was low. No biomarkers correlated significantly with plasma clearance. Reanalysis of published human data[1] in light of these results revealed that pharmacokinetic sex effects are not seen if Kaposi's sarcoma patients (who normally have HIV) are removed from the male subject cohort.

Discussion. These data suggest that reported pharmacokinetic sex effects and inter-individual variability may largely be a result of the immune status of patients, since 1) Kaposi's sarcoma patients normally have HIV, 2) peripheral monocyte count is predictive of systemic inflammation and immunological dysfunction and 3) healthy rats show less pharmacokinetic variability for PLD compared to human cancer patients.

[1] La-Beck et al (2012) Cancer Chemother Pharmacol 69:43-50

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Factors associated with the risk of falls in older patients taking opioid medications

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Introduction. The risk of falls in users of opioids is associated with frailty and is expected to be higher in older patients.

Aims. To identify the prevalence of modifiable and non-modifiable factors associated with the risk of falls amongst older patients who concurrently use opioid medications.

Methods. Patients aged ≥ 75 years admitted to the Royal Adelaide Hospital between September 2015 and August 2016 and taking ≥ 5 medications were included. From their recorded pre-admission data, Drug Burden Index (DBI), falls increasing risk medications (FIRD), orthostatic hypotension increasing risk drugs (OD) and Charlson Comorbidities Index (CCI) were calculated. Factors associated with falls were identified as modifiable (i.e. medications) or non-modifiable (i.e. morbidities). The association between a history of falls and the identified risk factors was computed using logistic regression, and the results presented as odds ratios (OR) with 95% confidence intervals (95% CI).

Results. Of the 1012 patients included, 269 (27%) were prescribed opioids. A past fall was more common in opioid users compared to non-users (26% vs 18%, $P = 0.006$) and was associated with increasing age (OR = 1.05, 95% CI 1.01 – 1.1) and a documented history of pulmonary diseases (OR = 0.5, 95% CI 0.3 – 0.97). Non-modifiable risk factors that were more common in opioid users were depression (31% vs 21%, $P = 0.003$), anxiety (23% vs 14%, $P < 0.001$) and osteoarthritis (28 % vs 17%, $P < 0.001$). Modifiable risk factors that were more common in opioid users included the number of prescribed medications (11.2 vs 8.7, $P < 0.001$), FRID (0.7 vs 0.4, $P < 0.001$) and DBI (0.5 vs 0, $P < 0.001$). Opioid users were more likely to be prescribed antidepressants (36% vs 22%, $P < 0.001$) and hypnotics (26% vs 14%, $P < 0.001$).

Discussion. Falls was more common with opioid users, and a history of falls was associated with DBI and FIRD use.

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Addressing Health Inequity: developing and delivering moxidectin for neglected tropical diseases

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Just 2% of the total research and development spend is on neglected tropical diseases, which affect 33% of the global population. Medicines Development for Global Health was formed to address this inequity through development of new medicines and vaccines for diseases of poverty. In 2018, it became the first Australian company and the first not for profit in history to register a novel medicine (moxidectin) with the US FDA, creating a new and sustainable model that is globally unique. This story is of interest to people focussed on research and on delivery of medical interventions. It will help reveal some of the effort in translating research efforts into medicines that are available for prescription.

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Symposium 5: Peptide therapeutics – challenges and opportunities to improve health outcomes

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Peptide therapeutics have been a focus of increasing research and application in medicine over the past decade. There are now >60 FDA approved peptide therapeutics on the market, and >150 in clinical trials, and this is expected to grow significantly. The main therapeutic application of peptides has been in metabolic disease and oncology, but there is also growing interest to treat autoimmune and inflammatory diseases. Peptide therapeutics are generally highly selective and efficacious, and relatively safe and well tolerated relative to small molecule therapeutics. However, challenges to their use as medicines include relatively short circulating plasma half-lifes, stability issues and suboptimal physical and chemical properties. Most peptide therapeutics are injectable but there is increasing focus on optimising the design and formulation of peptides to enable, for example, oral administration. In this symposium experts in the design, delivery and clinical application of peptides will discuss the challenges and opportunities to the utilisation of peptide therapeutics to improve patient health outcomes.

