

Precision medicine, personalising healthcare



APSA
2016

Annual Conference

THE UNIVERSITY OF SYDNEY

Scientific program

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#APSA2016

2 - 5
December
2016



Friday 2 December 2016

9:00 – 10:30	Education workshop 1: Developing outcomes-based activities in pharmacy education	9:00 – 11:00	Post-Graduate workshop
	Room: Room N351, Faculty of Pharmacy		Room: Room N352, Faculty of Pharmacy
	Chair: Dr Carl Schneider		Chair: Prof Ines Krass
	Ms Claire Bekema, Australian Pharmacy Council Dr Rebekah Moles, The University of Sydney		Statistics workshop Prof Heather Allore, Yale University
10:30 – 11:00	Morning tea Common Room, Faculty of Pharmacy		
11:00 – 12:30	Education workshop 1 (continued)	11:00 – 11:30	Morning tea Common Room, Faculty of Pharmacy
	Dr Joy Spark, La Trobe University Prof Ieva Stupans, RMIT University	11:30 – 13:30	Post-Graduate workshop (continued)
12:30 – 13:30	Lunch Common Room, Faculty of Pharmacy		Get your paper published Assoc Prof Parisa Aslani, The University of Sydney Prof Andrew McLachlan, The University of Sydney
13:30 – 15:00	Education workshop 2: Working well with others. Developing interprofessional learning outcomes	13:30 – 14:30	Lunch Common Room, Faculty of Pharmacy
	Chair: Dr Paulina Stehlik	14:30 – 16:30	Post-Graduate workshop (continued) How to apply for grants/fellowships Prof Judy Black, The University of Sydney
	Assoc Prof Tim Chen, The University of Sydney Dr Gillian Nisbet, The University of Sydney		
15:00 – 15:30	Afternoon tea Common Room, Faculty of Pharmacy		
15:30 – 17:00	Education workshop 2 (continued)		
	Prof Lindy McAllister, The University of Sydney Group Workshop		
16:00 – 18:00	Registration desk open Charles Perkins Centre foyer		
17:00 – 18:30	Conference opening		
	Room: Charles Perkins Centre lecture theater		
	Acknowledgement of country, Prof Paul Groundwater Indigenous dance performance, Christian Brothers' High School, Lewisham Conference open, Prof Paul Groundwater and Dr Danijela Gnjidic Conference welcome, Dr Michael Spence, Vice-Chancellor, The University of Sydney		
	Keynote presentation		
	Chairs: Prof Paul Groundwater and Dr Danijela Gnjidic		
	Personalized medicine: Roadmap to better health care - 100 Prof Wolfgang Sadee, The Ohio State University, USA		Sponsored by 
18:30 – 20:30	Welcome reception Venue: Refectory, Holme Building, The University of Sydney		

Social Media

Please use the hashtag #APSA2016 to communicate about the conference, network and share ideas.

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Due to the sensitive nature of data and preliminary, unpublished, research findings, it is prohibited to film, photograph, or record any part of the oral presentations or posters without the prior consent of the presenter.

Meeting attendees must gain approval from a speaker or poster presenter prior to quoting or publishing that individual's scientific results. This policy includes any use of social media or information sharing related to the conference. We respectfully ask that if you attend a presentation where a speaker has communicated that they do not wish to have their presentation commented on in the social media environment that you adhere to this request.

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Saturday 3 December 2016

8:30 – 16:30	Registration desk open Level 1 foyer, New Law School building			
9:00 – 10:00	Keynote presentation			
	Room: Lecture theatre 101, New Law School building Chair: Assoc Prof Tim Chen			
	Let it go? Rationalising medicines for patients with life limiting illness - 101 Dr Adam Todd, Durham University, UK			Sponsored by 
10:00 – 11:00	Morning tea Level 1 foyer, New Law School building Poster presentations: Pharmacy Practice			Sponsored by 
11:00 – 12:30	Symposium 1: Advanced practice		Symposium 2- Drug delivery	
	Room: Room 100, New Law School building		Room: Room 102, New Law School building	
	Chair: Prof Ines Krass		Chair: Dr Joseph Nicolazzo	
	Advancing pharmacist practice in Australia – Where are we heading? - 102 Dr Lance Emerson, Pharmaceutical Society of Australia		Blocking lymphatic metastasis using pharmaceutical strategies - 106 Dr Erica Sloan, Monash University	
	Enabling expanded scopes of practice - 103 Assoc Prof Debra Rowett, Drug and Therapeutics Information Service		Solid-state diagnostic technologies towards improved staging of lymphatic metastases - 107 Assoc Prof Benjamin Thierry, University of South Australia	
Pharmacists in general practice – Show me the evidence - 104 Dr Chris Freeman, The University of Queensland		Engineering antibodies and antibody fragments to enhance exposure and activity in the lymphatic system - 108 Dr Lisa Kaminskas, The University of Queensland		
Pharmacists in general practice – A lived experience of advancing pharmacy practice - 105 Dr Ian Williams, Camp Hill Healthcare		Understanding the secrets of nanoparticle cell interactions - 109 Dr Angus Johnston, Monash University		
12:30 – 13:30	Lunch Level 1 foyer, New Law School building Poster presentations: Pharmacy Practice			
13:30 – 15:00	Oral presentations 1 Pharmaceutics/ Formulation studies	Oral presentations 2 Pharmacy Education 1	Oral presentations 3 Pharmacy Practice 1 - Pharmacy Practice methods and tools	Oral presentations 4 Pharmacy Practice 2 - Cardiovascular, renal and diabetes care
	Room: Room 100, New Law School building Chair: Prof Andrew Davey	Room: Room 102, New Law School building Chair: Prof Ieva Stupans	Room: Room 105, New Law School building Chair: Dr Jeff Harrison	Room: Room 107, New Law School building Chair: Prof Peter Carroll
13:30 – 13:45	Oxaliplatin preformulation studies for the development of innovative topical drug delivery systems - 110 Ms Thaiene Reis, University of Brasilia, Brazil	Evaluation of a simulated training package about a hospital patient's journey - 116 Assoc Prof H Laetitia Hattingh, Curtin University	Systematic review of polypharmacy definition, assessment tools and association with clinical outcomes - 122 Ms Nashwa Masnoon, University of South Australia; Royal Adelaide Hospital	The Tasmanian atrial fibrillation study: Transition to direct oral anticoagulants, 2011-2015 - 128 Mr Endalkachew Admassie Alamneh, University of Tasmania
13:45 – 14:00	Drug delivery systems based on polymeric nanocarriers and polysaccharide hydrogels for local treatment of bone tissue diseases - 111 Prof Elzbieta Pamula, AGH University of Science and Technology, Poland	Consumers with a lived experience of mental illness as simulated patients: An innovative education tool for pharmacy students - 117 Ms Evelyn Boukouvelas, The University of Sydney	Adherence by disease state – Can a Leximancer™ analysis shed light on common and dissonant factors? - 123 Prof Greg Kyle, Queensland University of Technology	The utilisation of antithrombotic therapy in older patients in aged care facilities with atrial fibrillation - 129 Miss Bridget Frain, University of Tasmania

Saturday 3 December 2016 continued

14:00 – 14:15	<p>Evaluation of insulin-containing tablets in vitro - 112 Mr Chun Yuen Jerry Wong, Curtin University</p>	<p>A systematic review of educational interventions to teach medication history taking - 118 Ms Vien Truong, The University of Sydney</p>	<p>Development and principal components analysis of a survey measuring pharmacists' attitudes towards perinatal depression - 124 Ms Sarira El-den, The University of Sydney</p>	<p>The relationship between anticoagulation knowledge, health literacy and medication adherence in patients with atrial fibrillation - 130 Mr Kehinde Obamiro, University of Tasmania</p>
14:15 – 14:30	<p>Addressing inequity in the care of vulnerable infants: Improving cost-effectiveness of palivizumab RSV prophylaxis through rational dose regimen design - 113 Assoc Prof Michael Ward, University of South Australia</p>	<p>Community Medicines Clinic - a patient-centred example for student engagement with health literacy - 119 Mr James Windle, University of Otago, New Zealand</p>	<p>Discursis® visualization of hospital pharmacist-patient communication during medication counselling - 125 Ms Bernadette Chevalier, The University of Queensland</p>	<p>Self-management experience among Chinese women with Gestational diabetes - 131 Mr Eric Wah, The University of Sydney</p>
14:30 – 14:45	<p>Development of a LC-MS/MS method for the analysis of ivacaftor, its metabolites and lumacaftor in cystic-fibrosis patients treated with ORKAMBI/KALYDECO - 114 Mrs Elena Schneider, Monash University</p>	<p>Students' and pharmacy educators' perceptions of integrating the Reflective Ability Clinical Assessment (RACA) into an undergraduate curriculum - 120 Dr Cherie Tsingos-Lucas, University of Technology</p>	<p>The value of 'I don't know' – handling missing data in electronic surveys - 126 Mr Ardalan Mirzaei, The University of Sydney</p>	<p>Current practices of assessing medication adherence in Australian dialysis centres - 132 Mr Saurav Ghimire, University of Tasmania</p>
14:45 – 15:00	<p>Can the co-spray drying of a lung surfactant, 1,2-dipalmitoyl-sn-glycero-3-phosphatidylcholine (DPPC) with anti-TB drugs increase aerosolization of the drugs? - 115 Dr Shyamal Das, University of Otago, New Zealand</p>	<p>Making Bachelor of Pharmacy students hospital placement ready: A Monash experience - 121 Dr Johnson George, Monash University</p>	<p>Assessing genome-wide association studies for spin and quality - 127 Miss Kellia Chiu, The University of Sydney</p>	<p>Comparative effectiveness of interventions to reduce inappropriate prescribing in renal impairment: A Systematic Review - 133 Mr Wubshet Tesfaye, University of Tasmania</p>
15:00 – 15:30	Afternoon tea			
	Level 1 foyer, New Law School building			
15:30 – 16:30	APSA medal presentation			
	Room: Lecture theatre 101, New Law School building			
	Chair: Assoc Prof Parisa Aslani			
	A retrospective – reflections on a pharmacy practice researcher's journey - 134 Prof Ines Krass, The University of Sydney			
16:30 – 18:00	APSA AGM			
	Room: Lecture theatre 101, New Law School building			
19:00 – 23:00	APSA student dinner			
	Venue: Forest Lodge Hotel, 117 Arundel Street, Forest lodge			

Sunday 4 December 2016

8:30 – 17:30	Registration desk open Level 1 foyer, New Law School building			
9:00 – 10:30	Early Career Research symposium			
	Room: Lecture theatre 101, New Law School building			
	Chair: Dr Nial Wheate			
	Personalising health care: Delivering an innovative smoking cessation intervention in Paris, France. - 200 Dr Oksana Burford, Curtin University			
	Asking patients and caregivers how frequently they have received messages about the harmfulness of medicines could help elicit poor adherence - 201 Dr Stephen Carter, The University of Sydney			
	Surgical antibiotic prophylaxis use and infection prevalence in breast surgery - 202 Dr Petra Czarniak, Curtin University			
	Powder formulations for respiratory delivery to treat tuberculosis - 203 Dr Shyamal Das, University of Otago, New Zealand			
	Hyaluronic acid based self-assembling nanosystems for cancer therapy - 204 Dr Meghna Talekar, The University of Queensland			
10:30 – 11:00	Morning tea Level 1 foyer, New Law School building Poster presentations: Pharmaceutical Science and Pharmacy Education			
11:00 – 12:30	Symposium 3: Improving medicine use		Symposium 4: Precision therapy	
	Room: Room 100, New Law School building		Room: Room 102, New Law School building	
	Chair: Prof Lynne Emmerton		Chair: Dr Wojtek Chrzanowski	
	Medicines only work if you know what to take - 205 Gerard Stevens, Webstercare		Clinical trial data transparency as an enabler of precision medicine - 209 Assoc Prof Michael Sorich, Flinders University	
	Increasing pharmacists' roles in improving medicine use - 206 Assoc Prof Rhiannon Braund, Otago University, New Zealand		Cancer treatment in the era of personalised medicine and biomarkers - 210 Assoc Prof Chris Karapetis, Flinders Centre for Innovation in Cancer	
	Optimizing medication use in older multimorbidity patients - 207 Dr Darrell Abernethy, Food Drug Administration (FDA); Johns Hopkins School of Medicine, USA		A novel nano-theranostic platform for detecting and targeting lymph node metastases with hybrid PET/MRI - 211 Prof Zdenka Kuncic, The University of Sydney	
	Deprescribing in people with dementia - 208 Dr Emily Reeve, The University of Sydney; Nova Scotia Health Authority		Precision nanomedicine for delivery of therapeutics to aggressive cancers - 212 Prof Maria Kavallaris, Children's Cancer Institute; University of New South Wales	
12:30 – 13:30	Lunch Level 1 foyer, New Law School building Poster presentations: Pharmaceutical Science and Pharmacy Education			
13:30 – 15:00	Oral presentations 5 Antibiotics/antifungals	Oral presentations 6 Pharmacy Education 2	Oral presentations 7 Pharmacy Practice 3 - Consumer experiences	Oral presentations 8 Pharmacy Practice 4 - Pharmacy Practice research
	Room: Room 100, New Law School building	Room: Room 102, New Law School building	Room: Room 105, New Law School building	Room: Room 107, New Law School building
	Chair: Dr Stephanie Reuter Lange	Chair: Assoc Prof Mark Naunton	Chair: Dr Jasmina Fejzić	Chair: Prof Lynne Emmerton
13:30 – 13:45	The chemical and physical stability of ceftaroline fosamile in an elastomeric device - 213 Mrs Farah Almadfai, University of Tasmania	Development of an integrated BPharm curriculum at the University of Auckland - 219 Prof John Shaw, University of Auckland, New Zealand	Asthma management experiences of Australians who are native Arabic speakers - 225 Mrs Reem Alzayer, The University of Sydney	Pharmacists' cultural competence in a community pharmacy setting: An exploration of the issue of language proficiency - 231 Miss Annim Mohammad, The University of Sydney

Sunday 4 December 2016 continued

13:45 – 14:00	Combination dry powder formulation of moxifloxacin and ethionamide for treating drug-resistant tuberculosis - 214 Mr Mohammad Momin, University of Otago, New Zealand	An international workshop that researched how a pharmacy curriculum may develop a commitment to lifelong learning - 220 Mrs Wendy Thompson, Queensland University of Technology	Home Medicines Review (HMR) in patients with COPD: Experiences from a cluster randomised trial - 226 Dr Johnson George, Monash University	Exploring community pharmacists' ethical reasoning: Insights through a qualitative study - 232 Assoc Prof Laetitia Hattingh, Curtin University
14:00 – 14:15	Stability of Anidulafungin in Total Parenteral Nutrition (TPN) at Y-site - 215 Miss Yusra Saleem, University of Tasmania	Development of the Part II Experiential Learning Placement within the revised BPharm curriculum at the University of Auckland - 221 Prof John Shaw, University of Auckland, New Zealand	Relationships between illness and treatment perceptions with adherence to diabetes self-care: A comparison between Arabic-speaking migrants and Caucasian English-speaking patients - 227 Dr Hamzah Alzubaidi, University of Sharjah, United Arab Emirates	Pharmacists' attitudes towards practice change and role extension - 233 Dr Karen Luetsch, The University of Queensland
14:15 – 14:30	Investigations into the physical and chemical stability of co-trimoxazole intravenous infusions - 216 Mrs Israa Khaleel, University of Tasmania	Investigation of Sri Lankan pharmacy students' knowledge of antibiotics and antimicrobial resistance - 222 Mrs Fatima Sakeena, The University of Sydney	Adverse Drug Reaction (ADR) reporting and follow up in a hospital setting - A patient's perspective - 228 Dr Joy Spark, Latrobe University	Knowledge, perception and practice of pharmacists in screening, prevention and treatment of delirium in elderly patients - 234 Mr Gizat Molla Kassie, University of South Australia
14:30 – 14:45	Investigation of chemical and physical stability of voriconazole infusion pumps - 217 Mr Harmanjeet Harmanjeet, University of Tasmania	Did it evaporate? 1st year chemical concepts in 2nd year students - 223 Dr Yasmin Antwertinger, Queensland University of Technology	Adverse drug reaction-related hospitalisation in older patients - A prospective analysis in two hospitals - 229 Mr Nibu Parameswaran Nair, University of Tasmania	Evaluation of the Western Australian pharmacy-administered immunisations: A qualitative study - 235 Assoc Prof Laetitia Hattingh, Curtin University
14:45 – 15:00	Evaluation of the stability of linezolid in commonly used intravenous fluids - 218 Miss Rachel Taylor, Curtin University	The capabilities that count for professional success in Pharmacy: A case study of graduates, employer and course teaching team perspectives - 224 Assoc Prof Lisa BG Tee, Curtin University	The impact of medications on charcot marie tooth disease: A patients' perspective - 230 Mrs Astrid Socha Hernandez, University of Canberra	A shot in the arm - Pharmacist administered influenza vaccine - 236 Prof Peter Carroll, The University of Sydney
15:00 – 15:30	Afternoon tea Level 1 foyer, New Law School building			
15:30 – 16:30	Keynote presentation			
	Room: Lecture theatre 101, New Law School building			
	Chair: Prof Andrew McLachlan			
	New opportunities and challenges for evidence synthesis - 237 Prof Lisa Bero, The University of Sydney			
16:30 – 17:30	Keynote presentation			
	Chair: Prof Jo-anne Brien			
	Bioinformatic analysis that leads to changing health care for patients - 238 Prof Melanie Bahlo, The Walter and Eliza Hall Institute of Medical Research			
19:00 – 23:00	Conference dinner Venue: MacLaurin Hall, The University of Sydney			

Monday 5 December 2016

8:30 – 15:30	Registration desk open Level 1 foyer, New Law School building			
9:00 – 10:00	APSA lecture Room: Lecture theatre 101, New Law School building Chair: Prof Iqbal Ramzan, Dean, Faculty of Pharmacy, The University of Sydney Putting the balance back in diet: The nutritional geometry of health and ageing - 300 Prof Stephen Simpson, The University of Sydney			
10:00 – 11:00	Morning tea Level 1 foyer, New Law School building Poster presentations: judging of poster finalists			
11:00 – 12:30	Oral presentations 9 Pharmaceutical Sciences	Oral presentations 10 Pharmacy Practice 5 - Mental health and neurology	Oral presentations 11 Pharmacy Practice 6 - Health services delivery	Oral presentations 12 Pharmacy Practice 7 - Consumer-focused research
	Room: Room 100, New Law School building Chair: Prof Peter Little	Room: Room 102, New Law School building Chair: Dr Stephen Carter	Room: Room 105, New Law School building Chair: Prof Rhonda Clifford	Room: Room 107, New Law School building Chair: Assoc Prof Bandana Saini
11:00 – 11:15	Effect of oxidative stress on mitochondrial morphology - 301 Mrs Sulochana (Sue) Mahat Basnet, University of Canberra	Shared decision making in the pharmacological management of schizophrenia: Perspectives of health care professionals and consumers - 307 Miss Yuh-Lin Gan, The University of Sydney	How can pharmacists provide medication services to mining sites? - 313 Prof Lynne Emmerton, Curtin University	How do Australian and UK consumers receive and use information about their over-the-counter medicines? - 319 Ms Vivien Tong, The University of Sydney
11:15 – 11:30	Intracellular kinetics of adenovirus inner components: Inspiring a better DNA vaccine design - 302 Mr Hareth Wassiti, Monash University	Mental health first aid training and its application in a tertiary setting benefits staff and students - 308 Miss Kristy-lee Albrecht, Mrs Erin Giffakis, University of Western Australia	The feasibility of a pharmacist-led osteoporosis screening program in a Malaysian primary care clinic - 314 Dr Li Shean Toh, University of Tasmania	Consumers' use of social media for health purposes: A focus group study - 320 Mr Arcelio Benetoli, The University of Sydney
11:30 – 11:45	Pharmacokinetics and bioavailability of Mitragynine in Sprague Dawley (SD) rats using microdialysis - 303 Assoc Prof Zamri Chik, University of Malaya, Malaysia	The risk of hip fracture in older people using selective serotonin reuptake inhibitors (SSRIs) and other psychoactive medicines concurrently - 309 Dr Michael Leach, University of South Australia; Bendigo Health	Stakeholder's experiences of providing remunerated professional pharmacy services under Community Pharmacy Agreements - 315 Mr Andi Hermansyah, The University of Sydney	Does consumer medicines interest reflect medicines use? - 321 Dr Treasure McGuire, The University of Queensland
11:45 – 12:00	Formulation development of triterpenoids to enhance its anticancer effects on glioblastoma cells - 304 Mr Yat Sum William Wah, The University of Sydney	Metabolic monitoring of hospital inpatients receiving antipsychotics: Multisite quality improvement study - 310 Dr Alexandra Bennett, NSW Therapeutic Advisory Group	Community pharmacist-led interventions and their impact on patients' medication adherence and other health outcomes: A systematic review - 316 Miss Aleksandra Milosavljevic, University of Auckland, New Zealand	Evaluation of unplanned medication related readmissions within 28 days of discharge - 322 Miss Aatiqah Syed, Curtin University of Technology
12:00 – 12:15	Possible involvement of Caveolin-1 in Alzheimer's disease via activation of β-Secretase in rat - 305 Dr Rohit Goyal, Shoolini University, India	'Culture is more than what we do around here': Influence of basic assumptions on psychotropic medicine use in nursing homes - 311 Miss Mouna Sawan, The University of Sydney	Hospital clinical pharmacy services in Vietnam - 317 Mr Hieu Trinh, The University of Sydney	N-of-1 trials for assessing the effects of deprescribing medications on short-term clinical outcomes in older adults: A systematic review - 323 Mr Alexander Clough, The University of Sydney
12:15 – 12:30	Chemical profile and anti-diabetic potentials of Dendrobium species from Australia and China - 306 Mr I Gusti Made Surya Trapika, The University of Sydney	Investigation of hospital opioid prescribing among opioid naive surgical patients - 312 Mr Luke Kardell, The University of Sydney	Moving beyond the four walls: Pharmacist roles in New Zealand primary care - 318 Ms Chloe Campbell, University of Otago, New Zealand	The effect of medications used by Charcot-Marie-Tooth patients on neuropathic symptoms - 324 Miss Sufia Toung, University of Canberra

Monday 5 December 2016 continued

12:30 – 13:30	Lunch Level 1 foyer, New Law School building	
13:30 – 15:00	Symposium 5: Big data for precision medicine/e-health	Symposium 6: Infectious disease
	Room: Room 100, New Law School building	Room: Room 102, New Law School building
	Chair: Dr Danijela Gnjidic	Chair: Prof Paul Groundwater
	Does size really matter? Using big data to examine the patterns and predictors of opioid utilisation in Australia - 325 Dr Natasa Gisev, University of New South Wales	Rapid identification of bacterial pathogens in clinical samples - 329 Prof Paul Groundwater, The University of Sydney
	Big data for precision medicine: Moving beyond the buzzwords - 326 Prof Sallie Pearson, University of New South Wales	Patient centred antimicrobial stewardship - 330 Ms Fiona Doukas, Concord Repatriation General Hospital; The University of Sydney
	Using (big?) data to improve the quality use of medicines in residential aged care - 327 Dr Lisa Pont, Macquarie University	Antimicrobial therapy of respiratory infections by inhalation drug delivery - 331 Prof Hak-Kim Chan, The University of Sydney
From big genomic data to personalized medicine - 328 Dr Siew Kee (Amanda) Low, The University of Sydney; Centre for Integrative Medical Sciences, Japan	Polishing the tarnished silver bullet – Crowdsourcing new antibiotics - 332 Dr Mark Blaskovich, The University of Queensland	
15:00 – 15:30	Conference awards and close	
	Room: Lecture theatre T01, New Law School building	
	Chair: Assoc Prof Parisa Aslani	

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Optimising medicines for optimal patient outcomes

Saturday 3 December, 10:00-11:00 and 12:30-13:30

Posterboard and paper reference number	Paper Title	First Name Last Name	Theme
400	Evaluation of the use, efficacy and safety of second line agents in the treatment of uncomplicated type 2 Diabetes	Shalini Adiga	Pharmacy Practice
401	The content validity and inter-rater reliability of a medication discrepancy classification system	Enas Almanasreh	Pharmacy Practice
402	Fasting and Diabetes: Optimising Health Outcomes for Ramadan Observers: A Literature Review	Hadi Almansour	Pharmacy Practice
403	Impact of nutritional status on calcium channel blocker therapy outcome in elderly patients at two primary health care facilities in Bandung, Indonesia	Lia Amalia	Pharmacy Practice
404	Integration of pharmacists in diabetes care in Nepal- challenges and opportunities	Parisa Aslani	Pharmacy Practice
405	Health literacy and the decision-making process to use complementary medicine products in pregnancy and lactation	Larisa Barnes	Pharmacy Practice
406	The WentWest Non-Dispensing Pharmacist Project: Integrating pharmacists in general practice	Helen Benson	Pharmacy Practice
407	Got milk? Quality appraisal of consensus-based guidelines for lactation	Carla Payne	Pharmacy Practice
408	Guidelines for guidelines	Carla Payne	Pharmacy Practice
409	An evaluation of Consumer Satisfaction and Experience with Pharmacist-Administered Influenza Vaccination Services in Western Australia	Sarah Burt	Pharmacy Practice
410	A preliminary investigation in the use of fingerprick vancomycin levels for therapeutic drug monitoring: Lessons that can be learned	Vincent Chan	Pharmacy Practice
411	The Pharmacological Treatment of Comorbidities in People with Dementia: A Literature Review	Rhonda Clifford	Pharmacy Practice
412	A simple decision-making guide for assessment and referral of pharmacy clients with bowel symptoms	Lynne Emmerton	Pharmacy Practice
413	Compounding buccal delivery dosage forms: consideration of the dose accuracy of troches and ODTs	Rose Estafanos	Pharmacy Practice
414	Community pharmacists' perspectives towards clozapine provision for consumers with schizophrenia	Yuh-Lin Gan	Pharmacy Practice
415	We don't know what they don't know: Knowledge of pain medication and pain management	Anthony Hall	Pharmacy Practice
416	Pharmacists' role in supporting breastfeeding women in the community pharmacy setting: facilitators and barriers	H Laetitia Hattingh	Pharmacy Practice
417	Evaluation of Simpler©: An evidence based pharmacist diabetes intervention tool	H Laetitia Hattingh	Pharmacy Practice
418	Codeine in primary care: Improving the use of opioid therapy for pain	Joel Hillman	Pharmacy Practice
419	Development and validation of the Dementia-specific Medication review Electronic Decision Support System (D-MEDSS©)	Lisa Kouladjian-O'Donnell	Pharmacy Practice
420	Factors affecting adherence – a new methodology systematic review using Leximancer™	Greg Kyle	Pharmacy Practice
421	What are the responsibilities of pharmacists selling complementary medicine?: A systematic review	Adam La Caze	Pharmacy Practice
422	Pharmacist perceptions and attitudes toward dispensing HIV medicines in the community	Esther Lau	Pharmacy Practice
423	Community pharmacist perceptions and attitudes toward dispensing hepatitis B and C medicines	Esther Lau	Pharmacy Practice
424	A systematic review of healthcare workers' opinions and experiences of administering medicines to people with swallowing difficulties in aged-care facilities	Esther Lau	Pharmacy Practice
425	The effectiveness of components of swallowing assessments for identifying people with swallowing difficulties: A systematic review for quantitative evidence	Esther Lau	Pharmacy Practice
426	Patient satisfaction with information and adherence to topical corticosteroids	Ling Lee	Pharmacy Practice
427	Efficacy of statins in obese asthmatics	Bharti Magazine	Pharmacy Practice
428	Medication Safety Information for Lactating Women: A Systematic Review	Alyson McClatchey	Pharmacy Practice
429	A comparative analysis of cancer drugs pricing	Long Chiau Ming	Pharmacy Practice
430	Evidence-based Therapy of Neuropathic Pain in a Paraplegic Type-2 Diabetic patient undergoing End-Colostomy: Global Year against Neuropathic Pain 2015	Yogi Mishra	Pharmacy Practice
431	A change reaction? Patient safety risks of a hybrid system for allergy documentation	Rayan Nahas	Pharmacy Practice
432	Exploring accredited pharmacists' work processes during Home Medicines Reviews	Marea Patounas	Pharmacy Practice
433	Expressing emotions related to chronic disease states in open Facebook groups	Nanda Puspita	Pharmacy Practice
434	Medications affecting alertness: Beliefs and perceptions of consumers	Fatema-Tun-Naher Sake	Pharmacy Practice
435	A study of modification to first line antiretroviral therapy in treatment naive, HIV positive patients in a tertiary care hospital	Smita Shenoy	Pharmacy Practice
436	The use of herbal medicines during breastfeeding in an Australian population	Alison Shield	Pharmacy Practice
437	Medication information needs on discharge in a rehabilitation ward- A patients' perspective	Joy Spark	Pharmacy Practice
438	Assessing community pharmacists knowledge of popular herbal/nutrient weight-loss medications	Meng-Wong Taing	Pharmacy Practice
439	Pharmacists' perceptions of career opportunities in Australia	Hayley Taylor	Pharmacy Practice
440	The association between frailty and medicine use over time	Imaina Widagdo	Pharmacy Practice

Sunday 4 December, 10:30-11:00 and 12:30-13:30

Posterboard and paper reference number	Paper Title	First Name Last Name	Theme
441	Preparation, solid state characterization of etravirine co-crystals with improved solubility	Muddukrishna Bs	Pharmaceutical Science
442	Can the co-spray drying of a lung surfactant, 1,2-dipalmitoyl-sn-glycero-3-phosphatidylcholine (DPPC) with anti-TB drugs increase aerosolization of the drugs?	Shyamal Das	Pharmaceutical Science
443	Development and Validation of an LC-MS/MS Bioanalytical Method for Quantification of Dexmedetomidine in Samples of Human Plasma	Sussan Ghassabian	Pharmaceutical Science
444	The function of M26V r1 GABAC mutant receptor	Jane Hanrahan	Pharmaceutical Science
445	Nanostructured lipidic carriers of diflunisal for treatment of rheumatoid arthritis: Systematic optimization, characterization and therapeutic efficacy evaluation	Amanpreet Kaura	Pharmaceutical Science
446	Systematic development of Type IV self-nanoemulsifying drug delivery systems of Mangiferin: Cellular uptake studies and mechanistic pathways on resistant cells	Rajneet Kaur Khurana	Pharmaceutical Science
447	Long circulation of quantum dot loaded PLGA-nanoparticles surface modified with poloxamer	Diky Mudhakar	Pharmaceutical Science
448	Thermo- and magneto-sensitive drug delivery carriers for the treatment of lung cancer	Elzbieta Pamula	Pharmaceutical Science
449	Extraction methodologies and phytochemical analysis of Australian Pittosporum angustifolium	Anuja Patil	Pharmaceutical Science
450	Bioanalytical method development and validation of Aminophylline in rat plasma using RP-HPLC – An application to preclinical pharmacokinetics	Vasantharaju S G	Pharmaceutical Science
451	Gliclazide-Ciprofloxacin Interactions in Rats: Mechanism Study of P-glycoprotein role using Quinidine	Lucy Sasongko	Pharmaceutical Science
452	Effect of storage on release from delayed release sodium diclofenac tablets	Dorothy Saville	Pharmaceutical Science
453	Effect of humidity on release from carbamazepine tablets	Dorothy Saville	Pharmaceutical Science
454	Nanosizing of Poorly Water Soluble Compounds Using Rotation/Revolution Pulverizer	Takatsuka Takayuki	Pharmaceutical Science
455	Simulating the response of liposomes exposed to ultrasound using the finite element method (FEM)	Ian Tucker	Pharmaceutical Science
456	Unlocking mechanisms implicated in drug-induced bizarre idiosyncratic behaviours: Learning from people and molecules	Carmen Wong	Pharmaceutical Science
457	South Asian ancestry: Implications for global drug development	Rebecca Wong	Pharmaceutical Science
458	A review of the effects of central nervous system active drugs on sleep spindles and sleep-related memory consolidation	Bandana Saini	Pharmaceutical Science
459	Pharmacy Perspectives of pharmacy students, pharmacy academics and practicing pharmacists on interprofessional education and collaborative practice: a comprehensive systematic review	Alla El-Awaisi	Pharmacy Education
460	Perceptions of Pre-Diabetic, Obese and Overweight Patients on Complementary Medicine, Dietary Supplements to Promote Weight Loss: Results from a Phone Survey	Misha Kaura	Pharmacy Education
461	Pharmacist Tutors: Development and delivery of a training program	Gillian Knott	Pharmacy Education
462	Public perceptions on dikir farmasi: A qualitative exploratory study	Long Chiau Ming	Pharmacy Education
463	Folk songs for health education: Implementation and qualitative evaluation	Long Chiau Ming	Pharmacy Education
464	Teaching approaches in Pharmacy courses: an observational study	Jose Manuel Serrano Santos	Pharmacy Education
465	Development of integrated modules within the revised BPharm curriculum at the University of Auckland: Dermatology as an example.	John Shaw	Pharmacy Education
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Personalized medicine: Roadmap to better health care

Wolfgang Sadec. Center for Pharmacogenomics, College of Medicine, The Ohio State University, Columbus, OH, USA

With improving living conditions and therapies, longevity has increased dramatically worldwide. Yet, continued expansion of the world population and growing environmental and societal pressures put these gains in jeopardy. Also, common diseases such as cardiovascular and CNS disorders, and diabetes, become more prevalent with advancing age while drug therapies remain only partially effective and can cause severe adverse effects. Tailoring therapies and prevention strategies to the individual promises to yield substantial improvements. First, vast new information on genomic features, at the level of DNA, RNA, protein, and metabolite, reveals disease processes and variation between subjects that can be exploited for targeted therapies. Where a single gene can be identified as a cause of disease, for example somatic driver mutations in cancer or germline mutations in cystic fibrosis, drugs targeting these proteins can be highly effective. These therapies require a companion diagnostic test, as such drugs are inactive when the mutation is absent. Over the recent years, ~25% of new drug approvals by the FDA have been linked to companion tests, a trend that will further increase. Second, genomics studies have yielded deep insight into the etiology of common multigenic diseases, paving the way for improved therapy matching the disease process prevalent in the individual patient. Multi-factorial biomarker panels (including genetics) can serve to define an individual's disease risk, enabling early intervention or even prevention, and guiding the optimal therapeutic strategy person-by-person. Yet, we are far from understanding genomic factors resulting in substantial heritability of disease risk and drug response (termed the 'missing heritability') (Sadec et al.). Moreover, disease complexity impedes therapeutic success relying on single drugs, defying the idea of precision medicine. Rather, lifestyle, diet, and behavioural interventions are equally critical for successfully therapy. Third, novel approaches are beginning to live up to the promise of truly individualized therapy, including tissue engineering, cellular reprogramming *in vivo*, immune therapies of cancer and autoimmune disorders, and *in vivo* genome editing. Such therapies will have potential for substantial impact on health care delivery within the coming ten years. As the 20th century was marked by drug discovery, we now enter uncharted territory in trying to maintain an individual's health throughout life in novel ways. Health care services and research have to meet these new challenges.

Sadec W et al (2014) *Hum.Gen.* 133: 1199-1215

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Let it go? Rationalising medicines for patients with life limiting illness

Adam Todd¹. School of Medicine, Pharmacy and Health, Durham University¹, Durham, UK.

Introduction. Polypharmacy and pill burden are common in patients with life-limiting illness such as cancer, heart failure, renal disease and dementia. It is widely acknowledged these patients are frequently exposed to the harms of medication, including increased risk of developing adverse drug reactions and drug-drug interactions. Previous work has shown that many medications are prescribed inappropriately in the context of life limiting illness. In order to understand why this occurs, it is crucial to understand the perspective of patients, their caregivers and the healthcare professionals responsible for prescribing their medication. Unfortunately, however, there is a scarcity of literature in this area.

Aims. To explore the lived experience of patients, caregivers and healthcare professionals in the context of medication use in life-limiting illness.

Methods. In-depth interviews, using a phenomenological approach: methods of transcendental phenomenology were used for the patient and carer interviews, while hermeneutic phenomenology was used for the healthcare professional interviews.

Results. In total, thirty-six participants were recruited to the study (twelve patients, twelve caregivers, and twelve healthcare professionals). The study highlighted that medication formed a significant part of a patient's day-to-day routine; this was also apparent for their carers who took on an active role-as a gatekeeper of care-in managing medication. Patients described the experience of a point in which, in their disease journey, they placed less importance on taking certain medications; healthcare professionals also recognize this and refer it as a 'transition'. This point appeared to occur when the patient became accepting of their illness and associated life expectancy.

Discussion. Future deprescribing strategies should seek to establish patient expectations, consider the timing of the discussion about ceasing treatment and encourage the involvement of other stakeholders in the decision-making process.



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Advancing pharmacist practice in Australia – Where are we heading?

Dr Lance Emerson, CEO, Pharmaceutical Society of Australia, DEAKIN ACT 2600

This presentation will focus on the future of pharmacist practice in Australia, including progress over the past ten years, an overview of the current state of evidence, opportunity and preparedness of the profession to use this evidence to progress new roles, trends in pharmacy practice in other countries, examples of new and expanded roles within Australia and plans for the future.

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Enabling expanded scopes of practice

Assoc Prof Debra Rowett, Drug and Therapeutics Information Service

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Pharmacists in General Practice – Show me the evidence

Dr Christopher Freeman. School of Pharmacy, University of Queensland, Brisbane, QLD

At a time of significant health care review and reform, integration of a pharmacist into the general practice environment offers opportunities for the profession to further contribute to health consumer outcomes within primary care and at transitions of care. Australia continues to observe the international lead of this emerging model while it considers how it may best be applied in its unique context. The 'Practice Pharmacist' offers the pharmacy profession but one example of what advancing practice may look like. However, what is the evidence to support pharmacist integration into the general practice medical team?

Chris will explore the evidence as it relates to pharmacist integration into general practice both at an international and local level and will consider current and ongoing research in this area. The presentation will conclude with the current research gaps and what could be done to translate this body research into practice.

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Pharmacists in general practice – A lived experience of advancing pharmacy practice

Dr Ian Williams. Camp Hill Healthcare, Brisbane, QLD

Pharmacists integration within general practice medical teams provides the pharmacy profession with an opportunity for an alternate career path and acts as an example of advancing pharmacy practice. The 'Practice Pharmacist' can be viewed as an extension of the role of the community pharmacist, providing increased access to health consumer to expertise in medicines. As the evidence for this role continues to emerge, pockets of practice have gradually arisen, attempting to translate the research into practice.

Ian will explore a model of 'Practice Pharmacist' that has emerged in his medical centre located in Camp Hill, Brisbane. In 2009, a pharmacist joined his multidisciplinary team to improve the quality use of medicines for the practice population. The presentation will describe the roles and activities of the practice pharmacist as described through the lens of a General Practitioner.



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Blocking lymphatic metastasis using pharmaceutical strategies

Erica K. Sloan^{1,2,3} Drug Discovery Biology Theme, Monash Institute of Pharmaceutical Sciences, Monash University¹, Parkville, VIC 3052, Australia, Department of Cancer Anaesthesia and Pain Medicine, Peter MacCallum Cancer Centre², East Melbourne, VIC 3002, Australia, Cousins Center for PNI, UCLA Semel Institute, UCLA Jonsson Comprehensive Cancer Center, and UCLA AIDS Institute, University of California³ Los Angeles, LOS ANGELES, CA, USA

Introduction. Under normal physiological conditions, the lymphatic system maintains homeostasis by directing cells and solutes from the interstitial fluid of peripheral tissues through lymphatic vessels and into lymph nodes, where they undergo immune examination. In cancer, the lymphatic system also provides a route for tumour cell dissemination and metastasis. However, few studies have investigated physiological factors that regular lymphatic function and defined their effect on cancer dissemination.

Aims. To define the impact of peripheral neural signalling on lymphatic vascular architecture, and identify drug intervention strategies to stop tumour cell dissemination through lymphatic pathways.

Methods. We used advanced *in vivo* imaging technologies to define the effect of pharmaceutical interventions on lymphatic structure and function in mouse models of cancer.

Results. We show that VEGFC is required for neural remodeling of lymphatics, and that this is inflammation dependent. Beta-blockade of neural signaling prevented lymphatic remodeling *in vivo* and reduced lymphatic metastasis in preclinical cancer models and in patients with breast cancer.

Discussion. These findings reveal unanticipated communication between stress-induced neural signaling and inflammation, which regulates tumor lymphatic architecture and lymphogenous tumour cell dissemination. These findings suggest that limiting the effects of SNS signaling to prevent tumor cell dissemination through lymphatic routes may provide a strategy to improve cancer outcomes.

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Solid-state diagnostic technologies towards improved staging of lymphatic metastases

Benjamin Thierry. Future Industries Institute, Adelaide, SA

Introduction. A technology enabling the accurate detection of tumour markers in biopsied and resected tissues within the time-frame of surgery would significantly improve cancer patient care. For instance, the possibility to intraoperatively detect the presence of metastatic tumour cells in regional lymph nodes would guide the surgeon during intervention and spare a significant number of patients a subsequent repeat surgery (up to 25% for breast cancer).

Aims. To develop solid-state sensing technologies able to (1) accurately map intraoperatively lymphatic drainage from primary tumours and (2) determine within the time-frame of a surgery the presence of tumour cells within a resected specimen.

Methods. Two solid-state technologies have been developed based on state-of-the-art Magnetic Tunnelling Junction (MTJ) sensors and Silicon Nanowire Field Effect Transistor (SiNW FET) sensing.

Results&Discussion. The Sentinel Lymph Node (SLN) concept describes the preferential lymphatic metastasis of a primary tumour to one or more draining regional LNs and is the current standard of care in breast cancer and melanoma. However, anatomical and technological challenges associated to the use of radioactive tracers limit the application of the SLN concept to other more complex cancer type such as head and neck cancer. We have developed and validated pre-clinically a novel handheld magnetometer technology based on MTJ sensing. Key features include high spatial resolution (~x4 times that of conventional gamma probes), small physical footprint allowing for smaller incision (~x6 times smaller than existing probes), no interference from metallic tools such as retractors, and high stability eliminating the need for intra-procedural calibration. The technology has been validated in a large animal model (swine) and a clinical prototype is currently under development. Conversely, we have developed a Silicon Nanowire Field Effect Transistor (SiNW FET) sensing platform able to detect a single tumour cell within an hour in a whole LN. This remarkable result demonstrates that Si FETs are prime candidates for the realization of intraoperative molecular diagnostic technologies. In this presentation, we will discuss the requirements and challenge of such intraoperative diagnostic platform and present recent developments in our laboratory on the fabrication and operation of such devices.



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Engineering antibodies and antibody fragments to enhance exposure and activity in the lymphatic system

Lisa M Kaminskas¹. School of Biomedical Sciences, University of Queensland¹, St Lucia, QLD.

Introduction. Drug conjugated and unmodified human recombinant antibodies are increasingly being developed and used for the treatment of cancer. In some cases, the use of antibody fragments presents several advantages over the use of full length antibodies. However, a key downside of this approach is the limited exposure of the lymphatics to smaller (eg. Fab') fragments.

Aims. This work was therefore aimed at identifying how the lymphatic exposure and biological activity of Fab's could be optimised through PEGylation.

Methods. Fab' fragments of the recombinant human monoclonal antibody trastuzumab (Herceptin) were prepared from the commercial antibody and conjugated with single linear 10 or 40 kDa PEG chains at the hinge region. The full length antibody was also conjugated with a 40 kDa PEG. The IV and SC lymphatic pharmacokinetics of the un-conjugated and PEGylated antibodies were then evaluated in thoracic lymph duct cannulated rats.

Results. The full length antibody displayed the greatest plasma and lymph exposure after IV and SC administration (~45 and 27% dose respectively recovered in lymph over 30 h). PEGylation did not have a significant impact on lymphatic exposure, but accelerated the plasma clearance of the antibody after SC administration. The Fab' displayed limited plasma and lymphatic exposure as expected, but conjugation with 10 kDa PEG increased lymphatic exposure by 11 to 5 fold after IV and SC administration respectively, and had minimal impact on the receptor binding affinity and in vitro activity of the Fab'. Increasing PEG size significantly improved plasma exposure, but had little impact on lymphatic exposure compared to the 10 kDa PEG-Fab' and reduced its receptor binding affinity by ~50%.

Discussion. PEGylation has the potential to limit the systemic activity of full length antibodies as a result of accelerated clearance after SC administration (presumably due to the generation of anti-PEG antibodies). However, minimal PEGylation (approx. 20% PEG loading) has the potential to optimally enhance the plasma and lymphatic exposure and activity of Fabs, while retaining maximal biological activity compared to the use of much larger PEGs.

Chan LJ et al (2016) Mol Pharm 13:1229-41

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Understanding the secrets of nanoparticle cell interactions

Angus P.R. Johnston,^{1,2} Laura I. Selby,¹ Sarah K. Mann,^{1,3} Georgina K. Such,³ Justine D. Mintern⁴

¹ Drug Delivery, Disposition and Dynamics, Monash Institute of Pharmaceutical Sciences, Monash University, 399 Royal Parade, Parkville, Melbourne, Australia, ² ARC Centre of Excellence in Convergent Bio-Nano Science and Technology, Monash University, Parkville, Melbourne, Australia, ³ Department of Chemistry, The University of Melbourne, Parkville, Victoria, ⁴ Department of Biochemistry and Molecular Biology, The University of Melbourne, Parkville, Victoria.

Introduction: To engineer 'smart', responsive materials for drug delivery it is essential to understand how nanoparticles interact with cells. Targeted delivery of drugs to specific cells in the body by immobilising therapeutics inside antibody functionalised nanoparticles has the potential to revolutionise the treatment of many diseases. However, our understanding of how these nanoengineered materials interact with cells is limited.

Results: We are developing tools to understanding how these materials interact with cells,^{1,2} so we can engineer materials that respond better to the biological conditions they encounter.^{3,4} In particular, we are interested in understanding the internalisation, processing and trafficking of nanoparticles in cells. This presentation will focus on understanding the internalisation of polymer nanoparticles into cells, and their subsequent fate once they are inside the cell. It will also outline the progress we are making towards understanding how nanoparticles can induce transport of drugs from the endosomal compartments into the cytoplasm.

¹ Liu, H.; Johnston, A. P. R. *Angew Chem Int Edit* **2013**, *52*, 5744–5748.

² Selby, L. I.; Kongkatigumjorn, N.; Such, G. K.; Johnston, A. P. R. *Advanced Healthcare Materials* **2016**, *5*, 2333–2338.

³ Mann, S. K.; Czuba, E.; Selby, L. I.; Such, G. K.; Johnston, A. P. R. *Pharmaceut Res* **2016**, *33*, 2421–2432.

⁴ Mann, S. K.; Dufour, A.; Glass, J. J.; De Rose, R.; Kent, S. J.; Such, G. K.; Johnston, A. P. R. *Polym. Chem.* **2016**, *7*, 6015–6024.

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Oxaliplatin preformulation studies for the development of innovative topical drug delivery systems

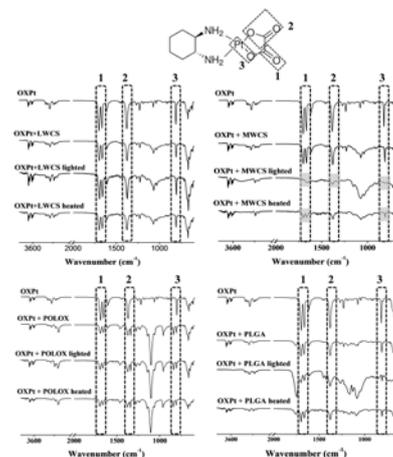
Thaiene A Reis¹, Breno N Matos¹, Juliano A Chaker², Eliana M Lima³, Tais Gratieri¹, Marcílio S S Cunha-Filho¹, Guilherme M Gelfuso¹. Laboratory of Food, Drug and Cosmetics (LTMAC), University of Brasília¹, Brasília, DF, Brazil; Faculty of Ceilandia, University of Brasília², Brasília, DF, Brazil; Laboratory of Pharmaceutical Technology, University of Goiás³, Goiânia, GO, Brazil.