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Symposium 6: Using Pharmaceutical Benefits Scheme Data to inform practice and policy

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Pharmacy dispensing records are a widely used resource for research on medication utilisation and health outcomes. Recent research utilising the Australian Pharmaceutical Benefits Scheme (PBS) Data has provided valuable information that can be translated into clinical practice and policy. This symposium will cover some recent examples of such research, including patient adherence to asthma treatment, the patterns of opioid use and the use of contraceptives. These case studies will be delivered by pharmacy researchers with expertise in using the PBS dataset to answer key research questions. The symposium will finish on the description of novel methodologies to investigate adverse drug reactions using the PBS data. This symposium involves speakers from three universities in two states. The speakers are a mix of early and mid-career researchers and hospital clinical pharmacists.

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Evaluating the acceptability and feasibility of an ethical framework for the sale of complementary medicines

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Introduction. There is a need for clearer guidance for pharmacists regarding their responsibilities when selling complementary medicines. The investigators have developed an ethical framework that proposes five responsibilities for pharmacists supplying complementary medicines: responsibility to 1) provide evidence-based recommendations and 2) sufficient information for informed choice, 3) train staff, 4) set up the pharmacy so that consumers are offered advice when purchasing complementary medicines and 5) be vigilant for complementary medicine-related harms.

Aims. Determine the acceptability and feasibility of an ethical framework for selling complementary medicines in community pharmacy.

Methods. Australian community pharmacists were invited to participate in online focus groups and interviews. Participants were recruited via social media and the professional networks of pharmacy groups. Participants were provided the ethical framework prior to the discussion. Discussions were transcribed verbatim and analysed using inductive thematic analysis.

Results. Seventeen community pharmacists participated in four focus groups and six individual interviews. There was good representation among participants in terms of gender, years of practice, pharmacy location and script volume. Most participants adopted an evidence-based approach to complementary medicines, but differed in terms of level of active involvement in recommending complementary medicines. Most participants felt that the proposed ethical framework was acceptable but identified barriers to implementation. A small number of participants argued that requiring pharmacists to fulfil more responsibilities when selling complementary medicines compared to other providers place an unfair financial burden on pharmacies. Barriers to implementation included lack of access to high-quality resources on complementary medicines and the financial and time burden involved in training staff and implementing the framework. Strategies to overcome barriers were identified by participants.

Discussion. The framework was acceptable to the community pharmacists who participated in the study. The barriers identified to implementing the framework in practice suggest improvements to the presentation of the framework and identify several support strategies to help pharmacists implement the proposed practice changes.

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Rapid down-selection of antivirals and antiseptics against WHO priority viruses

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Introduction. Ebola has been declared a Public Health Emergency of International Concern for the second time in five years, while Nipah outbreaks occur every year around the world. During such PHEICs it is critical to provide a rapid screening platform for effective antiviral countermeasures and antiseptics.

Aims. Benchmarking performance of promising compounds using virus assays, molecular tests and toxicity assays prior to in vivo studies, e.g. Nipah virus in pigs, Ebola virus in ferrets etc.

Methods. Virucidal activity of compounds are tested by exposing viruses in suspension to increasing concentrations of antiviral/antiseptic agent, with exposure times typically ranging between 5 min and 1 hr. Virus infectivity is determined by $TCID_{50}$ assays and viral replication measured and compared over a series of time points using a real-time PCR approach. The compounds of interest are assessed for toxicity on MRC-5 or Vero cells using a colourimetric tetrazolium-based assay to detect viable cells.

Results. Selecting a compound for in vivo studies is a complex decision and involves factors such as Technology Readiness Level (TRL), cost-benefit analysis, etc., however compounds that do not demonstrate a significant reduction of viral infectivity, or are highly toxic to cells, are unlikely to progress to animal studies.

Discussion. Besides enabling rapid down-selection, these studies also provide insight into the likely mechanism of action, e.g. is the compound inhibiting virus replication or acting directly on the viral particle. As the developers of compounds ultimately aim for regulatory approval, we recommend conducting these studies under GSP (Good scientific Practice) and using the ASTM standards as recommended by regulators such as the TGA or FDA. It is also important to have the freedom to publish "negative" results to avoid duplication of work across the world.

ASTM standard E1052 – 11.

Dowall SD, et al. Viruses. 2016 Oct 27;8(11). pii: E277.

Vasan SS, et al. Business Development & Licensing Journal. December 2017; 26: pp.27-33.

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Effect of an electronic medical record design modification on laxative co-prescribing among hospitalised patients taking opioids: a before-and-after study

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Introduction. Constipation occurs in up to 71.7% (33/46) of hospital inpatients taking opioid analgesics. Co-prescribing laxatives with opioid analgesics is recommended to prevent opioid-induced constipation.