Introduction. Oxaliplatin (OXPt) is a third generation platinum chemotherapeutical compound with reduced incidence of certain toxicities related to other platin-based regimens. Dose related toxicity, however, has been observed in clinical trials in which this drug was systemically.

Aims. This work aimed to assess physicochemical characteristics of OXPt and to determine its compatibility with the polymeric matrices with most relevance in development of topical drug delivery systems.

Methods. Physicochemical characteristics of drug were assessed following solubility and partition coefficient (Log P) assays. Thermal analysis (DSC and DTG) associated with molecular (FTIR), crystallographic (XRPD) and morphologic (optical microscopy) characterizations of the drug alone or associated (50:50, w/w) with polymeric matrices (PLGA, Poloxamer 407, chitosan of low or medium molecular weight) were conducted.

Results and Discussion. OXPt could be classified as a class III drug according to BCS, i.e., it is highly water-soluble ($8.02 \pm 0.23 \text{ mg mL}^{-1}$) but low permeable (Log P was -2.06 ± 0.22). Probable difficulty of OXPt in permeating biological membranes justifies our search for novel polymeric delivery systems aiming topical application. OXPt in solid state showed to be adequate for regular pharmaceutical manufacturing conditions, being stable even when exposed to heating and light. Among tested polymers, only chitosan of medium molecular weight showed to be incompatible with OXPt, with strong evidence of chemical decomposition and physical changes in drug-polymer samples. Another tested polymers may be indicated for the development of innovative topical delivery systems containing OXPt.



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Drug delivery systems based on polymeric nanocarriers and polysaccharide hydrogels for local treatment of bone tissue diseases

Elżbieta Pamuła¹, Urszula Cibor¹, Katarzyna Reczyńska¹, Małgorzata Krok-Borkowicz¹, Łucja Rumian¹, Krzysztof Pietryga¹. AGH University of Science and Technology, Faculty of Materials Science and Ceramics, Department of Biomaterials¹, Kraków, PL

Introduction. Bone tissue diseases such as osteomyelitis, osteoporosis or bone metastasis affect millions of people worldwide. Bone infections are usually treated with antibiotics via parenteral route, while osteoporosis and bone metastasis are predominantly treated with bisphosphonates administered orally. Both routes suffer from insufficient biodistribution and systemic toxicity of the drugs.

Aims. The main objective was to develop local drug delivery systems based on poly(lactide-co-glycolide) (PLGA) nanoparticles (NPs) processed into injectable or implantable drug delivery systems.

Methods. NPs produced by solid-in-water emulsification and characterised by DLS, SEM, AFM were: i) suspended in polysaccharide hydrogels to be administered by injection or ii) immobilised within highly-porous PLGA scaffolds to be implanted locally in the affected area. The systems were studied with respect to surgical handiness, mechanical properties (compression, rheology), drug release kinetics and in vitro activity (antimicrobial with *Staphylococcus* spp. or cytocompatibility with osteoblasts and osteoclasts).

Results and Discussion. Defined-size drug loaded NPs ($280 \pm 30 \text{ nm}$ in diameter, drug encapsulation efficiency $70 \pm 5\%$) were produced by double emulsification. The carriers released the drugs in a sustainable manner up to 35 days, which was prolonged up to 3 months when the carriers were suspended in hydrogels or processed into implantable forms. The systems containing antibiotics showed antimicrobial activity against classical strains of *S. aureus* and *S. epidermidis* and their clinical isolates from infected bones. The systems containing bisphosphonates downregulated osteoclasts and simultaneously did not affect osteoblast functions. Proposed processing methods preserved biological activity of encapsulated drugs and thus the systems may constitute promising solutions in site-specific therapies of bone tissues diseases.

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Evaluation of insulin-containing tablets *in vitro*

Chun Y Wong¹, Jorge Martinez¹, Crispin R Dass¹, School of Pharmacy, Curtin University¹, Bentley, WA.

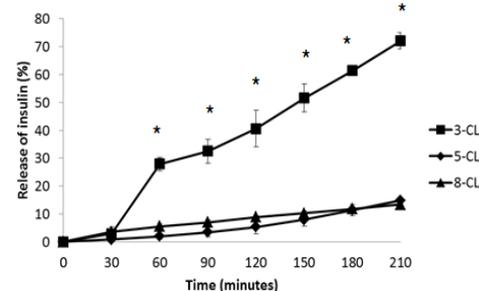
Introduction. Subcutaneous insulin injection is employed to lower blood glucose in patients with type 1 diabetes. Some incidence of concomitant side-effects, such as local pain, discomfort, irritation, needlestick injuries and possible skin infection by *Staphylococcus aureus* and *Mycobacterium chelonae* associated with injections may occur during treatment. Side-effects and stress of multiple daily injection can also reduce patient compliance and hinder the control of blood sugar level.

Aims. Administration of oral insulin could present a more convenient dosage form and improve patient compliance. The aim of the present work was to develop an enteric coated insulin tablet formulation using polymers, absorption enhancer and enzyme inhibitor, which protect the tablets in acidic pH and enhance systemic bioavailability.

Methods. In this study, the influence of coating by cellulose acetate hydrogen phthalate solution, and chosen excipients on Glut-4 transporter translocation in C2C12 skeletal muscle cells was examined. Following the determination of optimum number of coating layers, two dissolution buffers including pH 2, 0.01M hydrochloric acid and pH 7.4, 50mM phosphate were employed to determine the *in vitro* release of insulin.

Results. Insulin was protected by the coating during the dissolution process. Glut-4 translocation in C2C12 cells was promoted by the chosen excipients. No detrimental metabolic effects were observed in these cells.

Discussion. To date, limited studies combine the overall effectiveness of multiple excipients. Our study showed that the coated tablets have an immediate release effect in phosphate buffer. The combination of 5-CL of cellulose acetate hydrogen phthalate solution, chitosan (absorption enhancer) and sodium glycocholate (enzyme inhibitor) produced the desired effect of Glut-4 translocation in C2C12 cells.



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Addressing inequity in the care of premature and vulnerable infants: Improving cost-effectiveness of palivizumab respiratory syncytial virus (RSV) prophylaxis through rational dose regimen design

Michael B Ward & Stephanie E Reuter. School of Pharmacy and Medical Sciences, University of South Australia, Adelaide SA.

Introduction. RSV is a major cause of lower respiratory tract infection and bronchiolitis in infants and can be fatal. At present, there are no recommended pharmacological treatments for RSV disease; the only option is prevention by prophylaxis with palivizumab. In the context of high drug cost and the absence of PBS funding, affordable access to palivizumab for vulnerable infants has been devolved to local jurisdictions. As a result of discrepant outcomes, there now exists a situation in Australia whereby at-risk infants receive different care purely on the basis of the State in which they reside. Consequently, there is a significant need to improve the cost-effectiveness of palivizumab prophylaxis, and in doing so provide the opportunity for universal access for this vulnerable patient group.

Aim. The objective of this project was to design a pharmacokinetically-guided palivizumab dose regimen for RSV prophylaxis in premature and vulnerable infants that reduces drug utilisation whilst maintaining therapeutic efficacy.

Methods. Using advanced modelling and simulation, enabled by a rigorous industry-developed pharmacokinetic model, optimal palivizumab dose regimens were explored for a representative patient population through the moderation of dose magnitude, number of doses and dose interval; this was investigated using an iterative approach.

Results. A logical, clinically practical palivizumab dose regimen was identified that reduces drug utilisation by 25%. Furthermore, the rational design of the regimen also enables a greater proportion of infants attaining target concentrations, particular those considered to be at greatest risk of RSV. Importantly, because of injection site volume restriction, this regimen also results in a substantial reduction in the number of infants who require more than one injection in order to achieve their requisite dose at any individual time-point.

Discussion. Through maximisation of pharmacokinetic efficiency and intelligent dose regimen design, a substantial reduction in palivizumab drug requirements can be achieved. The identified rationally-designed palivizumab dose regimen can be readily implemented, with no further imposition as compared with the standard regimen, but will generate substantial cost savings to those institutions already providing palivizumab therapy, and provide greater equity of access across Australia and internationally.



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Development of a LC-MS/MS method for the analysis of ivacaftor, its metabolites and lumacaftor in cystic fibrosis patients treated with ORKAMBI/KALYDECO

Elena K. Schneider¹, Felisa Reyes-Ortega, Jian Li^{1,2}, Tony Velkov¹

¹Drug Delivery, Disposition and Dynamics, Monash Institute of Pharmaceutical Sciences; Monash University, Parkville, VIC 3052, Australia; ²Monash Biomedicine Discovery Institute, Department of Microbiology, Monash University, Clayton, VIC 3800, Australia

Introduction: ORKAMBI (ivacaftor-lumacaftor [LUMA]) and KALYDECO (ivacaftor; IVA) are two new breakthrough cystic fibrosis drugs that directly modulate the activity of the defective CFTR underlying the CF disease state. Currently, no therapeutic drug monitoring assays exist for these very expensive, albeit, important drugs.

Aims: For the first time HPLC and LC-MS methods were developed and validated for rapid detection and quantification of IVA and its metabolites M1 and M6; and LUMA in the plasma and sputum of CF patients.

Methods: With a mobile phase consisting of acetonitrile/water:0.1% formic acid (60:40 v/v) at a flow rate of 1 mL/min, a linear correlation was observed over a concentration range from 0.01 to 10 µg/mL in human plasma.

Results: The assay was successfully utilized to quantify LUMA, IVA, M1 and M6 in the plasma and sputum of patients treated with KALYDECO (IVA 150 mg/q12 h) or ORKAMBI (200 mg/q12 h LUMA-125 mg/q12 h IVA). The KALYDECO patient exhibited IVA plasma concentration of 0.97 µg/mL at 2.5 h post dosage. M1 and M6 plasma concentrations were 0.50 µg/mL and 0.16 µg/mL, respectively. Surprisingly, the ORKAMBI patient displayed very low plasma concentrations of IVA (0.06 µg/mL) and M1 (0.07 µg/mL) and comparable M6 concentrations (0.15 µg/mL). We observed a relatively high plasma concentration of LUMA (4.42 µg/mL).

Discussion: This novel method offers a simple and sensitive approach for TDM of KALYDECO and ORKAMBI. The introduction of the assay into the clinical setting will facilitate pharmacokinetics/pharmacodynamic analysis and assist clinicians to develop more cost effective and efficacious dosage regimens for these breakthrough CF drugs.

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Can the co-spray drying of a lung surfactant, 1,2-dipalmitoyl-sn-glycero-3-phosphatidylcholine (DPPC) with anti-TB drugs increase aerosolization of the drugs?

Bhamini Rangnekar, Basanth B Eedara, Shyamal C Das. New Zealand's National School of Pharmacy, University of Otago, Dunedin, OTAGO

Introduction. The treatment via pulmonary delivery is potentially more efficient than current oral and parenteral anti-tubercular treatments due to its ability to deliver a higher drug concentration to the lungs. For treating TB, a high dose of the drug (many milligrams) needs to be delivered to the lungs requiring to develop highly aerosolizable powders.

Aims. The aim was to investigate the influence of lung surfactant, DPPC, on the aerosolization of a hydrophilic anti-TB drug, pyrazinamide and a hydrophobic drug, moxifloxacin HCl in the presence or absence of L-Leucine.

Methods. Individual powders of supplied pyrazinamide and moxifloxacin HCl alone and with 10% L-leucine and 10% DPPC were produced by spray drying. The powders were characterized for physicochemical properties. Aerosolization behavior (fine particle fraction (FPF) which is an in vitro measure of deep lung delivery and emitted dose were determined by a next generation impactor.

Results. The particle size of all powders except spray dried pyrazinamide was < 5 µm. The emitted doses of all the spray dried powders were very high (~80%). The spray dried pyrazinamide showed poor aerosolization behaviour (FPF of 18.7 ± 3.4%). However, the co-spray drying of pyrazinamide with L-leucine produced spherical hollow particles and improved aerosolization (FPF 53.0 ± 3.2%). The co-spray drying of addition of pyrazinamide with DPPC and L-leucine further improved aerosolization (FPF 74.5 ± 5.3%). However, the aerosolization of spray dried moxifloxacin although increased by co-spray drying with L-leucine (FPF from FPF 55.6 ± 3.3% to 74.1 ± 1.3%), it was not further increased when spray dried with both DPPC and L-Leucine.

Discussion. The lung surfactant, DPPC can improve aerosolization of a relatively hydrophilic anti-TB drug, pyrazinamide in presence of L-Leucine. However, the aerosolization of relatively hydrophobic moxifloxacin HCl can be increased with L-Leucine, the addition of DPPC with L-Leucine cannot increase aerosolization. Although further studies are required, it is postulated that improved aerosolization could be due to the DPPC migrating to the surface.



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Evaluation of a simulated training package about a hospital patient's journey

H Laetitia Hattingh¹, Denise Robinson¹, Sue White¹, Alison Kelly². School of Pharmacy¹, Curtin University, Perth, WA; Faculty of Health Sciences², Curtin University, Perth, WA

Introduction. Exposing pharmacy students to hospital pharmacy through work-integrated learning provides an opportunity for students to develop a working knowledge of hospital procedures and practices. The Australian Pharmacy Council Accreditation Standards for Pharmacy Programs state that it is important for hospital practice settings to be experienced during undergraduate degree programs.¹ Anecdotal feedback from hospital pharmacists and students during placement debrief sessions indicated that students would benefit from and value having a greater understanding of the model of care that operates within a hospital prior to completing such placements.

Aims. To develop an online training package for undergraduate students to simulate a patient's hospital journey, and medication management and reconciliation processes, which was to be completed prior to hospital placements.

Methods. Mixed methodology was used for the evaluation of the five module training package and the impact of the training on students' confidence, knowledge and skills. Evaluation involved 1) written pre- and post-tests and (April 2016) 2) an end-of-training survey to obtain quantitative and qualitative feedback (June 2016).

Results. At baseline, 79 students completed the pre-test and there were differences between students who had already completed a hospital placement and those who had not. Following the training, 44 students completed the post-test and those who had not previously undertaken a hospital placement showed statistically significant improvements and gained similar test scores to those that had previously undertaken a hospital placement ($p=0.5838$). The change in score for the 44 participants who completed both tests was very statistically significant ($p<0.0001$). Assessment of students' confidence according to the 16 ranking statements also improved markedly post-training.

Discussion. The training package appeared to significantly increase students' test scores and confidence in dealing with a range of situations. This online package will in future be used with face-to-face workshops to better prepare students for hospital pharmacy placements.

1. Australian Pharmacy Council Ltd. Accreditation Standards for Pharmacy Programs in Australia and New Zealand. Australian Pharmacy Council; 2012. p. 1-22.

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Consumers with a Lived Experience of Mental Illness as Simulated Patients: An Innovative Education Tool For Pharmacy Students.

Evelyn A. Boukouvalas¹, Timothy F. Chen¹, Bandana Saini¹, Rebekah Moles¹, Sarira El-Den¹ Claire L. O'Reilly¹ Faculty of Pharmacy, The University of Sydney¹, Sydney, NSW

Introduction. Suicide is the second leading cause of death globally among adolescents and young adults. Trained health care professionals including pharmacists have the potential to recognize and assist those at risk of a suicidal crisis.

Aims. To assess the impact of consumers with a lived experience of mental illness as simulated patients on final year pharmacy student's confidence towards suicide, post Mental Health First Aid (MHFA) training.

Methods. A three group pre-post-post test design was used. Following MHFA training, the first group directly *participated* in the simulation, the second group *observed*, and the final group had no exposure to the patient scenario. Consumers with a lived experience of mental illness enacted patients experiencing a mental health crisis. Surveys measuring changes in student confidence (8-item test) were conducted at three time points; pre and post MHFA and then at 6 weeks follow up.

Results. 33 participants, 99 observers and 48 comparator group students completed the survey at all 3 time points. Mean confidence scores significantly improved for all groups post MHFA training ($p<0.001$). At 6-week follow up, all 8 confidence items for the participant group, and 4 of the 8 items for the observer group further improved and maintained significance from baseline post intervention ($p<0.001$). Whilst the final comparison group showed improved confidence post MHFA, all mean confidence scores decreased at 6 weeks follow up.

Discussion. These data suggest that the use of consumers with a lived experience of mental illness as simulated patients had a significant effect in sustaining the positive impacts of MHFA on pharmacy student confidence. Future larger scale studies are needed to further investigate the impact of this innovative teaching intervention in aiding the retention of learning and cementing of confidence towards supporting people at risk suicide.



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A systematic review of educational interventions to teach medication history taking

Vien T Truong¹, Paulina Stehlik¹, Rebekah Moles¹, Carl Schneider¹. Dept of Pharmacy, Univ of Sydney¹, Camperdown, NSW

Introduction. Obtaining an accurate medication history is central to preventing medication errors and forms the basis for clinical decision making. However, sound medication history taking skills and the required communication skills have been found to be lacking or poorly developed in health professionals and students.

Aims. This review aimed to examine the effectiveness of various education interventions in teaching medication history taking skills.

Methods. MEDLINE, EMBASE, CINAHL and International Pharmaceutical Abstracts (IPA) were systematically searched up to April 2016 according to the PRISMA guidelines. Included studies focused on educational interventions designed to teach medication history taking skills and had at least one outcome measure for evaluation of the intervention.

Results. Sixteen studies met the inclusion criteria. Various methods of teaching and assessment were used in different educational interventions. Educational interventions included didactic methods, interactive workshops, self-instructional modules, patient simulation and real-life medication history interviewing with patients.

Discussion. Experiential learning demonstrated the most favourable results followed by simulation. Interventions which used purely didactic teaching methods found statistically insignificant or unfavourable results. Overall, this review found that teaching and assessment methods of learners that were constructively aligned achieved better learning outcomes.

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Community Medicines Clinic – a patient-centred example for student engagement with health literacy

James M Windle¹, Aynsley K Peterson¹, Rhiannon Braund¹, Stephen B Duffull¹. School of Pharmacy, Univ of Otago¹, Dunedin.

Introduction. In 2014, the School of Pharmacy at the University of Otago, Dunedin, commenced Medicines Health and Literacy Clinics (MHLC) within local communities. The MHLC (adapted from 'Brown Bag' Medication Reviews) encourages patients to bring all of their medicines and supplements to a community setting, without appointment or cost, for patient-initiated discussion with pharmacists and students. This paper reports on the clinic outcomes over one year focusing on opportunities for student engagement and learning about adult health literacy.

Aims. The aim was to both gauge and receive feedback if providing a community based patient-centred placement opportunity for final year students would better their understanding about adult health literacy.

Methods. Final year pharmacy students volunteers were selected to attend MHLC held approximately monthly in suburban community settings between June 2014 and June 2015. Student pre-and post-clinic activities included 1) pre-clinic health literacy related readings, 2) a post-clinic reflection assignment and 3) voluntarily consent to completing an exit survey to identify changes in student understanding on health literacy. The survey was approved by the University of Otago Ethics Committee.

Results. A total of 65 patients and 36 students attended 11 clinics during this period. Twenty four students consented to complete the study survey. There was an overall small mean positive shift of knowledge on adult health literacy reported (3.41 prior to 2.85 after attending MHLC on a 5 point Likert scale). Seven students reported a negative shift in literacy learning however several had reported overestimating their level of knowledge prior to clinic attendance. Student reflection comments demonstrated valuable clinical and literacy tuition from academic pharmacists during the clinic and that students were supported in their own conversations with patients. Commonly reported concerns prior to attending clinics were 1) insecurity about lack of prior knowledge and 2) that their communication may be misunderstood. Student contribution to patient conversations were reported as being adequate or fully inclusive and all students wished to participate further in future clinics.

Discussion. Student survey and reflection feedback showed positive literacy learning experiences when clinics were supported with resources including pre-readings, academic pharmacist support when contributing to patient conversations, debriefing opportunities and post clinic reflections. Additional clinic opportunities are recommended.



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Students' and pharmacy educators' perceptions of integrating the Reflective Ability Clinical Assessment (RACA) into an undergraduate curriculum

Cherie Tsingos-Lucas^{1,2}, Sinthia Bosnic-Anticevich³, Lorraine Smith¹.

Faculty of Pharmacy, The University of Sydney, Sydney, NSW¹; Graduate School of Health, University of Technology Sydney, NSW²; Woolcock Institute of Medical Research, The University of Sydney, Sydney, NSW³.

Introduction. Reflective practice has the potential to improve reflective thinking, self and peer reflection, problem solving, counseling skills, and provide skills for better future practice [1]. The RACA (Reflective Ability Clinical Assessment (RACA) was developed, tested and evaluated as a novel learning and teaching tool in a pharmacy curriculum to enhance reflective capacity of students [1].

Aims. To evaluate students' and pharmacy educators' perceptions of the utility of the RACA in an undergraduate pharmacy curriculum at an Australian University.

Methods. A mixed method study was employed. The administration of a 7-item student survey on a 6-point Likert-type scale and a focus group or telephone interview with educators was conducted.

Results. Student responses ($n=199$) indicated statistically significant positive correlations between self-directed learning, counseling skills, relevance to future practice and performance in an oral examination ($ps<0.05$). Seven key themes emerged from the pharmacy educators' ($n=3$) focus group/telephone sessions: (i) Usefulness; (ii) Value; (iii) Student Experience; (iv) Student Engagement; (v) Challenges; (vi) Sustainability and (vii) Improvement.

Discussion. The study revealed both students' and pharmacy educators' perceived value with the implementation of the RACA as a novel educational tool to enhance self and peer reflection to improve skill development for future clinical practice. Most students, despite their initial apprehensive thoughts, perceived the RACA as a useful component of the curriculum, and reported its greatest value as assisting them with counseling skills. The pharmacy educator participants perceived the RACA to be beneficial and provided insights for scaffolding of this tool for future cohorts.

[1] Tsingos-Lucas C *et al.* (2016) The effect of reflective activities on reflective thinking ability in an undergraduate pharmacy curriculum. *Am J Pharm Educ*; 2016; 80(4), Article 65.

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Making Bachelor of Pharmacy Students Hospital Placement Ready: a Monash Experience

Johnson George¹, Simone Taylor², Anne Leversha¹, David Kong¹, Jenny McDowell¹. Centre for Medicine Use and Safety, Monash University¹, Parkville, VIC; Pharmacy Department, Austin Health², Heidelberg, VIC

Introduction. Many pharmacy students at Monash University work part-time in community pharmacy and are well prepared for their community pharmacy professional experience placement (PEP). In contrast, the first hospital PEP in late third year or early fourth year, for most students provides their first real hospital pharmacy experience. Feedback from hospital preceptors and lecturers suggested a need to develop hands-on training and assessments focused on hospital practice, to better prepare students for their hospital PEPs.

Aims. To develop and implement a hospital practice tutorial series to prepare pharmacy students for their hospital PEP, evaluate changes in student perceptions of their understanding and obtain feedback on their experiences.

Methods. Case vignettes based upon real patient scenarios were developed by the investigatory team comprising the unit coordinator, teaching staff and an education projects coordinator. These vignettes were video recorded at the Austin Health Simulation Centre. Three two-hour tutorials were developed to include the video case vignettes, discussion and small group tasks/formative assessments. Practising hospital pharmacists delivered the tutorials to third year students ($n=203$) before students undertook their hospital PEP. Student perceptions were evaluated using an anonymous questionnaire administered before the first tutorial and after the last tutorial. The questionnaire included seven items on preparedness for hospital placement, rated on a scale of 1 (very poor) to 5 (excellent); changes in perceptions before and after the tutorial series were assessed using Mann-Whitney U test. Students could comment on their perceived preparedness for hospital PEPs and provide suggestions.

Results. Six case vignettes were developed based on key hospital practice content areas: medication reconciliation and review, counselling and medicines information. Participation rates in the pre- and post-tutorial surveys were 68% and 81%, respectively. Significant ($p<0.001$) improvements from baseline in clinical knowledge, and student understanding of the hospital system, pharmacist roles and interactions with other health professionals were found. Most students appreciated the learning opportunity, however some wanted more practical hands-on activities.

Discussion. The hospital tutorials prepare students for PEPs by improving their understanding of hospital practice and pharmacist roles. Additional tutorials and clinical activities may further increase student confidence.