Aims. To examine the effect of an electronic medical record (EMR) design modification to increase laxative co-prescribing among hospitalised inpatients taking opioid analgesics.

Methods. In this retrospective 3-month before-and-after study, an EMR modification to improve docusate with sennosides order sentence visibility was implemented on 21 February 2018, at a teaching hospital in Sydney, Australia. The primary outcome was the co- prescription rate of docusate with sennosides within 24-hours of the first opioid analgesic administered. Data were collected from the EMR including International Classification of Diseases 10th Revision Australian Modification diagnosis codes. Multivariable logistic regression was performed to determine the impact of the EMR modification on co- prescribing of laxatives with opioid analgesics.

Results. Of the 1,832 adult inpatients included (51.0%, 935/1832 male), 50.5% (926/1832) were admitted before the EMR modification implementation and 49.5% (906/1832) were admitted following the implementation. The majority of patients were admitted to surgical wards (79.9%, 1463/1832). Docusate with sennosides was co-prescribed in 12.5% (116/926) of patients before and 14.9% (135/906) of patients after the EMR modification implementation. In the logistic regression model, a significant interaction between EMR modification and admission unit was identified, therefore the model was stratified by surgical and aged care patients. Although the EMR modification did not change laxative co-prescribing in surgical patients (odds ratio [OR]=1.1, 95% confidence interval [CI] 0.8 - 1.6, p=0.54) a significant increase in co-prescription of docusate with sennosides among aged care patients (OR=1.8, 95% CI 1.0 – 3.0, p=0.03) was observed.

Discussion. An EMR design modification did not change laxative co-prescribing in hospital inpatients overall. However, the EMR design modification was associated with a significant increase in laxative co-prescribing among aged care patients taking opioid analgesics.

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Opioid analgesic education for clinicians reduces discharge prescribing among opioid-naïve surgical patients

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Introduction. Despite recommendations and guidelines, opioid prescribing remains highly variable.

Aims. To evaluate the impact of pharmacist-led education on discharge opioid prescribing in opioid-naïve surgical patients.

Methods. This cluster-randomised controlled trial allocated surgical units at a major hospital: in the intervention arm, junior doctors and clinical pharmacists received face-to-face education by an Analgesic Stewardship Pharmacist from 1-14 February 2019; control units received no dedicated education. Discharge prescribing was evaluated before (1 February-30 April 2018) and after (17 February-30 April 2019). Primary outcome was change in proportion of opioid-naïve patients prescribed slow-release (SR) opioids. Secondary outcomes included overall and immediate-release (IR) opioid use, daily dose (as oral morphine equivalence) and quantity supplied, and documented de-escalation plans. Mixed-models multivariate regression was performed with interaction terms to measure the effect of the intervention.

Results. Prescribing for 4062 patients were evaluated. Patients discharged from intervention units were half as likely to be discharged with SR opioids following the intervention upon mixed-effects analysis (OR 0.51, 95% CI 0.28-0.90). Significant reductions were observed for IR opioid prescribing (p=.005), daily SR opioid dose (p=.011) and quantity (p=.016). Likelihood of discharge without opioids (OR 1.7, 95% CI 1.2-2.3) or with documented de-escalation plans (OR 2.3, 95% CI 1.2-4.4) was significantly higher post-intervention.

Discussion. Pharmacist-led education was associated with significant reductions in discharge opioid prescribing. Clinician education is an effective tool to optimise opioid prescribing in surgical patients.

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Pharmacological Treatment Dynamics in People Initially Prescribed Metformin or Sulfonylurea for Type 2 Diabetes

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Aim. To estimate the predictors of time to anti-glycaemic medication addition and switching during the first year after initiation of metformin or sulfonylurea (SU) in people with Type 2 Diabetes (T2DM).

Methods. 109,573 individuals aged 18-99 years initiating metformin or a SU between July 2013 and April 2015 were identified from the National Diabetes Service Scheme (NDSS) database containing 80-90% of Australians with diagnosed T2DM. Medication use was accessed via pharmacy dispensing data linked to the NDSS. Cox Proportional Hazards Regression was used to estimate adjusted Hazard Ratios (HRs) with 95% confidence intervals (CI) for predictors of time to an addition to or switch from the index medication during a one-year follow-up.