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Systematic review of polypharmacy definition, assessment tools and association with clinical outcomes

Nashwa Masnoon^{1,2}, Sepehr Shakib^{3,4}, Lisa Kalisch¹, Gillian Caughey^{1,3}. School of Pharmacy and Medical Sciences, Univ of South Australia, Adelaide, SA¹; Dept of Pharmacy, Royal Adelaide Hosp, Adelaide, SA²; Dept of Clinical Pharmacol, Royal Adelaide Hosp, Adelaide, SA³; Dept of Clinical Pharmacol, Univ of Adelaide, Adelaide, SA⁴.

Introduction. Multimorbidity and the use of multiple medicines, commonly referred to as polypharmacy, is common in the older population. However there is no consensus definition of polypharmacy.

Aims. To conduct systematic reviews of polypharmacy definition, polypharmacy assessment tools and their associations with clinical outcomes.

Methods. Three systematic reviews were conducted using Medline/Embase databases of articles in English between 2000-2016 which i) defined polypharmacy ii) explored tools that assess polypharmacy and iii) examined their associations with clinical outcomes.

Results. A total of 112 articles were identified for polypharmacy definitions. While the most commonly reported definition was five or more medications daily (n=51, 45.5%), definitions ranged from two or more, to 11 or more medications daily. While a small minority of studies (6.3%) distinguished between appropriate and inappropriate polypharmacy, this distinction was not based on the pharmacology of medications. A total of 26 polypharmacy tools were identified and divided into two broad categories; tools with a scoring system (n=8) such as the Drug Burden Index and Anticholinergic Risk Scale and tools that do not provide a score (n=18) but criteria for appropriate or inappropriate prescribing such as the Beers Criteria. Out of the 26 tools identified, 50% were associated with at least one clinical outcome. Four of the tools were associated with mortality, hospitalisation and functional decline.

Discussion. Whilst the majority of studies used five or more medicines to define polypharmacy, a numerical definition does not consider the pharmacology of medications involved and may not be clinically relevant for defining appropriate from inappropriate polypharmacy. There is a need for tools which consider polypharmacy at an individualised-patient level to provide tailored guidance around optimising appropriate therapy and deprescribing inappropriate therapy to improve health outcomes.

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Adherence by disease state – Can a Leximancer™ analysis shed light on common and dissonant factors?

Greg J Kyle¹. Discipline of Pharmacy, Queensland University of Technology, Brisbane, QLD

Introduction. Adherence is the major factor in determining improved health outcomes from medicines in the long term. Systematic reviews are often focussed on one factor or condition to reduce the workload of reading and analysing hundreds of articles. Leximancer™ can reduce the workload by providing a textual analysis which can then be interpreted by the researcher.

Aims. To use Leximancer™ software to analyse adherence by disease state in a subset of articles found using a systematic search protocol for general adherence to medication.

Methods. Full text articles were extracted from an EndNoteX7 database containing 1197 articles by title disease state keyword. Disease keywords were: hypertension (HT), heart failure (CHF), heart disease (CVD), asthma, HIV, diabetes and mental health (MH). All full-text articles were added to separate folders and a Leximancer™ project and the data cloud produced tagged with the folder names (disease state). Part words included in the analysis were removed as were word artefacts (eg "Table") and singular/plural versions of the same word were combined.

Results. A total of 336 were included in the analysis. "Adherence" was centrally located. Diabetes, and asthma tags were almost collocated around concepts of "control", "monitoring", "management" and "costs". Diabetes, asthma, HT, and CHF were more closely associated with the "patient" theme, whereas HIV and MH were more closely associated with "participants". CVD was approximately equidistant. "Adherence" was closely associated with "research", "interventions", "treatment" and "health". "Compliance" was almost equidistant between the CHF and HT folder tags and more closely associated with "patient" compared to "adherence". "Drug" and "clinic" were co-located equidistant between HIV and MH tags. "Baseline" was next to "analysis" and close to the MH tag and "scale" indicating the propensity of psychologists for robust data protocols and analysis.

Discussion. This sub-analysis shown some interesting relationships between the vocabulary used in reporting adherence between different disease states. Most would assume the adherence vocabulary would be constant across disease states, whereas this analysis shows subtle differences. These differences could dilute the messages being delivered in this space, but can also indicate the differing vocabularies used between disciplines discussing their patient groups.

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Development and principal components analysis of a survey measuring pharmacists' attitudes towards perinatal depression

Sarira El-Den¹, Claire L. O'Reilly¹, Timothy F. Chen.¹ Faculty of Pharmacy, The University of Sydney¹, Sydney, NSW.

Introduction. Australian recommendations encourage perinatal depression (PND) assessment/screening by health care professionals (HCPs). A systematic review on PND screening acceptability reported a lack of psychometrically tested acceptability measures.¹ Furthermore, pharmacists were not among the HCPs involved.¹

Aims. To develop and psychometrically evaluate a survey that measures pharmacists' attitudes towards PND, including their acceptability of being involved in screening.

Methods. A 31-item survey was developed based on the systematic review and previously published surveys. The survey was distributed to members of the Australian Association of Consultant Pharmacy using a Survey Monkey link through electronic reminders. Principal components analysis (PCA) with direct oblimin rotation was conducted using SPSS.

Results. A total of 153 useable surveys were collected. PCA resulted in a six-component solution, explaining 59.8% of the variance. No items cross-loaded at less than 0.2. Six items loaded (0.561-0.870) onto component 1 and explored the acceptability of screening. Seven items loaded (0.445-0.722) onto component 2 and explored PND stigma. Three items loaded (0.551-0.880) onto component 3 and explored attitudes towards therapy. Three items loaded (0.578-0.878) onto component 4 and explored readiness to screen. Three items loaded (0.588-0.714) onto component 5 and explored attitudes towards medication counselling. Two items loaded (0.717, 0.802) onto component 6 and explored opinions on how PND affects other family members. Cronbach alpha of each component ranged from 0.448-0.855.

Discussion. A survey measuring pharmacists' attitudes towards PND has been developed and psychometrically evaluated. Using PCA, the construct validity and internal consistency reliability of the survey were demonstrated.

1. El-Den, S., O'Reilly, C. L., & Chen, T. F. (2015). A systematic review on the acceptability of perinatal depression screening. *Journal of Affective Disorders, 188*, 284-303.

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Discursis® visualization of hospital pharmacist-patient communication during medication counselling

Bernadette AM Chevalier¹, Bernadette M Watson², Michael A Barras^{1,4}, W Neil Cottrell,¹ Daniel Angus³

School of Pharmacy,¹ School of Psychology², School of Communication and Arts,³ The University of Queensland, Brisbane, QLD; Pharmacy Department, Royal Brisbane and Women's Hospital⁴, Brisbane, QLD

Introduction. Effectiveness of pharmacist-patient communication can be successfully investigated using Communication Accommodation Theory (CAT) strategies. Discursis® software, as an adjunct to qualitative analyses, provides a chronological, visual plot of communication exchanges and allows for the identification of interactant engagement. Interpretation of pharmacist-patient interactions may be enhanced by using Discursis®.

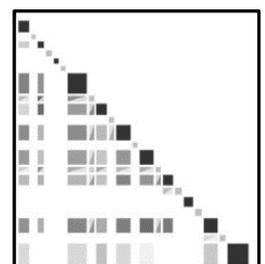
Aims. To examine Discursis® plots of pharmacist-patient exchanges, and to invoke CAT to further investigate Discursis® identified communication patterns, and episodes of engagement/non-engagement.

Methods. Graphical Discursis® plots were produced from transcribed audio recorded pharmacist-patient interactions conducted as part of a larger PhD project. Representative plots from inpatient and outpatient settings were selected to show low/high levels of speaker engagement. Details of engagement were investigated using CAT strategies (approximation, interpretability, discourse management, emotional expression, and interpersonal control) to better understand communication taking place.

Results. Characteristic patterns in outpatient interactions (medication reviews) showed longer patient responses (larger squares) whereas most inpatient interactions occurred at discharge and reflected pharmacists' conversation dominance with larger, more frequent squares. High pharmacist-patient engagement was depicted by multiple half/half squares meaning each speaker picked up on the other's previous concept (shown in plot). Low engagement episodes were shown as alternating squares only. Engagement episodes revealed pharmacist use of CAT strategies such as discourse management (face-maintenance or allowing the patient to save face).

Conclusions. Discursis® plots allowed for the identification of distinct patterns occurring within pharmacist-patient exchanges, and as an effective visualisation tool to pin point episodes for further analysis using CAT strategies.

■ Pharmacist ■ Patient
■ Shared concept



Discursis® Plot
Inpatient Setting
Engagement
Episode



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“The value of ‘I don’t know’ – handling missing data in electronic surveys”

Ardalan Mirzaei¹, Stephen R. Carter¹, Carl R. Schneider¹. Faculty of Pharmacy, The University of Sydney¹, Sydney, NSW

Introduction. Completing paper-based surveys can lead to respondents’ choices being artificially constrained if the option “I don’t know” is not available. Yet, missing data can lead to a loss of power in performing analyses. Electronic surveys can overcome this source of missingness by forcing responses for every item, even if “I don’t know” is not available. This could lead to inaccurate interpretation of data.

Aims. To determine whether survey responses of “I don’t know” are reflective of conceptual thought.

Methods. A cross-sectional study was conducted using an electronic survey, completed by consumers while waiting for their prescriptions in an Australian metropolitan pharmacy with a price-focused marketing strategy (PFMS). Inclusion criteria were adults who visited the pharmacy regularly for a prescription or non-prescription medicine. A response to each item was required before progressing using a Likert-type response scale with an option of “I don’t know”. Little’s test for missing completely at random (MCAR) was used to determine the nature of “I don’t know” responses. Parallel analysis, a form of exploratory factor analysis, was used to identify factors.

Results. Data from 372 participants were analysed. Responses of “I don’t know” were converted to a missing value before analysis. Tests showed data was not missing completely at random (MCAR) suggesting that these responses are either missing at random (MAR) or missing not at random (MNAR). Parallel analysis of the dataset with and without high levels of missing items yielded a one factor difference suggesting that data is missing not at random (MNAR). Conceptual analysis of the items that contained high levels of missing values formed the construct “perceptions of special services”.

Discussion. The PFMS pharmacy does not focus its marketing on the special services it may or may not provide. As such, respondents to a survey that assesses service quality could not form an opinion on “special services” when they have had minimal or no exposure. Performing factor analysis with “I don’t know” responses can provide valuable insight into respondents’ conceptual thoughts, attitudes and intended behaviours. This demonstrates that providing respondents with the option of “I don’t know” allows greater definition in capturing participant perceptions.

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Assessing genome-wide association studies for spin and quality

Kellia Chiu^{1,2}, Quinn Grundy^{1,2}, Lisa Bero^{1,2}. Faculty of Pharmacy, Univ of Sydney¹, Sydney, NSW; Charles Perkins Centre, Univ of Sydney², Sydney, NSW.

Introduction. Genome-wide association studies (GWAS) are commonly used to identify genetic variants that may be associated with particular traits or clinical conditions. An emerging application of GWAS is in the area of drug development and precision medicine, with researchers aiming to use genetic evidence to identify potential targets for drug therapy. However, GWAS are unable to definitively establish clinically relevant causal or predictive relationships between variants and phenotypes, thus conclusions related to drug discovery may be overly optimistic.

Aims. To assess the quality of, and to identify occurrences of ‘spin’ (biased interpretation of results) in GWAS, using a sample of studies by the genomics company, 23andMe, and a matched second sample with no 23andMe affiliations.

Methods. After performing an affiliation search for 23andMe on six electronic databases, a sample of 23andMe-affiliated studies were included. A second sample was generated to match the 23andMe sample by clinical topic and year of publication. Quality was assessed using a tool based on components from the Strengthening the Reporting of Genetic Association Studies reporting checklist. Spin was assessed by identifying occurrences of inappropriate attribution of causality, or over-extrapolation of the genotype-phenotype relationship.

Results. Fifteen studies with authors affiliated with 23andMe and 11 non-23andMe-affiliated studies were included. All 23andMe studies used online questionnaires to collect self-reported phenotype data from its voluntary customers, and contained selection and measurement bias. Thirteen of the studies did not sufficiently adjust for confounders. Spin was identified in 13 of the 15 studies, and over-extrapolating results was the most common spin strategy used. The matched studies had a lower prevalence of selection and measurement bias, and spin.

Discussion. Spin in GWAS is common and the methods of determining genotype-phenotype associations are of variable quality. While GWAS are useful, unbiased tools for identifying novel genetic variants across the genome, its applicability to drug development and screening for disease risk has yet to be fully established.



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The Tasmanian Atrial Fibrillation Study: Transition to Direct Oral Anticoagulants, 2011-2015.

Endalkachew Admassie¹, Leanne Chalmers¹, Luke R. Bereznicki¹. ¹Division of Pharmacy, School of Medicine, University of Tasmania, Hobart, TAS.

Introduction. Contemporary Australian data regarding antithrombotic prescribing patterns following approval of direct oral anticoagulants (DOACs) in patients with atrial fibrillation (AF) are limited.

Aims. We aimed to assess antithrombotic prescribing patterns in AF before, during and after the introduction of DOACs.

Methods. Using digital medical records, this retrospective cohort included all patients with AF as a primary or secondary diagnosis who were admitted to the Royal Hobart Hospital, Tasmania, Australia, between January 2011 and July 2015.

Results. Antithrombotic agents were prescribed for 2078 of 2261 (91.9%) patients with AF without documented contraindication to therapy. Warfarin or a DOAC were prescribed for 920 (40.7%) and 383 (16.9%) patients, respectively; 745 (33.0%) patients received antiplatelet therapy. A higher proportion of patients was prescribed OACs following Government subsidisation of DOACs in Quarter 3 (Q3) 2013 than OAC prescribing in the preceding quarters, (54.4% in Q3, 2013 to 68.1% in Q2, 2015, $p < 0.001$), with the prescribing of warfarin and antiplatelet agents declining (38.1% to 22.1% and 45.6% to 31.9%, respectively, $p < 0.001$). The proportion of patients receiving a DOAC steadily increased from 3.9% among OAC users in Q3, 2011 to 67.6% in Q2, 2015 ($p < 0.001$). In a sub-set of patients with newly diagnosed AF, patients commenced on DOACs were younger (70.4 vs. 73.8 years, $p = 0.04$) and had lower stroke and bleeding risk scores (CHA₂DS₂-VASc 2.8 vs. 3.3, $p = 0.03$, HAS-BLED 2.1 vs. 2.3, $p = 0.04$) than patients newly prescribed warfarin.

Discussion. DOACs rapidly became the drugs of choice for stroke prevention in NVAf and higher OAC prescribing rates were observed later in our study period. This corresponded with the commencement of Government subsidy of the new agents in August 2013. Nonetheless, antiplatelet agents accounted for a quarter to a third of all antithrombotic prescribing after DOACs became widely available highlighting the need for further improvement.

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The Utilisation of Antithrombotic Therapy in Older Patients in Aged Care Facilities with Atrial Fibrillation

Bridget Frain¹, Ronald Castelino¹, Luke Bereznicki¹ Div of Pharm, School of Med, Univ of Tasmania, Hobart, TAS ¹

Introduction. Oral Anticoagulants are essential drugs for the prevention of thromboembolic events in patients with atrial fibrillation (AF). While the underutilisation of anticoagulants in elderly patients with AF has been demonstrated internationally, few studies have been conducted among aged care residents in Australia.

Aims. The aim of this study was to determine the utilisation of anticoagulants with respect to stroke and bleeding risk among people with AF residing in aged care facilities.

Methods. We performed a non-experimental, retrospective analysis designed to evaluate antithrombotic usage in older patients with AF in Australia using data collected by pharmacists while performing Residential Medication Management Reviews (RMMRs). The utilisation of antithrombotic therapy and the appropriateness of therapy were determined based on the CHADS₂, CHA₂DS₂-VASc and HAS-BLED risk stratification schemes, and the appropriateness of therapy was considered in the light of documented contraindications to treatment. Predictors of anticoagulant use were determined using multivariate logistic regression.

Results. A total 1952 RMMR patients with AF were identified. Only 35.6% of eligible patients (CHADS₂ score ≥ 2 and no contraindications to anticoagulants) received an anticoagulant. As age increased, the likelihood of receiving an anticoagulant decreased, and the likelihood of receiving antiplatelet therapy or no therapy increased. In patients with a high risk of stroke (CHADS score ≥ 2), utilisation of anticoagulants dropped by 19.7% when the HAS-BLED score increased from 2 to 3, suggesting that physicians placed a heavier weighting on bleeding risk rather than stroke risk in the study population.

Discussion. Anticoagulant medications appeared to be underused in this elderly population, whose risk of stroke often exceeded their risk of bleeding. Prescribing of anticoagulants was influenced to a greater extent by bleeding risk than it was by the risk of stroke. Further research investigating whether the availability of direct oral anticoagulants changes practice in this patient population is needed.



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The relationship between anticoagulation knowledge, health literacy and medication adherence in patients with atrial fibrillation

Kehinde O Obamiro, Chanelle Rolls, Leanne Chalmers & Luke R Bereznicki. Pharmacy, School of Medicine, University of Tasmania, Hobart, TAS.

Introduction. Atrial fibrillation (AF) is associated with significant morbidity, mortality and economic implications. Patients with AF are often prescribed anticoagulants for the prevention of cardioembolic stroke and other embolic events. Patients' anticoagulation knowledge, level of medication adherence and health literacy are known to affect treatment outcomes. However, contemporary data regarding the relationships between these variables are lacking.

Aims. The aim of this study was to determine the relationships between anticoagulation knowledge, health literacy and medication adherence, and to investigate if knowledge is affected by health literacy levels.

Methods. A cross-sectional survey was conducted in 48 patients with AF identified from general practices. The Anticoagulation Knowledge Tool (AKT) was used to assess anticoagulation knowledge, the Short Test of Functional Health Literacy in Adults (s-TOHFLA) for health literacy and the 8-item Morisky Medication Adherence Scale (MMAS) for medication adherence. The relationships between study variables were assessed using Pearson's correlation coefficient, t-tests and regression analysis.

Result. Participants in the study had mean scores of 61.6 ± 15.8 for the AKT, 7.2 ± 1.1 for the MMAS-8, and 24.7 ± 9.5 for the s-TOHFLA. A significant correlation was observed between both anticoagulation knowledge and health literacy with medication adherence ($0.45, p < 0.01$ and $0.36, p < 0.05$, respectively). Participants with adequate health literacy had a significantly higher knowledge score than those with limited health literacy (66.1% vs 55.8% , $p < 0.05$), and regression analysis showed that both anticoagulation knowledge and health literacy scores were significant independent predictors of adherence levels ($0.03(95\%CI, 0.01-0.05), p=0.001$ and $0.04(95\%CI, 0.01-0.07), p=0.01$, respectively).

Discussion. Anticoagulation knowledge, health literacy and medication adherence were closely related and suboptimal in patients with AF. Further research in a larger population is required to definitely elucidate the magnitude of this problem. Future studies should also focus on developing effective interventions to improve anticoagulation knowledge, health literacy and medication adherence in this patient population.

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Self-management experience among Chinese women with Gestational diabetes

Yat Yin Eric Wah¹, Margaret McGill^{2,3}, Jencia Wong^{3,4}, Glynis P Ross^{4,5}, Anna-Jane Harding³, Ines Krass¹

Faculty of Pharmacy, The University of Sydney¹, Sydney, NSW; Central Clinical School, Sydney Medical School, The University of Sydney², Sydney, NSW; The Diabetes Centre, Royal Prince Alfred Hospital³, Sydney, NSW; Sydney Medical School, The University of Sydney³, Sydney, NSW; Department of Endocrinology, Royal Prince Alfred Hospital⁵, Sydney, NSW

Introduction. Gestational diabetes mellitus (GDM) is one of the most common complications of pregnancy. Women with GDM and their infants are at increased risk of serious health outcomes such as obstructed labour, congenital abnormalities, and stillbirth. Compared to many other ethnicities, Chinese women in Australia are more likely to develop GDM. To ensure they are provided with sufficient support, it is important to have an understanding of their experience in self-managing GDM. However, to date, no study has explored this area.

Aims. To investigate self-management experiences among Chinese migrants with GDM in Australia and factors influencing their self-management practice.

Methods. A qualitative study involving individual, semi-structured face-to-face interviews was conducted in August 2016. Participants were recruited from the antenatal clinic at the Royal Prince Alfred Hospital (RPAH). Interviews were audio-recorded, transcribed verbatim and thematically analysed. The study has ethics approval from the Sydney Local Health District Ethics Review Committee (RPAH Zone).

Results. Fifteen women aged 29-41 were interviewed at the clinic. Most of the participants came from China. The majority of participants demonstrated some knowledge of GDM, however, some expressed concerns about the rigidity of the prescribed diet, challenges when eating away from home and lack of nutritional information about Chinese food. Several factors influencing self-management were identified: barriers included lack of understanding of the self-management principles, lack of culturally sensitive dietary support and family and work responsibilities. Important facilitators included family support and concern for their baby's health.

Discussion. To assist Chinese women with GDM to better self-manage their condition, there is a need for greater cultural sensitivity among health care professionals and closer attention to ensuring a clear understanding of the principles behind lifestyle modification and self-monitoring practice in GDM.



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Current practices of assessing medication adherence in Australian dialysis centres

Saurav Ghimire¹, Colin Banks², Matthew D Jose², Ronald Castelino^{1,3}, Syed Tabish R Zaidi¹. Division of Pharmacy, University of Tasmania¹, Hobart, TAS; Department of Nephrology, Royal Hobart Hospital², Hobart, TAS; Sydney Nursing School, University of Sydney³, Sydney, NSW.

Introduction. Despite the high prevalence of medication nonadherence in dialysis patients, little is known about the practices of assessing medication adherence in Australian dialysis centres.

Aims. To determine the current practices of assessing medication adherence in Australian dialysis centres.

Methods. We conducted a cross-sectional survey of renal healthcare professionals (HCPs) in Australia between March and May 2016. An invitation flyer describing the study aims and a hyperlink to the online survey was sent to the HCPs through email alerts, e-newsletters, and social media posts through coordination with the professional organizations. Adherence assessment practices were identified using a 4-point graded response with do not practice at all until practice for every patient. Descriptive and inferential statistics were used for data analysis.

Results. Of 176 respondents, 171 identified their profession as renal nurses (n = 112), physicians (n = 18), and pharmacists (n = 41). Majority of the HCPs agreed (59.6%, n = 99) patients do not take their medicines as prescribed. Most of the HCPs agreed (86.7%, n = 137) medication history interview can be effective in identifying nonadherence however, over half the time (51.0%, n = 78) it was not practiced for every patient. Patient's family or carer were asked about medications only for those with high risk of adverse reactions (43.1%, n = 66). Most of the HCPs informed that objective assessment such as measuring phosphate levels or blood pressure monitoring was routinely conducted for every patient in their centres (78.3%, n = 119), though asking patients to bring their medication and counting them was rarely practiced (16.4%, n = 25). HCPs mostly agreed (90.5%, n = 143) presence of dedicated pharmacists would facilitate effective medication management in dialysis patients, however most of the time (55.9%, n = 85) pharmacists were not available for medication reviews and reconciliation in dialysis centres.

Discussion. HCPs acknowledged to high prevalence of medication nonadherence in dialysis patients however, the methods of screening medication adherence behaviour in patients were less utilized in the dialysis settings. Future research should explore the barriers to pharmacists' involvement in dialysis centres.

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Comparative effectiveness of interventions to reduce inappropriate prescribing in renal impairment: A Systematic Review

Wubshet Tesfaye¹, Ronald Castelino², Barbara Wimmer¹, Syed Tabish Zaidi¹. Pharmacy, School of Medicine, University of Tasmania¹, Hobart, TAS; Sydney Nursing School, The University of Sydney², Sydney, NSW.

Introduction. Reduction in renal function is associated with accumulation of medications causing unwanted adverse effects in patients with renal impairment. Reducing the doses of renally cleared medications and avoidance of nephrotoxic medications is a standard clinical practice though the prevalence of inappropriate prescribing (IP) in renal impairment is high.

Aims. To systematically review the prevalence of IP and compare the relative effectiveness of available interventions in reducing IP in patients with renal impairment.

Methods. Studies were identified searching PubMed/Medline, EMBASE, Cochrane Library, IPA, Web of Science, Ovid/Medline, CINAHL, and PsychINFO databases up to June 2016. Medical subject headings and keywords such as "renal impairment," and "dose adjustment" were used. Studies defining renal impairment based on laboratory parameters, studies quantifying the prevalence of IP and measuring the effect of interventions were included.

Results. Forty-nine studies from 23 countries met the inclusion criteria. The prevalence of IP ranged between 9.4 and 81.1% of the medications prescribed to renally-impaired patients. IP was associated with prolonged hospital stay [Mean (SD) of 4.5 (4.8) Vs 4.3 (4.5)], increased risk of mortality [40%], higher drug expenditure, and adverse drug events. Twenty-one studies reported the impact of interventions on decreasing IP. Manual supports involving training and feedback to physicians was the main form of intervention applied (n=11) followed by computerised alerts (n=8) and prompts of reduced estimated glomerular filtration rate (eGFR) (n=2). The most significant reduction in IP was obtained when physicians received concurrent feedback from a clinical pharmacist ($p < 0.001$); on the other hand, prompts of reduced eGFR were not able to decrease IP in patients with renal impairment ($p = 0.9$ and $p = 0.81$). Polypharmacy, comorbidities, and age were identified as predictors of IP.

Discussion. IP in renal impairment is high and is associated with poor patient outcomes. A number of interventions exist though pharmacist-based and computer-aided approaches have shown the most promising results. A multidisciplinary approach addressing the wide-spread prevalence of IP in renal impairment is urgently needed.



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Personalising health care: delivering an innovative smoking cessation intervention in Paris, France.

Oksana Burford¹, Souraya Kindarji², Richard Parsons¹, Hector Falcoff² School of Pharmacy, Curtin University¹, Perth, WA; Department of General Medicine, Paris Descartes University², Paris, France.

Introduction: A personalised, photo ageing tool combined with health care counselling was successfully delivered in Australian community pharmacies to motivate behavioural change in young smoking adults. Could this innovative smoking cessation intervention be delivered to another population of young adults with a higher prevalence of smoking and associated morbidities?

Aims. The primary aim of the study was to see if it was feasible and acceptable to demonstrate a novel, proven smoking cessation intervention to young French smoking adults and if they were engaged with it. The secondary aims of the study were efficacy of the intervention on quit attempts and reduced nicotine dependence.

Methods. A pilot study was conducted in France with 98 young adult smokers recruited from a Paris University. All students received standardised smoking cessation advice. 50 of the students also received a personalised smoking cessation message (photo ageing intervention) where they previewed an image of themselves as a lifelong smoker and as a non-smoker. The outcome measures were feasibility and acceptability of the intervention, quit attempts and nicotine dependence. All students were followed-up by telephone after 3 months.

Results. Students were successfully recruited to the study and actively participated in the healthcare counselling sessions. There was no statistical significant difference between the intervention and control groups in smoking dependence at recruitment. At the three month stage, the proportions of each group who had attempted to quit smoking were 37% (control) vs 46% (intervention). These percentages suggested a positive result for the intervention, although the difference was not statistically significant ($p=0.39$). There was no difference in smoking dependence between groups.

Discussion. The photo ageing smoking cessation intervention was acceptable and feasible to deliver to young French smoking adults. The design of the French pilot study was not as robust as the Australian randomised controlled trial design which may have led to the statistically insignificant results. Therefore further research recruiting smokers from the general French population is required, to explore if the innovative personalised health message can motivate young French adult smokers to quit.

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Asking patients and caregivers how frequently they have received messages about the harmfulness of medicines could help elicit poor adherence

Stephen R Carter¹ Faculty of Pharm, Univ of Sydney, Sydney, NSW¹

Introduction. Clinicians are often advised to elicit patients' medication concerns so that these worries can be addressed in order to improve adherence. Medication concerns however, can be deeply private and people may be reluctant to reveal them, thinking that the clinician may not approve of these personal beliefs. There is a need to find alternative ways to guide clinicians on how best to introduce conversations about patients' genuine concerns about their medicines. This is particularly relevant when using topical corticosteroids, where "steroid phobia" is prevalent.

Aims. The aim of this study was determine whether patients' and caregivers' recall as to how frequently they have received concerning messages about topical corticosteroids is predictive of their level of adherence.

Methods. A cross-sectional survey was completed by patients (and/or the caregivers of children) with inflammatory skin conditions while waiting to see specialist dermatologists. The MARS-5 was adapted to measure self-reported adherence. The BMQ – Specific scales were adapted to suit the context. A new 12-item scale was developed to measure the frequency of receiving concerning messages, including for example concerns about skin thinning. Structural equation modelling (SEM) was used to test the relationships between the variables.

Results. Questionnaires from 121 patients and 77 caregivers were analysed. The scales for MARS-5, BMQ-Necessity, BMQ-Concerns and the frequency of receiving concerning messages had acceptable convergent validity. Tests of measurement invariance showed equality in item-factor scaling for patients and caregivers. The SEM demonstrated acceptable fit indices and predicted 18% of the variation in adherence. Receiving higher frequency of concerning messages had a moderately positive effect on BMQ-Concerns ($\beta = 0.36$, $p < 0.001$) and a mildly negative effect on adherence ($\beta = - 0.19$, $p < 0.05$). BMQ-Concerns had no significant effect on adherence.

Discussion. This study shows that patients' recall of the frequency with which they have received messages about the potential harms of topical corticosteroids, predicts even greater amount of variation in adherence than estimates of concerns themselves. This supports the notion that clinicians' screening questions for adherence could include the emotionally neutral question "How frequently have you heard about the potential harms of this medicine?"



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Surgical antibiotic prophylaxis use and infection prevalence in breast surgery

Petra Czarniak¹, Smeem Jaber¹, Crystal Vitala¹, Richard Parsons¹, Sarah Mackenzie², Jason Seet², Bruce Sunderland¹ School of Pharmacy, Faculty of Health Sciences, Curtin University¹, Bentley, WA; Sir Charles Gairdner Hospital², Perth, WA.

Background In Australia, guidelines for the appropriate use of antibiotic prophylaxis are provided in the Therapeutic Guidelines: Antibiotics. However, their inappropriate use remains a concern.

Aim To examine adherence to guidelines in breast surgery and identify trends of non-adherence in a Western Australian teaching hospital.

Method A retrospective study collected data from a random sample of 150 of a total of 1049 eligible medical records of patients who underwent a breast surgical procedure in 2013 or 2014. A binary classification (adhered to/not adhered to) was utilised to assess adherence of preoperative antibiotic use to the head, neck and thoracic therapeutic guidelines: antibiotic that were current at the time. Secondary analyses investigated any link between adherence to guidelines and development of an infection.

Results Antibiotic prophylaxis was prescribed by 14 surgeons for 140 (92.7%) procedures. Adherence to all guidelines occurred in 20 (13.3%) procedures, whilst 11 (7.3%) did not adhere to any element of the guidelines. Appropriate timing was the main factor not adhered to occurring in 65 (43.3%) procedures. Postoperative antibiotics were prescribed in 35 (23.3%) of surgeries, with 32 (91.4%) administered beyond 24 hours. The average antibiotic course was 8.21 days. The length of stay was significantly different ($p=0.0036$) between surgical groups but being only statistically significantly longer ($p=0.0066$) in the 'other' surgical grouping (other than mastectomy, axillary node clearance and reconstruction). There was a tendency for risk of an infection to be decreased with compliance (odds ratio: 0.23; 95% CI: 0.05, 1.07; $p=0.06$).

Discussion A gap between clinical practice and guidelines exists possibly owing to lack of specificity in the guidelines current at the time. With the update guidelines, there is hope that adherence to the guidelines will be increased. Education and guidelines based upon the Therapeutic Guidelines: Antibiotic for breast surgery needs to be implemented at the hospital.

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Powder formulations for respiratory delivery to treat tuberculosis

Shyamal C Das, New Zealand's National School of Pharmacy, University of Otago, Dunedin, Otago

Introduction. Current pharmacotherapeutic regimens for TB require high oral and parenteral doses of multiple drugs for long periods (6-24 months), leading to significant adverse effects. Thus, a shorter, safer, well tolerated and more effective treatment option is required. Since ~80% of Mtb are localized in the lung, pulmonary delivery of anti-TB drugs offers several potential advantages. In particular, achievement of high drug concentrations in the lung using relatively low doses has the potential to increase treatment success, reduce the risk of drug resistance and systemic toxicity. For TB, powders of high aerosolization are essential.

Aims. The aim was to develop dry powders containing single or multiple drugs by spray drying which would be highly aerosolizable, physically stable, safe and well tolerated.

Methods. Powders containing one or more anti-TB drug(s), rationally designed, were developed by spray drying in combination with L-leucine and a lung surfactant DPPC. Powders were characterized for physical properties, surface composition, and aerosolization performance. The impact of high doses of drugs on the DPPC monolayer was investigated.

Results. All the individual or combination spray dried powders of isoniazid, rifampicin, pyrazinamide, moxifloxacin and kanamycin were of inhalable size ($<5\ \mu\text{m}$). The aerosolization was significantly improved when co-spray dried with L-Leucine. Although it varied with drugs, the best aerosolization (~80%) for Moxifloxacin was achieved with 20% of L-Leucine (w/w). The aerosolization of pyrazinamide was also improved when it was co-spray dried with DPPC. When a hydrophilic drug (e.g. kanamycin) was spray dried with a hydrophobic drug (e.g. rifampicin), the aerosolization improved significantly (~90%). The aerosolizability of drugs from the combination powders remained stable. Surface analysis revealed that the surface of the combined powders was enriched with hydrophobic drugs or excipients. The delivery of a high dose of drugs such as isoniazid and rifampicin reduced the collapse pressure of lung surfactant monolayer.

Discussion. Spray drying can produce high aerosolization capacity powders for inhalation containing single or multiple drugs. The use of hydrophobic excipient or drug or surfactant can improve aerosolization stability by their enrichment on the surface.

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Hyaluronic acid based self-assembling nanosystems for cancer therapy

Meghna Talekar¹, Qijun Ouyang², Michael Goldberg³ and Mansoor Amiji²

¹University of Queensland Diamantina Institute, Translation Research Institute, Brisbane, QLD; ²Northeastern University, Boston, MA; ³Dana-Farber Cancer Institute, Harvard Medical School, Boston, MA

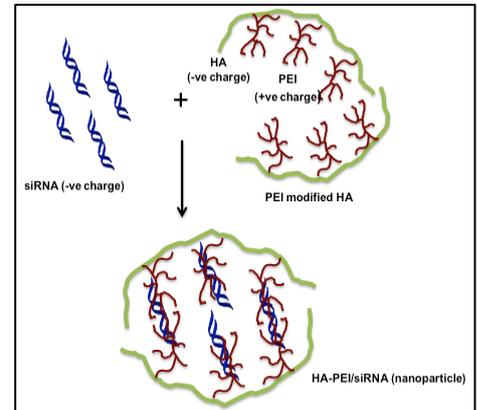
Introduction: Multi-drug resistance is a serious clinical challenge that significantly limits the effectiveness of cytotoxic chemotherapy. Since tumor cells are known to metabolize glucose by aerobic glycolysis and produce lactate, we hypothesized that down-regulation of genes over-expressed in aerobic glycolysis would have synergistic effect with cytotoxic chemotherapy in MDR model of ovarian cancer.

Aims: The aim of our study was to evaluate the effectiveness of combination therapy with siMDR-1 and siPKM-2 in human ovarian adenocarcinoma cell lines and xenograft models using HA-PEI based systems.

Methods: The nanoparticles with the siRNA were characterized for morphology, size, charge, encapsulation and transfection efficiency. In vivo studies included biodistribution assessment, gene knockdown confirmation, therapeutic efficacy and safety analysis.

Results: The self-assembling HA-PEI nanoparticles showed down-regulation of target genes (60-80%) following transfection. In vivo knockdown studies showed the targeted nanoparticles provided down-regulation MDR-1 (65%) and PKM-2 (65-70%) in SKOV-3 tumor bearing mice. Combination therapy showed improved tumor growth inhibition (TGI) and tumor volume doubling (TVD) time for all treatment groups compared to PTX solution.

Discussion: This study showed the encapsulation and delivery of siMDR-1 and siPKM-2 in HA-PEI based self-assembling nanoparticles improved the efficacy and cytotoxic effect of PTX in cancer cells. These delivery systems showed applicability in other types of cancers including lung cancer and pancreatic cancers.



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Medicines only work if you know what to take

Gerard Stevens, Webstercare

Medication has a value. To the PBS it is about \$9 billion a year(1) but to the individual the value could be a cure, symptom relief or prevention of an event. Yet it is often quoted that only 50% of prescribed medicines are actually taken, indicating non-adherence is the cause of massive waste within the healthcare system. One of the key questions to ask of the complex medication adherence puzzle is why there is such disconnection between what the doctor prescribes and what the patient takes.

Often the barrier is not that the patient doesn't want to take their medicines but a consequence of the complexity of their situation. There are more than 353,800 Australians(2) living with dementia and 100,000 people supported in the community by Commonwealth-funded home care packages(3) and we know loss of executive function skills and conflicting information can significantly impact medication adherence.

This is exacerbated by confusion between points of care as to what medicines the patient is actually taking at any point in time. There is no one 'source of truth' universally referred to. Doctors' databases only identify what has been dispensed, not what is actually being taken including over-the-counter medicines.

The first step in solving this puzzle is to examine how patients know what medicines they should be taking, and how this information is stored and communicated so it is accessible to all members of the healthcare team. Advances in technology see more computing power in an iPhone than the computers that put a man on the moon. It should not be beyond us to find out with confidence what medicines a vulnerable elderly person should be taking.

1. <https://www.pbs.gov.au/statistics/2014-2015-files/exp-prs-book-01-2014-15.pdf>

2. <https://www.fightdementia.org.au/about-dementia/statistics>

3. <https://agedcare.health.gov.au/aged-care-reform/home-care/home-care-packages-reform>



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Increasing Pharmacists' roles in improving medicine use

Rhiannon Braund. School of Pharmacy, University of Otago, Dunedin, New Zealand.

Introduction. There is increasing evidence that Pharmacists can play a vital role in improving medicine use through education, health literacy, adherence support and other cognitive services. However, time is often cited as a barrier and sporadic service contracts can impact on the provision and continuation of care.

Aims. The aim of this piece of work is to bring together several studies conducted in New Zealand that show where pharmacists can have direct benefits for patients in assisting them improve their medication use.

Discussion. Within New Zealand (NZ), Medicine Use Reviews (MURs) are provided in several regions, a more advanced service Medicines Therapy Assessment (MTA) is also available but there can be a blurring of the lines of service when pharmacists intervene to improve medication therapy. Further, time has been cited as a significant barrier for many pharmacists to implement these services and this presentation will discuss the pilot and implementation of a Pharmacy Accuracy Checking Technician (PACT) role into the NZ pharmacy setting. This role has been created specifically to allow pharmacists more time to focus on clinical cognitive tasks. Lastly, the roles of Clinical Pharmacist Facilitators will be presented and the impact that these pharmacists within or attached to General Practice can have on improving medicine use, not only via patient education.

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Optimizing medication use in older multimorbidity patients

Darrell R Abernethy, Johns Hopkins Univ. School of Medicine, Baltimore, MD, USA, and US Food and Drug Administration, Silver Spring, MD, USA

Introduction. Polypharmacy in older patients is the norm. This is associated with substantial adverse drug effect related morbidity and mortality. Efforts to optimize treatment in a patient specific manner have not achieved the desired results.

Aims. The context of the multimorbidity older patient will be characterized. The aggregate clinical phenotype often appears as a geriatric syndrome.

Methods/Results/Discussion. Common pathophysiological changes with age and disease occur across geriatric syndromes and result in vulnerability to adverse drug effects related to orthostatic hypotension, sedation and confusion, urinary retention, and impaired balance and mobility. Drugs with these on and off target effects may be indicated for specific diagnoses in a given patient. However the shifted risk/benefit profile in the older patient must be considered, and such drugs are candidates for very critical evaluation before prescribing, or candidates for deprescribing. These are drugs with anticholinergic effects, sedative effects, and vasodilating or diuretic effects that exacerbate orthostatic hypotension. When evaluating the patient, the medication inventory should highlight such medicines, and each medicine individually considered in the context of the individual multimorbid patient instead of the individual disease for which the drug is indicated. Implementing this approach in geriatric and general medical practice is optimally done in the context of the multidisciplinary health care team. The clinical pharmacist member has a key role as the team member with most expertise in pharmacotherapy. The limited workforce of trained geriatric clinical pharmacologists and geriatric clinical pharmacists represents both a challenge and an opportunity.



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Deprescribing in people with dementia

Emily Reeve^{1,2}. Geriatric Medicine Research, Dalhousie University and Capital Health, Nova Scotia Health Authority¹, Halifax, NS; CDPC, Kolling Institute, Northern Clinical School, University of Sydney², Sydney, NSW.

In 2015, 46.8 million people worldwide lived with dementia, a number which is projected to increase to 131.5 million by 2050. The vast majority of people living with dementia are greater than 65 years old. As such, most people with dementia have additional age-related medical conditions, such as cardiovascular disease, diabetes, musculoskeletal disorders and chronic obstructive pulmonary disease. People with dementia are prescribed approximately five (community dwelling) to twelve (residing in aged care) regular medications to treat dementia symptoms and manage their other medical conditions. People with dementia have pharmacokinetic and pharmacodynamic alterations (additional to those associated with ageing) that may increase the risk and decrease the efficacy of medications. For example, people with dementia are at a greater risk of neurological side effects due to increased permeability of the blood brain barrier (BBB) and a possible decrease in P-glycoprotein activity at the BBB. Pharmacodynamically, reduced acetylcholine in the brain increases susceptibility to adverse cognitive side effects of anticholinergics.

Approximately 50% of people with dementia are prescribed an inappropriate medication. A multitude of challenges face health-care professionals aiming to optimise medication use in this population. People living with dementia are regularly excluded from clinical drug trials and they are generally not specifically considered in treatment guidelines for other conditions. General Practitioners report difficulties in establishing appropriate goals of care and as such identifying inappropriate medications is difficult. Enacting shared decision making about deprescribing can be perceived to be complicated due to reduced cognitive function and the involvement of carers as surrogate decision makers. However, we found that 85% of carers are willing to have one or more of their care recipient's medications ceased if their doctor said it was possible.

Current work is being conducted into developing drug-specific deprescribing guidelines for people with dementia. A focus has been placed on ensuring these guidelines can be successfully implemented into practice through the development of decision-making tools for both health-care professionals and consumers.

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Clinical trial data transparency as an enabler of precision medicine

Michael J Sorich¹. Clinical Pharmacology, Flinders University¹, Adelaide, SA

Introduction. Over the past 5 years there have been great advances in the sharing of patient-level data from clinical trials for secondary analysis by other researchers.

Aims. To highlight the recent advances in access to clinical trial data and the opportunities this enables for precision medicine.

Methods. Pooled analysis of patient-level data from multiple clinical trials of cancer medicines. Secondary analysis of the association between laboratory/clinical markers (pre-therapy or early following commencement of therapy) and key therapeutic/adverse outcomes of cancer medicine therapy.

Results. Most major pharmaceutical companies now provide mechanisms for requesting secure access to patient-level data, although the range of study data, the process of data requests and access, and the conditions of access differ. A range of case studies demonstrating the potential for this data to improve guidance of cancer treatment decisions will be presented.

Discussion. Although the ability to access clinical trial data has improved greatly in the last 5 years there are still many obstacles limiting both data access, data pooling and data analysis. Ongoing changes in policy of key institutions will likely result in further improvement in the availability of clinical trial data in the near future.

Sorich MJ et al. (2016) Br J Cancer. 114(12): 1313-7.

Sorich MJ et al. (2016) Int J Cancer. 138(9): 2293-9

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Cancer Treatment in the Era of Personalised Medicine and Biomarkers

Chris Karapetis, Flinders Centre for Innovation in Cancer, Adelaide

Improved understanding of cancer biology is transforming the approach to cancer treatment. The use of predictive biomarkers enables the treating physician to select patients for the most appropriate therapies. Efficacy can be enhanced in those predetermined to benefit and toxicity avoided in those with cancers expected to display resistance to therapy. The cost effectiveness of new cancer treatments is therefore optimised. The presentation will outline the history of personalised medicine in oncology through the application of biomarkers. Future directions and potential challenges will be explored.

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A novel nano-theranostic platform for detecting and targeting lymph node metastases with hybrid PET/MRI

Zdenka Kuncic, Australian Institute for Nanoscale Science and Technology, University of Sydney, Sydney, NSW.

Introduction. The lymph nodes are usually the initial site of distal spread of tumour cells from a primary cancer. Lymph node metastases is a critical prognostic indicator of outcome and is thus crucial for cancer staging and treatment planning. To date, no reliable clinical techniques exist for detecting lymph node metastases or delivering targeted therapy.

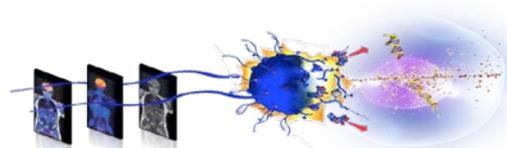
Aims. This project aims to develop a nano-theranostic platform that can passively target the lymph nodes and detect metastatic tumour cells therein using multimodal Positron Emission Tomography (PET) and

Magnetic Resonance Imaging (MRI), which combine high sensitivity and high resolution, respectively, in a single image. The nanoparticle platform can also deliver a therapeutic cargo to tumour cells in the lymph nodes.

Methods. Super-Paramagnetic Iron Oxide Nanoparticles (SPIONs) were characterised for MRI contrast. They were then radiolabeled with a PET tracer using a novel method, heat-induced radiolabeling, that eliminates the need for chelation. Phantom imaging studies were carried out to demonstrate the principle of a nanoplatform for hybrid PET/MRI. Additional studies were also carried out to assess targeted delivery of radionuclide therapy.

Results. Proof-of-principle of a nanoplatform for hybrid PET/MRI was demonstrated using different radiolabelled SPIONs. Results of simulation studies further demonstrate potential efficacy of targeted therapy with internally delivered radionuclide particles.

Discussion. These preliminary studies pave the way for pre-clinical studies. Importantly, our preliminary results indicate that the nanoparticle platform is robust to a variety of different SPION/radiolabel combinations which could potentially offer different advantages for different cancers.



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Torti SV and Torti FM (2013) *Nat Rev Canc* 13:342-355

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Precision nanomedicine for delivery of therapeutics to aggressive cancers

Maria Kavallaris^{1,2}. ¹Tumour Biology and Targeting Program, Children's Cancer Institute, NSW 2031, Australia.

²Australian Centre for NanoMedicine and ARC Centre of Excellence in Convergent Bio-Nano Science and Technology, UNSW Australia, NSW.

Cancer is a major cause of morbidity with approximately 44,000 people dying in Australia from their disease in 2011 alone. Disseminated disease and drug resistance are a major cause of treatment failure in cancer therapy. Our research has identified cytoskeletal and mitotic proteins that are altered in cancer and can mediate drug resistance. Suppressing these proteins using short-interfering RNA (siRNA) or short-hairpin RNA (shRNA) approaches led to increased drug sensitivity, tumour reduction and decreases in metastatic spread. Unfortunately, siRNA is not stable in serum and requires a delivery vehicle to shield it from degradation. Nanomedicine (engineered materials at the nano meter scale) can provide effective vehicles to encapsulate siRNA or drugs for delivery applications. We have been developing and evaluating dendrimer and star-based polymers for siRNA delivery. Specifically, we have shown both *in vitro* and in animal models of epithelial cancer that we can deliver and suppress expression of cytoskeletal and mitotic genes and reduce tumour growth. The opportunities and challenges of nano-based drug delivery will be presented.

Gan PP, et al. (2007) *Cancer Res*; 67: 9356-9363.

Kavallaris M. (2010) *Nat Rev Cancer*; 10: 194-204.

McCarroll JA, et al. (2010) *Cancer Res*; 70: 4995-5003.

McCarroll JA, et al. (2015) *Cancer Res*; 75: 415-425.