Results. Addition or switching occurred in 18% and 4% of metformin initiators and in 28% and 13% of sulfonylurea initiators, respectively. People aged ≥75 years versus 18-49 years (HR 0.56; 95%CI 0.53 0.60) had a lower risk, while those with Congestive Heart Failure (CHF) (HR 1.25; 95%CI 1.13 1.39) had a higher risk of an addition to metformin. Switching from metformin occurred faster in people with ≥5 comorbidities versus none (HR 1.52; 95%CI 1.30 1.77) but slower in Australia's most remote locations versus major cities (HR 0.73; 95%CI 0.56 0.95). Time to addition to sulfonylureas was longer in people aged ≥75 years versus 18-49 (HR 0.44; 95%CI 0.37 0.51), with ≥5 comorbidities versus none (HR 0.59; 95%CI 0.48 0.73) and living in the most remote areas versus major cities (HR 0.69; 95%CI 0.52 0.92). Longer durations up to 2 years from diagnosis to the initiation of metformin or sulfonylurea were associated with longer time to receiving an addition to or switch.

Conclusion. Longer intervals (≤2 years) before metformin or sulfonylurea initiations after diagnosis reduce the likelihood of individuals receiving an addition to or switch from the initial medication within one year. People in Australia's most remote areas are less likely to receive a switch from metformin or an addition to sulfonylurea than those in major cities.

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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 finding 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.

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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 scanden*) is an example of a traditional Australian medicinal plant which 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 analogies 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 dichoromethane 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.

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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*mut*S 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*mut*S, treatments A, B and C produced ≤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 ~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 ≤1.6 log_{10} CFU/cm^2 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.

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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 Tmax and higher Cmax 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.

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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.

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Molecular dynamics simulations for the aqueous phase behaviour of $C_{12}E_6$

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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 ($C_{12}E_6$) 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 $C_{12}E_6$/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.

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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.

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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 ^{3}H-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.

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Dinitro naphthalimides: a fluorescent probe for tumor hypoxia imaging

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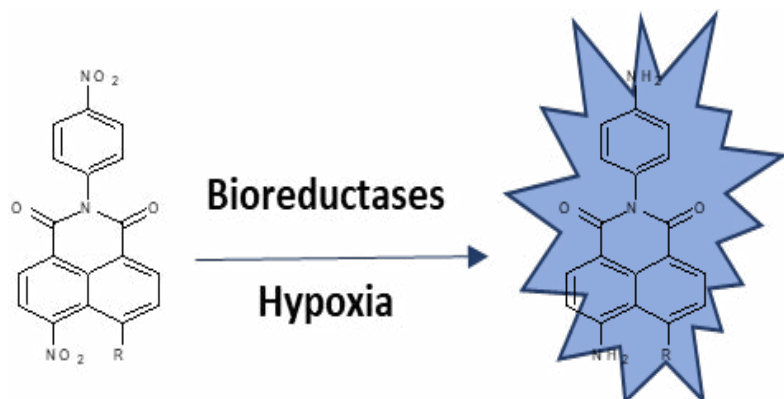
Introduction. Solid tumours are generally characterized by defective microvessels and inadequate oxygenation. This hypoxic tumour microenvironment (TME) directly correlates with cancer treatment resistance and disease progression. Hence it is critical to visualize hypoxic TME.

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.

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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.

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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.

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

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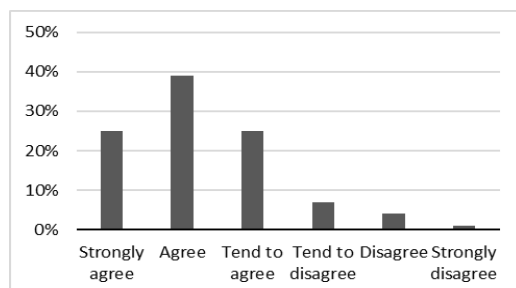
Fig. 1. Responses to the statement: "Gloup is an effective method to facilitate pill-swallowing in residents" (n=170)

Introduction. Gloup 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 Gloup 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 Gloup. Of those who had never used Gloup before, almost one-third of these (58/185) had heard about the product. The majority of respondents that have used Gloup 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 Gloup.

Discussion. Using Gloup 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 Gloup when the need for crushing medications is resolved. Further studies are needed to confirm the clinical effectiveness of Gloup.

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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.

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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 coasts 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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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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.

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

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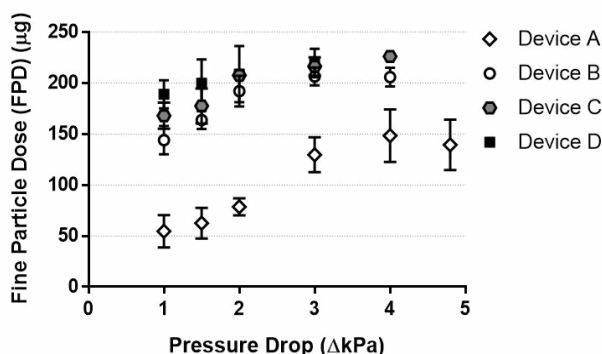
Introduction. Patients in low and lower-middle income countries (LMICs) experience significant barriers to access to receiving quality medicines, particularly injectable uterotonics for the prevention and treatment of postpartum hemorrhage. A spray dried formulation of oxytocin administered via a SUD-DPI 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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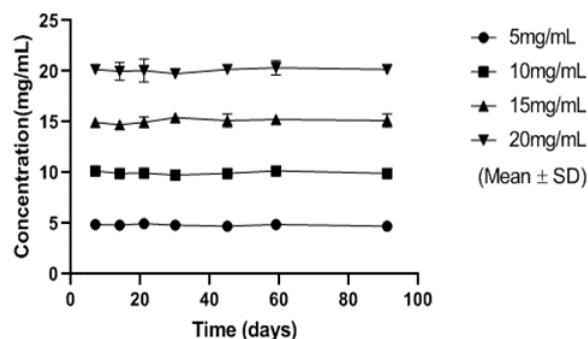
Figure 1: Concentration-time profile of caffeine citrate in aqueous solution

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.

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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.

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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.

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Synthesis and characterization of hypoxia responsive nanoparticles for cancer therapy

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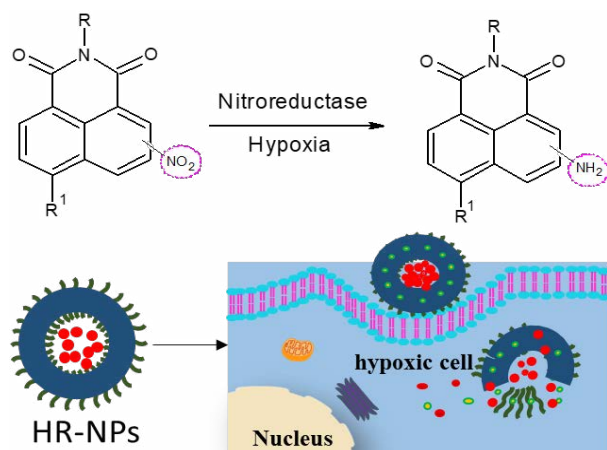
Introduction. Hypoxia is a pathological condition found in 60% of solid tumors with lower oxygenation level due to poorly adapted vascular network and improper blood flow. The formation of hypoxic areas is a key indicator to cancer progression towards metastasis and resistance to the various cancer treatments.

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.

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

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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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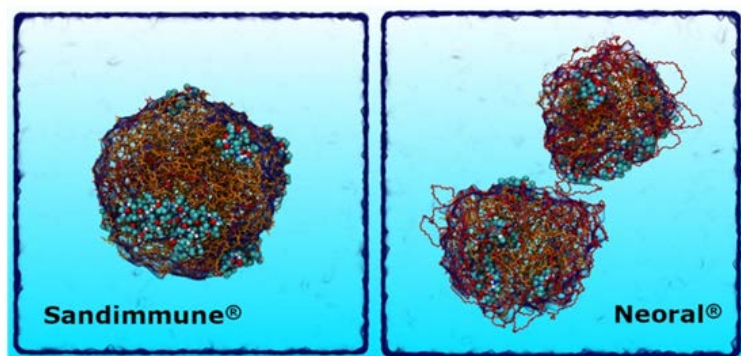
Introduction. The cyclosporine Sandimmune® vs. Neoral® story more than 20 years ago is still well known to those working in the lipid-based formulation (LBF) field. Sandimmune® LBF showed significant variability and a positive food-effect (1) while the newer LBF, Neoral® showed reduced variability and 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

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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 $[Pt(H_2O)_2(R,R\text{-dach})]^{2+}$, the active aquated component of the anticancer platinum drug oxaliplatin.