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Chemical and physical Stability of ceftaroline fosamile in an elastomeric device

Farah Almadfai¹, Rahul Patel¹, Syed Tabish R Zaidi¹, Troy Wanandy². Pharmacy, School of medicine¹, University of Tasmania¹, Pharmacy Department, Royal Hobart Hospital². Hobart, TAS

Introduction: Serious and life threatening infections such as endocarditis, cystic fibrosis, and osteomyelitis caused by multi drug-resistant bacteria such as Methicillin Resistant *Staphylococcus Aureus* often required prolong treatment with intravenous antibiotics (4 to 6 weeks). Due to unavailability of oral forms of many antibiotics, patients with such infections need to be admitted to the hospital for the entire duration of their therapy. An increase stay in hospital is associated with nosocomial infections, increase morbidity and mortality, and higher healthcare burden.

Elastomeric devices are non-battery operated infusion devices that deliver continuous infusion of antibiotics in a seamless manner allowing an earlier hospital discharge to patients who needed prolong duration of intravenous antibiotic treatment. Vancomycin is the most commonly used antibiotic to treat multi drug resistant infections, however poor lung penetration, serious adverse reactions, coupled with high resistance, led to a reduction the use of vancomycin. Ceftaroline, is a fifth-generation parenteral cephalosporin indicated for the treatment of systemic infections caused by resistant bacteria, can be used as an attractive alternative to vancomycin. However, the chemical and physical stability of ceftaroline in elastomeric devices is unknown and therefore, limits its administration using elastomeric devices.

Aims: to investigate the chemical and physical stability of ceftaroline in an elastomeric device (the Baxter infuser LV).
 Methods: A total of 16 Baxter infuser LV devices consisting of 6mg/mL of ceftaroline were prepared. Eight elastomeric devices diluted with saline and another eight diluted with dextrose 5% were stored at three different temperatures 4, 25, and 30°C. An aliquot was withdrawn immediately at time (0 hour) and at various time points. Each sample was analyzed in duplicate for the concentration of ceftaroline fosamile using a stability-indicating high-performance liquid chromatography (HPLC) technique. Samples were also investigated for PH (PH meter), visual color changes, evidence of precipitation immediately after preparation and on each day of analysis, and particle content (microscopically).

Results: Ceftaroline was chemically and physically stable for 144, 24, and 12hours at 4, 25, 30°C respectively.

Discussion: ceftaroline is found to be chemically and physically stable at 4°C for 144 hours which means the treatment can be prepared in bulk and/or supplied in advance by hospital pharmacist. This will avoid the need for patients to travel to the hospital on daily basis to collect the required drug admixtures. ceftaroline is found to be stable for 12 hours at 30°C, that will allow it to be self-administered through a continuous infusion.



Figure 1: Elastomeric device.

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Combination dry powder formulation of moxifloxacin and ethionamide for treating drug-resistant tuberculosis

Mohammad AM Momin¹, Ian G Tucker¹ & Shyamal C Das¹. School of Pharm, Univ of Otago¹, Dunedin, New Zealand.

Introduction: Drug-resistant tuberculosis (DR-TB) is an emerging global health problem. The current treatment of DR-TB includes both oral and parental delivery of drugs. High systemic exposure, side effects and lengthy treatment time are the problems of current treatment. Inhalation of drugs may be advantageous due to the direct delivery to the infection site, possibly reducing systemic exposure. On the other hand, monotherapy of drug may lead to the emergence of resistance; so synergistic combinations of drugs is an emerging strategy to treat drug-resistant TB.

Aims: This study aimed to develop a combination dry powder formulation of moxifloxacin HCl and ethionamide as this combination is synergistic against drug-resistant *Mycobacterium tuberculosis*. L-leucine (20% w/w) was added in the formulations to maximize the process yield.

Methods: Moxifloxacin HCl and/or ethionamide powders with/without L-leucine were produced using a Buchi Mini Spray-dryer. A next generation impactor (NGI) was used to determine the *in vitro* aerosolization efficiency. The powders were characterized for other physicochemical properties.

Results: All the spray-dried powders were within the aerodynamic size range of 2.3 to 2.9 μm except ethionamide-only powder (6.0 μm). The combination powders with L-leucine aerosolized better (%FPF: 80.7 and 79.9 for moxifloxacin and ethionamide, respectively) than moxifloxacin-only (%FPF: 30.8) and ethionamide-only (%FPF: 9.0) powders. The combination powders were spherical and corrugated whereas moxifloxacin-only powders were spherical and smooth and ethionamide-only powders were angular-shaped flakes. The combination powders had low water content (<2.0%).

Discussion: The improved aerosolization of combination powder formulation may be due to the changes in surface morphology and aerodynamic size. Further studies are required to understand the surface composition and mechanism for improved aerosolization. The improved aerosolization of the combination formulation may be helpful for the effective treatment of drug-resistant tuberculosis.

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Stability of Anidulafungin in Total Parenteral Nutrition (TPN) at Y- site.

Yusra Saleem¹, Tabish Zaidi¹, Troy Wannady² and Rahul P Patel¹. Pharmacy, School of Medicine, University of Tasmania¹, Pharmacy Department, Royal Hobart Hospital², Hobart, TAS.

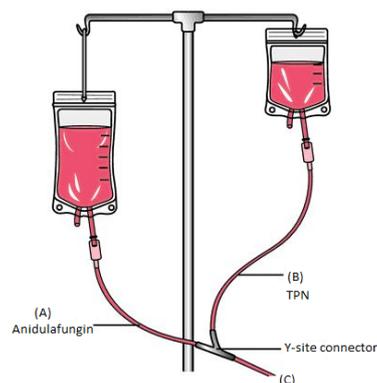
Introduction. Invasive candidiasis is a life threatening infection commonly occurs in cancer patients undergoing intensive chemotherapy. Available treatment options for invasive candidiasis include voriconazole, fluconazole, amphotericin B and echinocandins. Anidulafungin is a new class of echinocandin used intravenously in cancer patients suffering from invasive candidiasis. Also, cancer patients who are on intensive chemotherapy often develop chemotherapy induced oesophagitis, therefore, are unable to intake food by enteral route. In order to avoid malnutrition in such patients, total parenteral nutrition (TPN) composed of carbohydrates, proteins and lipids needs to be delivered intravenously on a daily basis. Required medications such as anidulafungin and TPN are required to be administered intravenously on a daily basis and access to multiple intravenous sites is a problem in such patients. One option to overcome this problem is to use a three-way Y-site connector. As shown in (fig.1) Y-site connector allows multiple fluids to infuse together

Aim. To determine the Physico-chemical stability of anidulafungin in total parenteral nutrition (TPN) at Y-site.

Method. Anidulafungin (0.77mg/mL) diluted with 0.9% normal saline or 5% dextrose was pumped through intravenous line (A). TPN (either pre-mixed or multi-chamber bag) was pumped through line (B). The mixture of line A and B was collected at site (C). The concentration of anidulafungin (t=0 and t=4 hours) was measured using a newly developed and validated at High performance liquid chromatography (HPLC). pH (using a pH meter), colour change (visually), particle content (microscopically) and lipid globule size (using dynamic light scattering DLS) were measured at times 0 and 4 hours. Figure.1 Y- site administration assembly.

Results. All the samples retained more than 96% of the initial anidulafungin concentration at all time periods. pH values did not change significantly over 4 hours. No particle presence was detected using microscope. There was no change in the lipid globule size from time 0 and after 4 hours.

Discussion. Anidulafungin in 5% dextrose and 0.9% saline was found to be stable in both pre-mixed and multi-chamber PN bags for more than 4 hours at room temperature. This information is useful for health care professionals. As it would allow the simultaneous administration of life saving anidulafungin and much needed TPN on a daily basis.





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Investigations into the physical and chemical stability of co-trimoxazole intravenous infusions

Israa M Khaleel¹, Rahul P Patel¹, Syed Tabish R. Zaidi¹, Troy Wanandy¹. Pharmacy¹, School of Medicine, University of Tasmania, Hobart, Tas. Department of Pharmacy², Royal Hobart Hospital, Hobart, Tas.

Introduction. Intravenous (IV) co-trimoxazole (combination of 80 mg trimethoprim and 400 mg sulfamethoxazole per 5 mL) infusion is used to treat infections such as pneumocystis jiroveci pneumonia in critically ill patients. IV co-trimoxazole infusion is commonly prepared by diluting the recommended dose of co-trimoxazole to a minimum of 500 mL of diluent. This infusion may be administered up to four times a day and therefore patients may receive additional 1.5 to 2 liters of IV fluid per day. This may lead to severe complications including a life threatening pulmonary edema.

Aims. The purpose of this study was to investigate the stability of IV infusion of co-trimoxazole after diluting co-trimoxazole injection in 1:25 v/v, 1:20 v/v, 1:15 v/v or 1:10 v/v of commonly used diluent (dextrose 5%).

Methods. Four ampoules of IV co-trimoxazole were injected into an infusion bag containing 500, 380, 280 or 180 mL of 5% of dextrose solution. A total of two bags for each dilution (in total = 8 bags) were prepared and stored at 25°C. An aliquot was withdrawn immediately before (0 hour) and after 0.5, 1, 2 and 4 hours of storage. Each sample was analysed in duplicate for the concentration of trimethoprim and sulfamethoxazole using a stability indicating high-performance liquid chromatography method. Samples were also assessed for pH (using a pH meter), colour changes and evidence of precipitation (visually), and for particle content (microscopically) immediately after preparation and on each analysis time point.

Results. The concentration of sulfamethoxazole remained higher than 99% over 4 hours for all the dilution ratios. The concentration of trimethoprim was more than 98% in 500 mL (1:25v/v), 380 mL (1:20 v/v), 280 mL (1:15 v/v) or 180 mL (1:10 v/v) dilutions. There was no change in pH at time zero and at various time points. and there was no visible precipitation or visible change in colour. Microscopically, no particles were detected when co-trimoxazole was diluted in 500 mL or 380 mL. Approximately more than 1700 particles were detected after 150 minutes when co-trimoxazole was diluted in 280 mL.

Discussion. Co-trimoxazole is physically and chemically stable over 4 hours when diluted with 380 mL. It means that diluent infusion volume can be decreased from 2 litres to approximately 1520 mL. This means more than 280 mL can be decreased and the risk of life threatening oedema also will be decreased.

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Investigation of chemical and physical stability of voriconazole in elastomeric infusion pumps

Harmanjeet¹, Syed Tabish R. Zaidi¹, Troy Wanandy², Rahul P Patel¹. Pharmacy, School of Medicine, University of Tasmania¹, Pharmacy Department, Royal Hobart Hospital² Hobart, TAS.

Introduction. Voriconazole is used as a first line treatment for invasive fungal infections such as invasive aspergillosis and is associated with less side effects as compared to other antifungal drugs including amphotericin B. Moreover, voriconazole can be administered intravenously using elastomeric infusion pump. These elastomeric infusion pumps deliver the drug into patient's body through the pressure generated on the walls of elastomer reservoir and do not require any external force for drug administration. So, the use of voriconazole in elastomeric infusion pumps will decrease the length of stay in hospitals as well as the overall cost associated with the treatment of various invasive fungal infections. However, there is no information available related to the physio-chemical stability of voriconazole in elastomeric infusion pumps. If voriconazole is chemically unstable then either less amount of drug or degraded products could be infused and if the drug is physically unstable then precipitates could be infused. However, if voriconazole is found to be stable both chemically and physically, patients suffering from fungal infections can be treated.

Aims. The aim of this study was to analyse the chemical and physical stability of voriconazole in elastomeric pumps at three different temperatures i.e. 4°C, 25°C and 35°C.

Methods. The voriconazole drug vial (n=6) was reconstituted with 19 ml of water for injection which was further diluted with 80ml of 0.9% normal saline or 5% dextrose solution to achieve 2mg/ml of drug concentration. The prepared solution was transferred to an Intermate SV elastomeric pump (n=6) (Baxter Healthcare corporation) and the pumps were stored at three different temperatures (4°C, 25°C and 35°C). The samples were drawn at pre-determined time intervals as follows; 0, 12, 24, 46, 72 and 96 hours for the pump stored at 4°C and 0, 1, 2, 3 and 4 hours for the pumps stored at 25°C and 35°C. However, the first sample (zero-minute sample) was kept from the prepared drug solution before transferring the drug solution into the pumps. The samples were diluted up to 5µg/ml and were analysed using High Performance Liquid Chromatography (HPLC) to investigate the chemical stability of voriconazole. The drug was considered to be chemically stable if more than 90% of drug concentration was retained to the initial drug concentration. The physical stability of samples was analysed for alteration in pH (pH meter), color (visual analysis) and precipitation (microscopic analysis).

Results. Voriconazole was found to be chemically stable as it retained more than 90% of its initial concentration for at least 96, 4 and 4 hours at 4°C, 25°C and 35°C respectively. Moreover, voriconazole was found to be physically stable as there was no appearance of particles, no change in the color and pH in the samples.

Discussion. The results obtained from this study will be helpful in the usage of voriconazole in elastomeric infusion pumps as the elastomeric pumps can be prepared with drug solution and stored at 4°C. Moreover, the pumps can be used at home as these are stable at 25°C and 35°C. Another positive aspect is that it will improve the quality of life of patients suffering from different types fungal infection as it will decrease the length of stay in hospital and overall cost associated with the treatment of fungal diseases. Furthermore, it will be helpful in decreasing the additional burden on healthcare systems.



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Evaluation of the stability of linezolid in commonly used intravenous fluids.

Rachel Taylor¹, Petra Czarniak¹, and Bruce Sunderland¹. School of Pharmacy, Faculty of Health Sciences, Curtin University¹, Bentley, WA.

Introduction. Little is known about the stability of linezolid in aqueous solution and common intravenous fluids.

Aims. To evaluate the stability of linezolid in commonly used intravenous fluids and at selected pH values in aqueous solution.

Methods. A validated High Performance Liquid Chromatography (HPLC) method was used for analysis. Sodium chloride 0.9% solution, Hartmann's solution, Glucose 5% solution and Glucose 10% solution containing 2.0 mg/mL linezolid were stored at 25.0°C ($\pm 0.1^\circ\text{C}$) for 34 days. Linezolid's stability in 0.1 M sodium hydroxide at 48.0-70.0°C ($\pm 0.1^\circ\text{C}$), and at pH values 8.7-11.4 at 70.0°C ($\pm 0.1^\circ\text{C}$) were evaluated. Zyvox[®] intravenous solution was stored at 70.0°C ($\pm 0.1^\circ\text{C}$) for 72 hours to evaluate stability.

Results. Linezolid maintained > 95% of initial concentration in all intravenous solutions tested. The antibiotic followed first-order kinetics, had an activation energy of 58.22 kJ/mol and underwent specific OH⁻ catalysis within the tested pH range.

Discussion. Linezolid maintained its shelf life for 34 days at 25.0°C ($\pm 0.1^\circ\text{C}$) in selected intravenous solutions and could be used as an alternative to the Zyvox[®] intravenous solution. At 70°C ($\pm 0.1^\circ\text{C}$) solutions showed shelf life values from less than one minute to > 12 hours dependent on pH.

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Development of an integrated BPharm curriculum at the University of Auckland

John Shaw. School of Pharmacy, University of Auckland, Auckland, NZ.

Introduction. In response to accreditation signals and consultation with the profession, the Auckland School of Pharmacy embarked on a major review of its BPharm curriculum in 2014. A Curriculum Committee oversaw the review and extensive consultation occurred with the profession and both internal and external stakeholders.

Aims. There were three major objectives for the review: i) to achieve a high degree of integration of subject content and assessment; ii) to increase experiential learning opportunities, both in duration and diversity; and iii) to place greater emphasis on the development of 'generic' skills such as communication, critical thinking, moral reasoning, and leadership.

Methods. A Graduate Profile was developed based on five broad domains of learning: 1. Applied Science for Pharmacy; 2. Science of Drug Delivery; 3. Clinical Pharmacy Practice; 4. Hauora Māori; 5. Personal and Professional Skills. The concept of the 'spiral curriculum' was used to inform the review and the Graduate learning outcomes were mapped to the individual courses of the integrated curriculum. As an example of an integrated course, PHARMACY 213 (60 points, Semester 2, Part II) comprises five modules: Dermatology (4 weeks), Infectious Diseases (4 weeks), Gastrointestinal (4 weeks), Clinical and Professional Skills (over 12 weeks), and Placement (day release over 10 weeks). The revised curriculum model was approved by all relevant University committees and submitted to the national Committee on University Academic Programmes (CUAP) in March, 2015 (CUAP approval is required in NZ to mount any new programme).

Results. CUAP approval was granted in August, 2015 and further development of the new courses followed. The new curriculum is being phased in with implementation of Part II in 2016, Part III in 2017, and Part IV in 2018 (note: entry to the Auckland BPharm is at Part II following a health sciences year).

Discussion. The Auckland BPharm curriculum review has resulted in major changes to the structure, content and delivery of the degree and the three initial objectives have been central in planning. There has been widespread support from students, staff and stakeholders for the planned changes and early indicators of success include excellent student achievement and positive evaluations.



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An international workshop that researched how a pharmacy curriculum may develop a commitment to lifelong learning

Wendy Thompson¹, Lisa M Nissen¹, Esther TM Lau¹, Jose Manuel Serrano Santos¹. School of Clinical Sciences¹, Faculty of Health, Queensland University of Technology, Brisbane, QLD

Introduction. The most recent 'Accreditation Standards for Pharmacy Programs in Australia and New Zealand' require pharmacy education to produce graduates that engender a commitment to lifelong learning (LLL). The graduate learning outcomes for this however, are not defined in the standards, nor is there any guidance on how curriculum should be designed to achieve this outcome. Previous research has identified that embedding graduate outcomes in assessment can have a strong influence on what students will learn, but to what effect does this have on developing these skills in pharmacy graduates?

Aims. To develop a list of skills, attitudes and attributes of a lifelong learner in pharmacy and discuss how curriculum may influence or prevent development of LLL skills in graduates.

Methods. As one part of a mixed methods study design, a qualitative workshop was held at the Lifelong Learning in Pharmacy conference, Croatia, 2016. The participants were asked to develop a list of skills, attitudes and attributes of LLL and identify how curriculum could teach these skills.

Results. Participants were able to identify a number of skills, prioritising the most important outcome of the graduate lifelong learner as someone who is 'Motivated to Learn'. Teaching staff were also recognised as being an influential part of the curriculum, and were also identified as a barrier if they do not demonstrate LLL skills. Assessment and teaching should provide support, relevant learning and encourage collaboration and reflection.

Discussion. As LLL outcomes are considered to be an essential quality in pharmacy graduates then research that aims to develop guidance around this is crucial. Being 'Motivated to Learn' is an essential factor for future graduate learning. There are extrinsic influences which can develop the graduates need to learn and motivated educators, authentic curriculum designs are essential in the development of this attribute

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Development of the Part II Experiential Learning Placement within the revised BPharm curriculum at the University of Auckland.

John Shaw, Lynne Bye, Maree Jensen. School of Pharmacy, University of Auckland, Auckland, NZ.

Introduction. One of the goals of the recent review of the Auckland BPharm curriculum was to increase experiential learning opportunities, both in duration and diversity. An Experiential Learning Framework was developed and the decision was made to introduce Experiential Learning at a 'Novice' level at Part II of the BPharm programme.

Aims. The development and implementation of the Part II Experiential Learning Placement is described.

Methods. As part of the development of the Experiential Learning Framework, the School convened two liaison groups representing the Hospital and Community Pharmacy sectors. These groups assisted in the development and implementation of the Placements. The first Placement was designed as a day-release programme in Semester 2, Part II. All students were free on either a Tuesday or a Thursday to undertake the Placement. The overall purpose of the first Placement was 'socialisation' into the profession with an emphasis on understanding the medicines pathway, the roles of pharmacists, and initial interactions with patients. This Placement was offered as three days in a hospital setting (in pairs), one day in an industry setting (in groups of ten), and six days in a community setting (individually). All sites were in the Greater Auckland area and sites went through a recruitment and selection process to become 'Recognised Training Sites of the University of Auckland'. Training was provided by the School of Pharmacy and there were 110 attendees at a Training Evening in July, 2016.

Results. There were 68 community pharmacy sites, five hospital sites, and one each of industry and wholesaler sites recruited. Each site provided an assessment of student engagement and students submitted an e-Portfolio for assessment. This component of the programme is a criterion-referenced assessment (Merit/Pass/Fail) and a global assessment is based on the various reports and e-Portfolio. The emphasis at this stage is on professionalism and engagement. If necessary, students may be required to undertake additional elements of the Placement to achieve an overall pass and proceed to the next Part.

Discussion. This first offering of a Part II day-release Placement in a variety of practice settings is yet to be completed but feedback to date from both preceptors and students has been excellent. The process of development has led to enhanced engagement between the School and the profession.



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Investigation of Sri Lankan pharmacy students' knowledge of antibiotics and antimicrobial resistance

M. H. Fatima Sakeena^{1, 2}, Alexandra A Bennett³, Andrew J McLachlan^{1, 4}. Faculty of Pharmacy¹, The University of Sydney, NSW, Australia; Department of Pharmacy², Faculty of Allied Health Sciences, University of Peradeniya, Sri Lanka; NSW Therapeutic Advisory Group³, NSW, Australia; Centre for Education and Research on Ageing⁴, Concord Repatriation General Hospital, NSW, Australia

Introduction: Antimicrobial resistance (AMR) is a major challenge for global health care. Pharmacists play a key role in the health care setting as the custodians of the quality use of medicines. The education, training and experiences of pharmacists and pharmacy students are likely to have an impact on patterns of antibiotic use in community and hospital settings. Currently, there are limited data on antibiotic use and understanding of AMR by Sri Lankan pharmacists and pharmacy students.

Aim: This cross-sectional survey investigated the understanding of antibiotics, their use and AMR as well as associated factors among undergraduate pharmacy students at Sri Lankan universities.

Method: This study used a self-administered questionnaire based on the WHO AMR document 2015. The questionnaire was modified to capture demographic information and selected questions clarified after face validity assessment. The survey was conducted in 6 universities in Sri Lanka offering undergraduate pharmacy programmes. The study instrument comprised 5 major sections; demographic information, self-reported antibiotic use, knowledge of antibiotic uses in human health, knowledge of AMR and antibiotic use in agriculture. Data were entered into SPSS[®] 22 and analysed. Cronbach alpha test assessed the reliability of the questionnaire. This study was approved by the Institutional Ethical Review Committee, University of Peradeniya, Sri Lanka.

Results: 466 pharmacy students completed the questionnaire between January and April, 2016. The mean participant response rate was above 80% in all but one of the 6 universities; this exception provides distance learning. Participants commonly reported antibiotic use (75.8%) during the past year. Half the pharmacy student respondents (51%) incorrectly indicated that antibiotic use was appropriate for the management of cold and flu disease conditions.

Discussion: These findings identify some misconceptions about antibiotics among Sri Lankan undergraduate pharmacy students, which may potentially increase the irrational use of antimicrobial agents.

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Did it evaporate? 1st year chemical concepts in 2nd year students

Yasmin J Antwertinger¹, QUT¹, Brisbane, QLD; School of Clinical Sciences.

Introduction. Retention of chemistry concepts and the understanding of how it applies to medicines is an essential part of the pharmacists expert knowledge of medicines. Having this understanding of chemistry enables pharmacists to have an appreciation of the therapeutic components of medicines and their safe and efficacious use in a patient centred context. So, do second year pharmacy students value their chemistry knowledge? Furthermore, will they be confident in applying it?

Aims. To gain insight into chemistry retention in pharmacy students 1 year later, and analyse whether higher scores are aligned with high confidence

Methods. Students completed a questionnaire containing chemistry quiz questions, questions about confidence level for each of the answers given and their opinions on the relevance of chemistry content to pharmacy students.

Results. Chemical concepts such as acids and bases, and ionisation were retained at higher levels than expected. Students who valued chemistry knowledge more were shown to have either higher confidence in their answers or higher scores or both.

Discussion. Students retained a surprising amount of chemistry knowledge from 1 year earlier, but higher confidence in their answers was not always aligned with higher scores. Higher scores that were associated with lower confidence levels, were most likely due to multiple choice answers which were 'guessed,' however it is suspected that a portion of these may also be due to students with lower self-esteem and 'cautious' personality types. This is worth further investigation in the pharmacy student cohort especially considering the anecdotal evidence that pharmacists tend toward the more 'risk-averse' end of the personality spectrum. The link between greater confidence and greater interest in chemistry or the belief in its relevance indicates a need to re-enforce the 'real-world' link between concepts taught and student perceptions of concepts needed. A study of pharmacy student personality types may also offer greater insight into the learning style of pharmacy students.



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The capabilities that count for professional success in Pharmacy: A case study of graduates, employer and course teaching team perspectives

Lisa BG Tee¹, Sonia Ferns² and Jeff D Hughes¹. School of Pharmacy¹, Curtin Learning and Teaching², Curtin University, Perth, WA

Introduction. Clearly defined graduate attributes are essential for producing graduates with the skills necessary to be proficient employees and contributors to society (4). The demand for improvements in the sector requires universities to provide evidence of quality assurance and employability outcomes. With heightened focus on the employability capabilities of graduates, institutions are placing greater emphasis on curriculum reform.

Aims. To gather and evaluate the perceptions of employers, graduates and course teaching team regarding graduate capabilities required for early professional success in pharmacy and the extent to which capabilities are demonstrated in new graduates.

Methods. The Graduate Employability Indicator (GEI) survey was administered online to gather stakeholders' perceptions about Curtin University's Bachelor of Pharmacy. The GEI asks graduates the extent to which their course experience contributed to achievement of the capabilities and asks employers and course teams the extent new graduates demonstrate the capabilities.

Results and discussion. In total, 95 graduates, 109 employers and 42 members of the course team participated in the survey. Graduate comments on the best aspect of the degree identified the work placement in the final year and acquiring knowledge to facilitate their role as a pharmacist. Graduates preferred earlier professional placement in the course. Employers identified communication and professional skills as the most useful capabilities for new graduates. Members of the course teaching team identified benefits to the students, industry and university as the main incentives for developing graduate employability. The result from this study has facilitated in the curriculum review of the BPharm course with implementation of a renewed course structure to include earlier exposure to experiential learning.

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Asthma management experiences of Australians who are native Arabic speakers.

Reem Alzayer¹, Dr. Betty Char¹, Dr. Bandana Saini^{1,2}. Faculty of Pharmacy, The University of Sydney¹, Sydney, NSW.

Introduction. Australia has one of the highest prevalence rates of asthma in the world (10%). It is likely the condition affects people across the highly multicultural fabric of Australian society. Arabic speaking people/migrants are a large group, however not enough data is available about Arabic speaking migrants with asthma in Australia. Coming from different countries with different languages, beliefs and cultures may have a significant impact on migrant health, which may lead to issues in asthma management.

Aims. The aim of this study is to explore asthma management issues in the Arabic speaking community in Australia. **Methods.** Qualitative in depth semi-structured interviews conducted with Arabic speakers with asthma (or carers of people with asthma) followed by verbatim transcription and thematic analyses.

Results. 24 Arabic speaking patients with asthma were interviewed (23 females, mean age 31). The data was rich in submerged themes (italicised). There was a lack of asthma awareness in this community; asthma control was suboptimal in many cases. The sample displayed a spectrum of *coping styles*, attached *stigma* to asthma and asthma medicine use and experienced access barriers in receiving asthma care. Recent migrants among the sample would rather follow their traditional folk medicine than consult with a general practitioner (GP) or pharmacist and *expectations* from health professionals are low and marred by *mistrust*. Many migrants do not trust their GPs and feel that they are uncaring and "hiding vital information". The cost of medications is another factor as many new migrants have lower income earning capacity and issues such as unemployment and/or stress also contribute to destabilising asthma control. In addition, fears and medicine related beliefs and low self-management skills affect adherence to medicine. Health system navigation was an issue as some were not conversant about local health care services/information sources.

Discussion The data is the first exploration of this culturally/linguistically diverse group of Australians with asthma. Clearly disparities in asthma management are likely given the myriad impediments stemming from the patient, their health professional or the system. Similar findings are evident in minority ethnic groups with asthma in other multicultural countries such as the US and UK. Our results demonstrate a need for interventions to optimise asthma management in this group.

Conclusion: There are many barriers hampering good asthma control in this population. Asthma educational programs in Arabic or interventions to empower patients to self-manage are needed. Cultural competence training for professionals may also improve care provision.



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Home Medicines Review (HMR) in patients with COPD: experiences from a cluster randomised trial

Johnson George¹, Brian Meier¹, Sally Wilson¹, Jenifer Liang¹, Kate Petrie¹, Michael J. Abramson², Nicholas Zwar³, Grant Russell⁴, Anne Holland⁵, Billie Bonevski⁶, Ajay Mahal², Benjamin van Hecke⁷, Kirsten Phillips⁸. Centre for Medicine Use and Safety, Monash University¹, Melbourne, VIC; Epidemiology and Preventive Medicine, Monash University², VIC; School of Public Health and Community Medicine, University of New South Wales³, Sydney, NSW; School of Primary Health Care, Monash University⁴, Melbourne, VIC; Department of Physiotherapy, La Trobe University⁵, Melbourne, VIC; School of Medicine & Public Health, University of Newcastle⁶, Newcastle, NSW; Boehringer Ingelheim Pty Ltd⁷, Sydney, NSW; Lung Foundation of Australia⁸, Brisbane, QLD.

Introduction. RADICALS[®] is an interdisciplinary model of care aimed at reducing the burden of COPD in Australian general practices. Home medicines review (HMR) by an accredited pharmacist is one of its components.

Aims. To characterise HMRs delivered as part of the RADICALS[®] cluster randomised trial and evaluate outcomes.

Methods. General practitioner (GP) clinics (n=38) were randomised to control/RADICALS[®]. Current/ex-smokers in RADICALS[®] with a COPD diagnosis and their GPs completed anonymous surveys on the HMR service received.

Results. Of the 238 participants recruited, 102 had an existing COPD diagnosis. HMRs have been completed in 59/145 (41%) of RADICALS[®] participants: mean age 66 years; newly diagnosed COPD (59%); median 10 medications, including two inhalers; current smokers (51%); unclear vaccination history (63%); and no short-acting bronchodilator (40%). A total of 358 medication-related problems (MRPs) have been identified, of which 165 were related to non-respiratory medications. In total, 467 recommendations have been made to the prescribers and/or patients to optimise management/medicine use. Suboptimal inhaler techniques were seen in almost 50% of users; the majority were able to improve their technique during the HMR. Following the HMR, consumer respondents (n = 41) reported total satisfaction with the pharmacist visit, better understanding about their medicines, increased confidence in how to use medicines, fewer concerns about medicines and better understanding of their illness. All GP respondents (n=6) thought that the HMR was useful in identifying MRPs, agreed that pharmacist recommendations were useful for improving their patients' care, and reported acting on the recommendations made.

Discussion. HMRs in patients with COPD identified a range of respiratory and non-respiratory MRPs. Pharmacist recommendations to address MRPs were generally appreciated and accepted by both GPs and consumers.

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The relationships between illness and treatment perceptions with adherence to diabetes self-care: A comparison between Arabic-speaking migrants and Caucasian English-speaking patients

Hamzah Alzubaidi¹, Kevin Mc Narmara², Jennifer Marriott³ Dept Pharm Pract, University of Sharjah, Sharjah¹; Dept Faculty of Med, Deakin University, Melbourne, VIC²; Dept Centre for Medicine Use and Safety, Monash University, VIC³

Aims. To compare illness and treatment perceptions between Arabic-speaking immigrants and Caucasian English-speaking people with type 2 diabetes, and explore the relationships between these beliefs and adherence to self-care activities.

Methods. A cross-sectional study was conducted in healthcare settings with large Arabic populations in metropolitan and rural Victoria, Australia. Adherence to self-care activities, illness and treatment perceptions, and clinical data were recorded. Bivariate associations for continuous normally distributed variables were tested with Pearson's Correlation. Non-parametric data were tested using Spearman's rank correlation coefficient.

Results. 701 participants were recruited; 392 Arabic-speaking participants (ASPs) and 309 English-speaking participants (ESPs). There were significant relationships between participants' illness and treatment perceptions and adherence to diabetes self-care activities. ASPs' negative beliefs about diabetes were strongly and significantly correlated with poorer adherence to diet recommendations, exercise, blood glucose testing and foot care. ASPs were significantly less adherent to all aspects of diabetes self-care compared with ESPs: dietary behaviours ($P = <0.01$; 95% Confidence Interval (CI) = -1.17, -0.84), exercise and physical activity ($P = <0.001$, 95% CI -1.14, -0.61), blood glucose testing ($P = <0.001$) and foot-care ($P = <0.001$). 52.8% of ASPs were sceptical about prescribed diabetes treatment compared with only 11.2% of the ESPs. 88.3% of ASPs were non-adherent to prescribed medication, compared with 45.1% of ESPs.

Discussion. Arabic-speaking migrants' illness and treatment perceptions were significantly different from the English-speaking group. There is a pressing need to develop new innovative interventions that deliver much-needed improvements in adherence to self-care activities and key health outcomes.



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Adverse Drug Reaction (ADR) Reporting and Follow Up in a Hospital Setting - A Patient's Perspective.

Matthew W Scott¹, Assoc Prof Michael McDonough², Grace Wong^{3,4}, Richard Summers¹, Dr. M Joy Spark¹. Department Pharmacy and Applied Science, La Trobe University¹, Bendigo, VIC; Department of Drug Health Service, Western Health², Footscray, VIC; Pharmacy Department, Western Health³, Footscray, VIC; Clinical Services, National Prescribing Service⁴, Melbourne, VIC.

Introduction. Adverse drug reactions (ADRs) are a common cause of negative health outcomes for patients, often resulting in increases in hospitalisation, length of stay and the overall cost. For this reason it is important to put in place procedures that minimise risk of inadvertent re-exposure to a drug that has caused the patient an ADR.

Aims. To assess the effectiveness of the ADR reporting system and follow up process at the hospital.

Methods. Cross-sectional survey, with interviewer administered questionnaire, of people who experienced an ADR.

Results. Of the 241 eligible cases reviewed by the ADRC between 2013 and April 2016, 108 (45%) consented to the phone interview with only 82% (89) having recollection of the event. Of these 55% (49) recalled receiving a temporary ADR warning card and 73% (65) remember receiving a permanent ADR warning card post-discharge. The ADR warning card was carried by 73% (65) of participants. 85.4% (76) had told their regular GP about their ADR [41% (31) used their ADR warning card]. Only 40% (36) had told a pharmacist about their ADR [50% (18) used their ADR warning card]. 85% (76) had a regular pharmacy and of those, 53% (40) believed it necessary to tell their pharmacy and 62% (47) considered it a good idea for the hospital to automatically notify their pharmacy. Overall satisfaction was relatively high with 89% (79) agreeing that this adverse drug reaction service as a whole was valuable to them and 92% (82) agreeing that it is a good thing that a letter was sent to their regular GP. Some participants (21% (19)) also made comments with follow up issues being the most common theme.

Discussion. Overall, there was a relatively high level of satisfaction with the ADR service, which provided support for this a model of care for patients who experienced an ADR. The current ADR warning cards were also found to be particularly useful for patients. There was potential for improvement, including increasing the number of patients remembering receiving a temporary ADR warning card prior to discharge. It is also evident that allowing patients to be responsible for communicating a new ADR to community pharmacists is not particularly effective so other means of notifying community pharmacists may need to be explored.

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Adverse drug reaction-related hospitalisation in older patients - A prospective analysis in two hospitals

Nibu Parameswaran Nair¹, Leanne Chalmers¹, Bonnie Bereznicki¹, Colin Curtain¹, Gregory Peterson¹, Michael Connolly¹, Luke Bereznicki¹. Division of Pharmacy, University of Tasmania¹, Hobart, TAS

Introduction. Adverse drug reactions (ADRs) are a major cause of hospital admissions in older patients. Despite the magnitude of this problem, there is limited prospective data on ADRs as a cause of hospitalisation in elderly medical patients.

Aims. To ascertain the proportion of ADR-related hospital admissions in older patients admitted in Tasmanian hospitals; to identify the commonly implicated drugs; to describe the clinical manifestations and outcomes of these ADRs; and for each ADR, to determine the causality, preventability and severity.

Methods. We conducted a prospective cross-sectional study at the Royal Hobart (March 2014 - March 2015) and Launceston General Hospitals (September - December 2015) in Tasmania, Australia. A convenience sample of patients aged 65 years and older undergoing unplanned, overnight medical admissions was screened. ADR-related admissions were determined through expert consensus from detailed review of medical records and patient interviews. The causality between drug use and ADR-related hospital admission was evaluated using the Naranjo algorithm. The preventability and severity of each ADR admission were assessed using Schumock and Thornton criteria and Hartwig's criteria, respectively.

Results. The proportion of ADR-related hospital admissions was 19% of 1008 admissions. Most (89%) ADR-related admissions were considered preventable. Cardiovascular complaints (26%) represented the most common ADRs, followed by renal (20%) and nervous system disorders (15%). The drugs most frequently responsible were diuretics (20%), agents acting on the renin angiotensin system (20%), beta-blockers (8%) and psychoanaesthetics (7%). Application of the Naranjo algorithm found 6% *definite*, 70% *probable* and 24% *possible* ADRs contributed to the hospital admissions. ADR severity was rated moderate in 98% and severe in 2% of admissions. For most admissions (98%) the ADR resolved and the patient recovered.

Discussion. Hospitalisation due to an ADR is a common occurrence in older Australians. Improved medication management services to prevent these admissions are urgently required.



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The Impact of Medications on Charcot Marie Tooth disease: A patients' perspective

Astrid Socha Hernandez¹, Sufia Tuong¹, Alison Shield¹. Pharmacy, Faculty of Health¹, University of Canberra, Bruce ACT.

Introduction. Studies on medication safety specific to patients with Charcot-Marie-Tooth (CMT) neuropathy and muscle atrophy are limited. Consequently, both patients and health professionals face limited access to reliable sources of information on drug toxicity, which potentially leads to symptom mismanagement and poorer health outcomes for patients.

Aims. Investigate patients' experiences of medication effects on their CMT symptoms and further explore patients' experience(s) in obtaining and understanding information on the safety of medicines.

Methods. Members of the CMT Australian Association were invited to participate in focus groups to discuss their concerns about medication safety. An opt-in approach was used to recruit both focus groups and/or interviews participants. Thematic analysis of interview transcripts was conducted using NVivo.

Results. Twenty-four adult CMT patients participated in focus groups or interviews. This study found CMT patients sought information primarily from their General Practitioners and/or Neurologist, as these health professionals were perceived as being more cognizant of the potentially neurotoxic effects of certain medications on CMT symptoms. Other findings revealed that those patients who faced uncertainty in obtaining and understanding medicines information turned to complementary and alternative medicines, internet resources and peer groups to self-manage CMT symptom exacerbations.

Discussion. This study highlights the need for better information services that empower CMT patients to discuss medication safety concerns with their health care providers. Understanding patients' perceptions on how medications impact the progression of their disease can improve patient outcomes and builds a body of evidence about medication safety and CMT. Further research is necessary for the development of evidence-based tools to enable health professionals to better manage a range of chronic health conditions in CMT patients.

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Pharmacists' cultural competence in a community pharmacy setting: an exploration of the issue of language proficiency

Annim Mohammad¹, Dr Betty Char¹. Associate Professor Bandana Saini¹ Faculty of Pharmacy, University of Sydney¹, Sydney, New South Wales, 2006

Introduction. Over the last decade, the importance of healthcare professionals' cultural competency in ensuring patient safety and optimal medicines use in diverse patient populations has been increasingly recognised. The ability to communicate effectively is an essential aspect of culturally competent practice. There is a paucity of studies that have explored community pharmacists' cultural competency towards patients of culturally and linguistically diverse (CALD) background with low English proficiency (LEP).

Aims. To explore and describe the current practice/s of community pharmacists serving CALD community members who have LEP and report on factors affecting their ability to provide culturally competent care.

Methods. Focus group discussions were conducted with community pharmacists who practiced in areas of high cultural and linguistic diversity in metropolitan Sydney until thematic saturation was deemed to have been attained. Pharmacist participants were also required to complete a de-identified study questionnaire. Data was analysed using the constant comparison method and a Grounded Theory approach was used to explore patterns that emerged

Results. A total of six focus group discussions were conducted. Data analysis revealed themes that provided a wholesome snapshot of community pharmacists' current practice in relation to serving CALD patients with LEP. Specific themes identified were: 1) Issues with professional satisfaction 2) Concern for patient safety 3) Barriers to culturally competent practice 4) Improvisations to deliver care in light of the aforementioned barriers and 5) Support required. **Discussion.** There are a variety of barriers and facilitators to community pharmacists' ability to provide culturally competent care to patients with CALD backgrounds who have LEP. Addressing identified barriers that hinder community pharmacists' capacity to engage in culturally competent practice will improve provision of pharmaceutical care to such patients.



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Exploring community pharmacists' ethical reasoning: insights through a qualitative study

Tin Fei Sim¹, Bruce Sunderland¹, H Laetitia Hattingh¹. ¹School of Pharmacy, Curtin University, Perth, WA

Introduction. Community pharmacists have a professional obligation to practise ethically. A foundation of ethical reasoning is established during university studies and placements. However, practising pharmacists, on a continuous basis, need to develop this skill which should evolve with practice experience and exposure to challenging scenarios. Taking into consideration recent expansions of the role of pharmacists and the paradigm shift towards patient-centred care, it is timely to explore community pharmacists' attitudes towards the importance of pharmacy ethics and their ethical reasoning skills.

Aims. This study aimed to qualitatively explore experienced pharmacists', interns' and senior pharmacy students' 1) attitudes towards ethics, 2) ethical reasoning processes and 3) dilemmas experienced in pharmacy practice.

Methods. Two focus group discussions (96.6 and 87.3 minutes) run by an independent facilitator, and one interview (52.9 minutes) were conducted with 15 participants in Western Australia. Participants were purposively selected based on their gender, background experience and level of practice. Discussions were guided by a list of questions informed by a literature review and expertise of the researchers. Discussions were audio-recorded, transcribed verbatim and compared with available field notes. Transcribed data were imported into NVivo 10 to facilitate qualitative analysis.

Results. The diversity of participants' experience and practice roles provided a broad discussion of a wide range of topical ethical issues. Three main themes emerged that impact on pharmacists' ethical reasoning: 1) change in, or expansion of, pharmacists' roles, 2) changes to the healthcare and workforce environment, and 3) exposure and development of ethical reasoning at university-level, mentorships, practice environment and practice experience.

Discussion This study highlighted the importance of sound and structured ethical reasoning as pharmacists are faced with contemporary challenges involving ensuring the provision of high-quality healthcare in a business environment. The paradigm shift in pharmacy practice creates greater responsibilities, leading to more complex ethical dilemmas. Participants identified many factors which intertwined to affect their ethical reasoning and behaviour. This study has identified gaps that, once addressed, will strengthen sound ethical reasoning in the pharmacy profession.

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Pharmacists' attitudes towards practice change and role extension

Karen Luetsch, School of Pharmacy, UQ, Brisbane, QLD

Introduction: While pharmacy as a profession continuously extends its scope of practice pharmacists' attitudes towards role extension are often regarded as potential barriers to practice change.

Aims: To systematically and critically review pharmacists' attitudes towards role extension and implementation of cognitive pharmaceutical services.

Method: A scoping review was performed after a systematic search of Medline, Cinahl and PsycInfo for studies describing pharmacists' attitudes towards role extension and practice change from 2000 to 2015. An interpretive synthesis of the selected literature was performed, comparing studies and context, forming the basis for a critical discussion and applying Theory of Planned Behaviour as a framework.

Results: The review included 47 articles exploring pharmacists' attitudes to a variety of newer, cognitive service models, e.g. prescribing, medication therapy management, pharmaceutical care or immunisation. Pharmacists' attitudes towards these extensions of their professional role and new pharmacy services were generally positive. While pharmacists perceived various benefits at an individual and professional level a number of internal and external barriers were identified. Considering pharmacists' attitudes and external barriers, e.g. workplace and organisational design and work flow, and framing them within the Theory of Planned Behaviour suggests that individual motivation needs to be underscored by systemic support for pharmacy practice change to succeed on a wide scale.

Conclusion: Pharmacists' attitudes towards role extensions was found to be generally positive. Addressing systemic and external barriers to changes of pharmacy practice would potentially facilitate the more rapid uptake of extended patient care roles by many pharmacists.



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Knowledge, perception and practice of pharmacists in screening, prevention and treatment of delirium in elderly patients

Gizat M. Kassie, Lisa M. Kalisch Ellett, Tuan A. Nguyen, Elizabeth E. Roughead

Quality Use of Medicines and Pharmacy Research Centre, University of South Australia, Adelaide, SA, Australia

Introduction. Delirium is a serious condition and medications are one of the risk factors. Adequate knowledge about delirium and participation of all healthcare professionals in delirium care can assist effective prevention and management. However, little is known about pharmacists' knowledge, perception and current involvement in delirium care.

Aims. This study aimed to assess the knowledge, perception and current practices of hospital pharmacists in screening, prevention and treatment of delirium in Australia.

Methods. A cross-sectional survey was conducted via a web-based questionnaire. The questionnaire was distributed, primarily, by a link to the survey in the newsletter of the Society of Hospital Pharmacists of Australia. Collected information included participants' demographics, knowledge and practices in the screening, prevention and treatment of delirium.

Results. One-hundred and six responses from participants were analysed. Nine of 11 basic knowledge questions, seven of eight questions relating to prevention strategies but only three of eight questions about risk factors for delirium were answered correctly by more than half of respondents. The majority of respondents indicated that delirium was a serious (74%) and an under-diagnosed (80%) syndrome. Most respondents believed that pharmacists could play a role in prevention (92%) and screening (62%) of patients for delirium. However, in practice only 8% of pharmacists reported that they had ever screened a patient for delirium using a validated tool and 79% indicated that pharmacists were never or rarely part of the delirium treating team in their setting.

Conclusion. Our study has highlighted that pharmacists have good basic knowledge about delirium and prevention strategies; however their knowledge about delirium risk factors could be improved. Pharmacists are underutilised in the screening and management of delirium. Efforts to improve pharmacists' knowledge about delirium risk factors, and strategies to increase their involvement in the screening and management of delirium should be implemented.

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Evaluation of the Western Australian pharmacy-administered immunisations: A qualitative study

Tin Fei Sim¹, Petra Czarniak¹, Shamala Ayadurai¹, Laetitia Hattingh¹. ¹School of Pharmacy, Curtin University, Perth, WA.

Introduction. In late December 2014, amendments were made to the Western Australian Poisons Regulations 1965 to allow trained pharmacists to administer influenza vaccines, without a prescription, to individuals 18 years and older.¹ All trained pharmacist immunisers in Western Australia (WA) must comply to the specifics as stated in the WA Pharmacist Vaccination Code.²

Aims. The study aimed to explore the perspectives and experiences of WA-trained pharmacist immunisers on their immunisation trainings, as well as the facilitators and challenges experienced in the preparation, implementation and delivery of pharmacist immunisation services.

Methods. During August 2015, pharmacists from pharmacies which participated in a previous survey were invited to participate in a semi-structured interview about pharmacist immunisation services. Pharmacists were selected based on the number of vaccinations delivered and the pharmacy types and locations. Interviews were audio-recorded, then transcribed verbatim. NVivo version 10 was used to organise qualitative data and thematic analysis of the data will be informed by the general inductive approach.³

Results. Interviews were conducted with 25 pharmacists, after which the point of data saturation was reached. Six main themes emerged: i) facilitators, ii) barriers and challenges, iii) positive impact of immunisation services in pharmacy, iv) needs identified, v) confidence of pharmacists, and vi) role of community pharmacists. Participants' personal experiences with the provision of immunisation services in community pharmacies were positive. Banner group-provided assistance was considered useful by some especially when dealing with administrative and logistical issues. The demand for immunisation services was reported to exceed expectations. It was evident that certain changes had to be implemented in the pharmacy to set-up the immunisation services and hence a whole-of-pharmacy approach with support from management was crucial for the successful implementation of the service. Discussion Convenience and accessibility of community pharmacies as well as flexibility in provision of services were identified as major factors that facilitated the demand and uptake of immunisation services. Overall the immuniser pharmacists were confident in providing immunisation services. Positive feedback from consumers, practice and experience and the presence of procedures and guidelines were identified as three major factors that affected confidence levels.