Methods. The ability of $[Pt(H_2O)_2(R,R\text{-dach})]^{2+}$ to bind to sCX[8] was examined by ^1H NMR and molecular modelling. A job plot was constructed to determine the sCX[8]–$[Pt(H_2O)_2(R,R\text{-dach})]^{2+}$ host-guest complex stoichiometric ratio. The effect of sCX[8] on the ability of $[Pt(H_2O)_2(R,R\text{-dach})]^{2+}$ to bind its target (DNA) was examined by guanosine 5'-monophosphate (5'GMP) NMR studies.

Results. $[Pt(H_2O)_2(R,R\text{-dach})]^{2+}$ 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 $[Pt(H_2O)_2(R,R\text{-dach})]^{2+}$ 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.

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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.

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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 specifics 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.

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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.

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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 he Saudi Arabian health care system.

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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.

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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.

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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.

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

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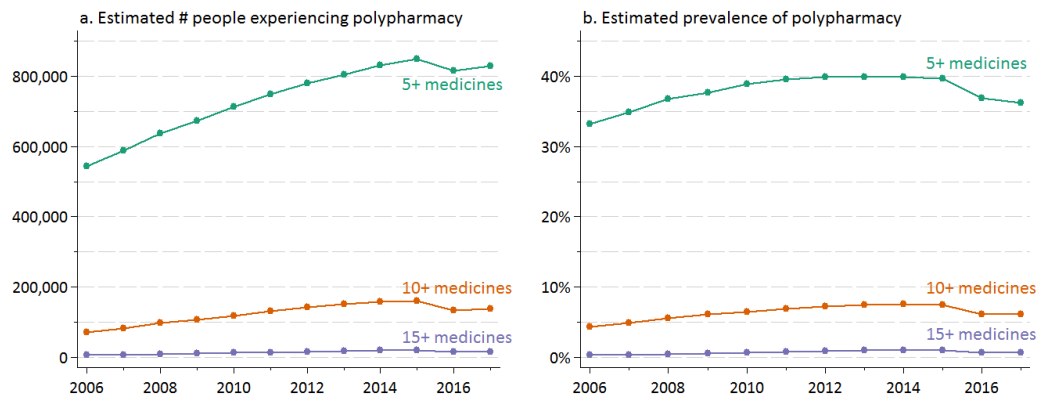
Figure 1

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.

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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.

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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.

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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.

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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 explores 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.

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

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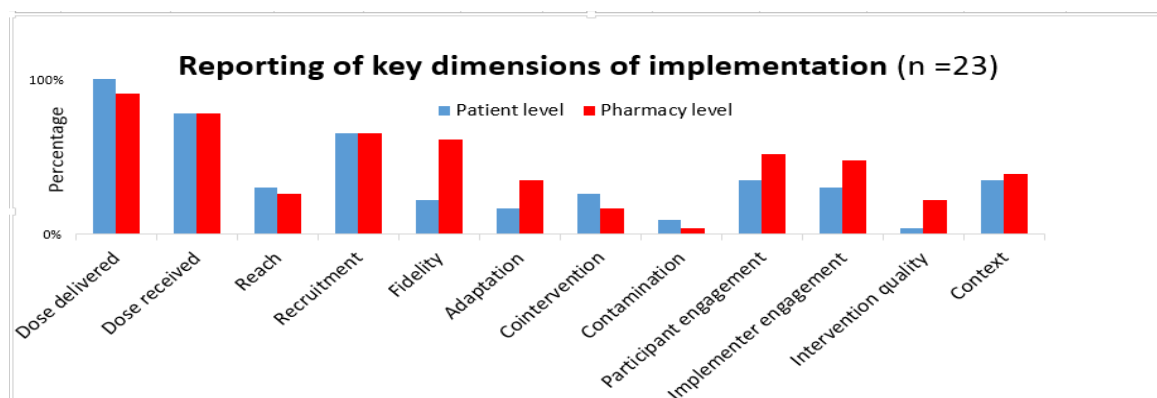
Introduction. Despite reports that over half the pharmacy workforce provide advanced professional services, there is inconsistency in the reporting how these services are implemented in community pharmacy. Inconsistency can lead to poor reproducibility of professional services implementation across settings.

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.

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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.

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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.

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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.

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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 2050[1]. 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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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.

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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.

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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.

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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.

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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.

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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.

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"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.