1. Government of Western Australia. Poisons Regulations 1965 (WA), Regulation 39AA.

2. Government of Western Australia. Pharmacist Vaccination Code, 2014.

3. Thomas DR. A general inductive approach for analyzing qualitative evaluation data. *American Journal of Evaluation*. 2006;27(2):237-46.



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A Shot in the Arm - Pharmacist Administered Influenza Vaccine

Peter R Carroll¹, Raz Badiyan² and Jane R Hanrahan². Discipline of Pharmacology, Sydney Medical School¹; Faculty of Pharmacy², University of Sydney, NSW.

Introduction. In NSW accredited pharmacists can administer influenza vaccine to people aged 18 years or older.

Aims. The aims of the study were to record the number of influenza vaccines administered by pharmacists who completed the Pharmacy Guild of Australia accredited vaccination training course during April and May of 2016, and to document the demographics of the people who received these vaccines.

Methods. Participating pharmacists received a template to record information relating to the person vaccinated, whether the person received the trivalent or quadrivalent vaccine, and whether any adverse events occurred.

Results. Of the 87 pharmacists who completed the courses during April and May 2016, 59 consented to participate in the study (68%). These pharmacists worked in 47 different pharmacies located both in metropolitan (73%) and rural (27%) areas. Data was collected for vaccinations administered between the start of April and the end of July 2016. During this time the pharmacists administered 2256 influenza vaccines. The age range of the people vaccinated was 18 to 95 years, and 377 were aged 65 and over. 61% of those vaccinated were female (of which 14 were pregnant), 27% received the trivalent vaccine and 73% the quadrivalent vaccine. Data relating to prior influenza vaccination was available for 918 people and 18% had not been vaccinated before. The number of vaccinations administered by individual pharmacists varied from 1 to 323, and no adverse events were recorded.

Discussion. Influenza vaccines administered by community pharmacists are not government reimbursed and the pharmacist charges a fee for the service. Of the people vaccinated, 377 were aged 65 and over, and 14 were pregnant. These people could have received their vaccine for free from their GP under the NIP, but they chose to pay. Reasons cited included convenience, no need to make a GP appointment and the concern of being infected by sitting in the GP waiting room with sick people. Where data was available, 18% of people had not been vaccinated before and possibly would not have been vaccinated without the community pharmacy program. 27% received the trivalent vaccine which may have been due to stock shortages and the increased price relative to the quadrivalent vaccine. The study clearly shows that as major public health initiative pharmacists can successfully administer influenza vaccine in the community pharmacy setting, and that this has wide public acceptance.

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New Opportunities and Challenges for Evidence Synthesis

Lisa A. Bero, Faculty of Pharmacy and Charles Perkins Centre, University of Sydney, Sydney, NSW

Evidence based medicine, a paradigm for teaching and practicing clinical medicine announced over 20 years ago, has evolved into evidence-based health. Systematic review methods are the foundation for evidence-based clinical decisions, but these methods are evolving for other health related applications. Evidence synthesis methods are now being applied in disciplines such as environmental science, animal toxicology, public health nutrition, policy implementation and genomics. Regulatory agencies and guideline producing bodies increasingly require "systematic reviews" as an evidence source. But, there have been obstacles to the expanding use of systematic reviews and there is a risk that the term is being corrupted. Reviews are not always conducted according to rigorous methods and the underlying evidence can be biased. This presentation will discuss ongoing initiatives to improve the quality and relevance of systematic reviews to make them applicable for a variety of health issues.

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Bioinformatic analysis that leads to changing health care for patients

Melanie Bahlo, The Walter and Eliza Hall Institute of Medical Research, Parkville, VIC

Next generation sequencing has made a significant impact in the diagnosis of Mendelian disorders, leading to the identification of causal variants. Success rates vary, depending on the disease. The understanding of the genetic cause can lead to a diagnosis, which can determine particular therapies. Much more work will be needed to determine which therapies will work best for particular patients. Genome-wide association studies have also yielded many genetic risk loci and allow the building of genetic predictors, which, in some diseases, achieve clinically relevant predictive power. This talk will provide an overview of genetic discovery methods currently yielding results, with applications to neurogenetics and an eye disorder, but will also highlight the chasm still present between finding genetic findings and finding treatments.



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Putting the balance back in diet: the nutritional geometry of health and ageing

Professor Stephen J Simpson, Charles Perkins Centre, The University of Sydney, Sydney, NSW

Macronutrients (protein, fats and carbohydrates) are fundamental dietary components, yet the question of what represents a balanced diet and how this maintains health and longevity remains unanswered. The talk will set out a powerful framework, Nutritional Geometry, for describing the multidimensional nature of nutritional requirements, the relative values of foods in relation to these requirements, the behavioural and physiological responses when feeding on diets of varying composition, and the health consequences of being restricted to particular diets. These models arose from the study of nutritional ecology and were developed initially using a wide variety of species in the laboratory and the field. I will use examples spanning insects to humans to address problems in ageing, obesity and cardiometabolic health.

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Effect of oxidative stress on mitochondrial morphology

Sue Mahat Basnet¹, Alison J Shield¹ Faculty of Health, University of Canberra, Canberra ACT 2601

Introduction. Studies have demonstrated that oxidative stress may lead to mitochondrial fragmentation by causing an imbalance between fission and fusion processes. This may include upregulation of fission proteins (Opa1, Drp1) and downregulation of mitofusin.

Aims. Our aim was to determine the effect of the mitochondrial fission protein Ganglioside Induced Differentiation Associated Protein 1 (GDAP1) in the presence of oxidative agents.

Methods. COS7 and Neuro2a cells were treated with six different oxidative stress agents and cell viability assessed using the MTT assay; N-acetylcysteine (NAC) was also used to protect against oxidative damage. Changes to mitochondrial morphology were analysed using MitoTracker dye and fluorescent microscopy. Cell lines were then transfected with GDAP1 and treated with the oxidative stress agents; cell viability and mitochondrial morphology were assessed as previous.

Results. For all six stress inducing agents we observed a dose responsive decrease in cell survival. We found 40mM glutamate exposure inhibited cell proliferation resulting in 40-60% cell death for COS7 and Neuro2a respectively. Quantitative analysis of mitochondrial morphology revealed a shift in the number of cells having fragmented mitochondria (from 1% to 62%) after glutamate exposure. NAC treatment (1mM) counteracts cell death but did not rescue the mitochondrial network (~55% fragmented mitochondria). After transfection with GDAP1 we found the cell death induced by 40mM glutamate was reduced (75% and 66% cell survival in COS7 and Neuro2a respectively); mitochondrial morphology was largely fragmented.

Discussion. Our study confirmed that glutamate causes both toxicity and mitochondrial fragmentation. Interestingly NAC treatment protects against oxidative damage but does not prevent fragmentation. Despite independently inducing mitochondrial fission, the overexpression of GDAP1 protects against oxidative glutamate toxicity in the COS7 and Neuro2a cell lines. Our study will help us to understand the dynamics of the mitochondrial network in the presence of oxidative stress agents.



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Intracellular Kinetics of Adenovirus inner components: inspiring a better DNA vaccine Design

Hareth Wassiti^{1,2}, Angus Johnston^{1,2}, Colin Pouton¹ Dept of Drug Delivery disposition and dynamics, Monash Inst. Of Pharmaceutical sciences ¹, Parkville, VIC; ARC centre of Excellence in Convergent Bio-Nano Sciences and Technology, Monash Inst. Of Pharmaceutical sciences ², Parkville, VIC.

Introduction. DNA vaccine is an emerging immunotherapeutic technology to train the immune system to seek and destroy metastatic cancer. Despite strong safety profile, DNA vaccines lack the needed clinical efficacy. This is primarily due to the poor delivery of DNA to the nucleus¹. In addition, methods to test different modalities of DNA vaccines still lacking.

Aims. To develop methods investigating nuclear import of DNA and DNA-complexes of adenovirus to inspire a better synthetic DNA vaccine design.

Methods. Using Microinjection and selective plasma membrane pore formation using digitonin import assay coupled with high resolution confocal microscopy and live imaging.

Results. We show that those methods can be successfully used to investigate the kinetics of BSA protein cross-linked with a nuclear localization signal and we also validate the import assay ability to be representative of nuclear pore transport. In addition, we isolated dissociated adenovirus using either partial (acid treated), core isolated (pyridine/ deoxycholate treatment) and complete removal of DNA-binding proteins. Using cellular kinetics methods, we find key differences in the ability of those different parts of the adenovirus to carry the DNA into the nucleus.

Discussion. A model of Adenovirus DNA nuclear delivery is proposed here where it highlights the importance of DNA binding proteins interaction with nuclear pore components in the delivery of its DNA. This highly suggests that to deliver exogenous DNA for a purpose of DNA vaccine and gene therapy, in vivo, one must include components interacting with nuclear-pore import machinery.

1- Nature Reviews Drug Discovery 5, 115-121 (February 2006) | doi:10.1038/nrd1960

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Pharmacokinetics and bioavailability of Mitragynine in Sprague Dawley (SD) Rats using microdialysis

Z. Chik, WM Kong, MA Alshawsh, Z Mohamed. Department of Pharmacology, Faculty of Medicine, University of Malaya, 50603 Kuala Lumpur, Malaysia.

Introduction. Mitragynine, an active indole alkaloid is the most abundant active alkaloid found in leaves of *Mitragyna speciosa* (MS). MS or popularly known as "Ketum" in Malaysia is widely used traditionally for the purpose of pain relief, anti-diarrhoea, increases energy etc. Since the potential action of mitragynine is in the brain, it is important to study its pharmacokinetics in both plasma and brain compartments. To achieve this, microdialysis technique has been utilized.

Aims. This study aims to develop and validate the sensitive LCMS method to analyse mitragynine in dialysate and to study the pharmacokinetics of mitragynine in both brain and plasma of SD rats.

Methods. LCMS method was developed and validated for the analysis of mitragynine in dialysate. Six adult SD rats were used for the study. Rats received a single oral (p.o.; 40 mg/kg) or intravenous (i.v.) 10 mg/kg) dose of mitragynine in 10 % tween-20 aqueous solution. Following the setting up of microdialysis system in the jugular vein and brain, the probes were perfused with ringer's buffer at a flow rate of 1 μ L/min. Blood and brain microdialysate samples were collected at intervals of 30 \pm 2 min up to 7.5 h. All the microdialysate samples were then extracted and analysed using LC-MS within period of 24 h. The pharmacokinetic parameters were analysed by non-compartmental method using Phoenix WinNonlin version 6.1 software.

Results. The LCMS method was linear from 10 to 1000ng/mL and fully validated. Bioavailability of mitragynine was calculated to be 11% and the brain:plasma ratio for both IV and oral administration were 66 and 74%, respectively. The half-life calculated were range from 6 to 13 hours.

Discussion. To our knowledge, this is the first report of mitragynine pharmacokinetic profiling in brain and blood using a microdialysis technique in rats. In summary, the microdialysis system coupled to the LCMS is useful to quantify low concentrations of mitragynine in the dialysate. Mitragynine shows long half-life and not suitable to be given orally due to poor oral bioavailability. However, its lipophilic properties allow it to effectively permeate the blood brain barrier as seen in this study.



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Formulation development of triterpenoids to enhance its anticancer effects on glioblastoma cells

Yat Sum William Wah¹, Ramin Rohanizadeh¹, Jane R. Hanrahan¹, Rebecca H. Roubin¹. Faculty of Pharmacy, The University of Sydney¹, Sydney, NSW.

Introduction. Glioblastomas are the most common and deadliest primary brain tumours, and novel ways of treating it are urgently needed. Ursolic acid (UA), a pentacyclic triterpenoid, has been recently reported to exhibit promising anticancer activity. With its multifaceted action, selective toxicity, chemo-sensitising effect and ability to penetrate the blood brain barrier, it is believed to have a potential role in the treatment of glioblastoma. However, up to date, the clinical application of UA has been greatly hindered by its limited aqueous solubility.

Aims. To develop novel formulations of UA with improved dispersibility, which will enhance its anticancer effect in glioblastoma cells.

Methods. UA nanoparticles (UA-NPs) were prepared as novel nanodrugs using anti-solvent precipitation technique with Pluronic F-127. β -cyclodextrin (β -CD) was employed as a drug carrier to form inclusion complexes with UA by kneading in a molar ratio of 1:2 with ethanol as solvent. These formulations were additionally characterised by dynamic light scattering, nuclear magnetic resonance and fourier transform infrared spectroscopy, and drug content was measured by high-performance liquid chromatography.

Results. UA-NPs and β -CD inclusion complex with UA were successfully synthesised as novel formulations. Both formulations have demonstrated increased dispersibility. The UA-NPs appear to have a higher dispersibility and drug loading rates than the β -CD inclusion complex.

Discussion. Our preliminary finding reveals that both types of formulations have improved dispersibility compared to UA, which suggests a potential enhancement in the anticancer effects of UA. Further biological evaluation will be tested on glioblastoma cells as an *in vitro* model for the pursuit of improvement in drug efficacy of UA.

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Possible involvement of Caveolin-1 in Alzheimer's disease via activation of β -Secretase in rat

Ankita Gupta¹, Rohit Goyal¹, Ashish Sharma¹, Anil Kumar²

Sch of Pharm Sci, Shoolini Uni, Solan, HP, India¹; Dept of Pharmacol, Uni Sch of Pharm Sci, Panjab Uni, Chandigarh, India²

Introduction. Alzheimer's disease is ascribed with lack of memory coordination and deficits. There is an emerging evidence for physical association of caveolin-1 and cholesterol biosynthesis in proteolytic processing of amyloid precursor protein (APP) and thereby in production of amyloid- β (A β) *in vivo*.

Aim. The present study was aimed to investigate the role of caveolin-1 in progression of Alzheimer's like dementia in intracerebroventricular streptozotocin (ICV-STZ) model in rats.

Methods. Male Wistar rats (220-260 g) were divided into different groups, each comprising 8 animals (n=8). Streptozotocin (STZ) was given on day 1 at the dose 3 mg/kg was via ICV route to all the groups except NC, sham and minoxidil groups. ICV-STZ was given at its submaximal dose 1.5 mg/kg only to the animals of minoxidil group. Daidzein, a caveolin inhibitor at 0.2 & 0.6 mg/kg *s.c.* were given daily whereas minoxidil at 0.45 mg/kg, *i.p.* on alternative days for 28 days. Neurological deficits were assessed using morris water maze, elevated plus maze and balance beam test. Biochemical estimations were made in tissue homogenate for oxidative stress *i.e.* lipid peroxidation and glutathione. Statistical analysis was carried out using GraphPad Prism6 software.

Results & Discussion. ICV-STZ control animals exhibited neurological deficits in the form of impairment in memory retention on morris water maze, elevated plus maze, and in episodic memory and working memory on balance beam test in the form of latency to turn toward goal box, number of hind paw slips and tangential velocity. Administration of low and high doses of daidzein significantly restored neurological deficits. Minoxidil with sub lethal doses of STZ caused significant impairment in memory functions in behavioral performances on mazes. A similar observations were observed in different groups for oxidative stress markers in brain. A typical STZ pathology regardless non-pathological dose of STZ along with activation of caveolin-1 using minoxidil and restoration of deficits by inhibition of caveolin-1, is mechanized through APP microprocessing. **Conclusion.** It may be concluded that caveolin-1 plays a significant role in progression of neurological deficits in Alzheimer's type of dementia in ICV-STZ treated animals.



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Chemical profile and anti-diabetic potentials of *Dendrobium* species from Australia and China

I Gusti S Trapika¹, Jun-Lae Cho¹, Kong M Li², Guoyi Ma³, George Q Li¹. ¹Faculty of Pharmacy, The University of Sydney, NSW 2006, Australia; ²Discipline of Pharmacology, The University of Sydney, NSW 2006, Australia; ³The National Center for Natural Products Research, The University of Mississippi, University, MS 38677, USA

Introduction. Lipid accumulation is one of the etiological factors of insulin resistance associated with type 2 diabetes mellitus. *Dendrobium*, the largest genus of orchid has been recently reported to have anti-cancer activity and anti-diabetic property. The aim of this study was to compare chemical profile and investigate antidiabetic potentials of *Dendrobium* species from Australia and China.

Method. Stems of *Dendrobium* including *D. speciosum*, *D. kingianum*, *D. officinale* and *D. nobile* were extracted with pure ethanol, and analysed by TLC. The samples were then extracted with hot water, and the solutions were deproteinized using Sevag reagent then precipitated with ethanol to obtain polysaccharide extracts. The HepG2 cells and Oil Red O method were used to test the accumulation of lipid. The K562 cells were used for evaluating mitosis inhibition.

Result. Blue spots on TLC under UV light indicated that *Dendrobium* spp contained some phenolic compounds, but the profiles were variable. *Dendrobiums* contained variable amount of polysaccharide. The preliminary results showed ethanol extracts of *Dendrobium* reduced lipogenesis and suppressed mitosis on HepG2 cells and K562 cells.

Discussion and conclusion. The TLC chemical profiling provides a method and quality comparison and phytochemical identification of *Dendrobium* herbs. The inhibition of lipogenesis and mitosis may be related to AKT signalling pathway which plays essential role of insulin resistance and cancer pathogenesis.

Ramakrishan G et al (2014) J Biol Chem 289:9:6054-6066

Ng TB et al (2012) Appl Microbiol Biotechnol 93:1795-1803

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Shared decision making in the pharmacological management of schizophrenia: Perspectives of health care professionals and consumers

Yuh-Lin Gan¹, Claire L. O'Reilly¹. Faculty of Pharmacy, the University of Sydney¹, Sydney, NSW.

Introduction. Shared decision making (SDM) has gained increasing importance following the emphasis on patient-centred care in current practice. It can play a major role in optimizing outcomes in schizophrenia, where medication adherence is key. Understanding of health care professionals (HCP) and consumers' perspectives is essential to facilitate SDM.

Aim. To explore HCPs and consumers' views on the application of SDM in managing medications in schizophrenia.

Methods. A systematic literature search of Medline, EMBASE, PubMed, CINAHL and PsycINFO was performed to identify studies published up to April 2016 using terms related to "shared decision making", "health care professional" or "consumer", "views", "pharmacological" and "schizophrenia". Only primary research studies, reporting views on SDM in schizophrenia, and published in English were included. Cross-referencing of the identified articles was also conducted.

Results. Fifteen articles, reporting on 14 quantitative and qualitative studies, were included. Consistent findings of HCPs and consumers in favour of SDM were reported, but consumers' perceived application was lower compared to HCPs. Many factors affected preferences of HCPs and consumers, including consumer characteristics, decision types, age and attitudes towards medications. Increased medication adherence was perceived as a major benefit of SDM. Despite some facilitators, impaired decisional capacity of consumers and the lack of commitment from HCPs and consumers presented barriers in implementing SDM.

Discussion. Following the increasing role of SDM in schizophrenia management, strategies to address the challenges in implementation needs to be explored. The lack of consumer outcome evaluations highlights the need for further investigations of the impact of various interventions on SDM in schizophrenia.



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Mental Health First Aid training and its application in a tertiary setting benefits staff and students

Kristy-Lee Albrecht¹, Erin Giftakis¹, Casey Baxter¹, Tricia Wylde², Rhonda Clifford¹, Deena Ashoorian¹. Sch of Med and Pharmacol, Univ of Western Australia¹, Perth, WA; Hlth Promo Unit, Univ of Western Australia², Perth, WA.

Introduction. The University of Western Australia (UWA) has a student population of over 25,000 and a staff population of over 3,700. According to statistics from the National Survey of Mental Health and Wellbeing, 2007, this translates to nearly 7000 university staff and students in any one year who may potentially be managing significant issues relating to mental health. Currently, there is limited research into the application of Mental Health First Aid (MHFA) in a tertiary setting.

Aims. To assess mental health literacy, confidence and application of skills post MHFA training in a tertiary setting.

Methods. A questionnaire was developed and validated by a MHFA research team. All UWA staff and students trained in the standard MHFA course during the previous 30 months were invited, via email, to participate in the online questionnaire to assess their literacy, confidence and skills application.

Results. Of the 485 questionnaires distributed 107 were completed. Participants agreed their mental health literacy (76%) and confidence (85%) had improved post training. MHFA was applied by 65% of participants with 22% specifically applying their skills to students. Of those who applied MHFA, 33% of participants reported assisting specifically in a crisis, most commonly panic attacks (21%), suicidal thoughts and behaviours (20%), self-harm (16%) and after a traumatic event (16%).

Discussion. Over 60% of the MHFA trained participants had the opportunity to apply their MHFA skills. This means they were in a position to provide assistance to those developing a mental illness or in a mental health crisis. With 22% of participants applying their MHFA training to fellow students this means a positive impact is made in the university environment. By having staff and students trained in MHFA, they are able to help preserve life and provide help to prevent mental health problems from escalating further and can promote recovery of existing illness.

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The risk of hip fracture in older people using selective serotonin reuptake inhibitors (SSRIs) and other psychoactive medicines concurrently

Michael J Leach^{1,2}, Nicole L Pratt¹, Elizabeth E Roughead¹. Quality Use of Medicines and Pharmacy Research Centre, Sansom Institute, School of Pharmacy and Medical Sciences, University of South Australia², Adelaide, SA; Loddon Mallee Integrated Cancer Service, Bendigo Health¹, Bendigo, VIC.

Introduction. Few studies have assessed the risk of hip fracture following concurrent use of psychoactive medicines, and none have investigated combinations with selective serotonin receptor inhibitors (SSRI).

Aims. To assess the risk of hip fracture in older people following concurrent use of SSRIs and other psychoactive medicines.

Methods. A matched case-control design was employed. Cases were Australian Government Department of Veterans' Affairs (DVA) beneficiaries aged over 65 years who experienced a hip fracture between 2009 and 2012. Each case was matched with up to four randomly selected controls of the same age (± 2 years) and gender. Medicine-hip fracture associations were estimated via multivariate conditional logistic regression. The relative excess risk due to interaction (RERI) was calculated to determine whether combined effects differed from the sum of individual effects.

Results. There were 8,828 cases and 35,310 age- and gender-matched controls. The median age of subjects was 88 years and 63% were women. When analysed individually, the risk of hip fracture was elevated for all medicines assessed, most notably SSRIs (initiation: odds ratio [OR]=2.7, 95% confidence interval [CI]=[2.1, 3.6]) and opioids (initiation: OR=2.3, 95% CI=[1.9, 2.9]). Combinations associated with increased odds of hip fracture included the addition of benzodiazepines to continuous SSRI therapy (OR=3.0, 95% CI=[1.9, 4.8]; RERI=0.9, 95% CI=[-0.5, 2.3]), continuous use of both opioids and SSRIs (OR=2.2, 95% CI=[1.9, 2.6]; RERI=0.1, 95% CI=[-0.3, 0.5]), addition of opioids to continuous SSRI therapy (OR=3.2, 95% CI=[1.8, 5.5]; RERI=0.1, 95% CI=[-2.0, 1.7]) and simultaneous initiation of benzodiazepines and SSRIs (OR=4.7, 95% CI=[1.7, 13]; RERI=1.3, 95% CI=[-3.8, 6.3]).

Discussion. In older people, SSRIs and psychoactive medicines were associated with increased risk of hip fracture individually and in combination with one another. While the RERI results showed no excess risk beyond the sum of individual effects, most combination medicine effects equalled the sum of the individual effects.



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Metabolic monitoring of hospital inpatients receiving antipsychotics: multisite quality improvement study

Alexandra A Bennett¹, Margaret L Jordan¹, Veta-Marie Peereboom², Aoife Davis³, Seniha Karacete⁴, Angela Meaney⁴, Greg Carter⁵, Nick O'Connor². NSW Therapeutic Advisory Group¹, Sydney, NSW; North Shore Ryde Mental Health Service², Sydney, NSW; Manly Hospital³, Sydney, NSW; Concord Centre for Mental Health⁴, Sydney, NSW; University of Newcastle⁵, Newcastle, NSW.

Introduction. The National Quality Use of Medicines mental health (MH) indicator "Percentage of patients taking antipsychotic medications who receive appropriate monitoring for the development of metabolic side effects" measures adherence to best practice recommendations for monitoring of metabolic adverse effects that occur with regular antipsychotic use.

Aims. To undertake performance assessment, benchmarking and implementation of strategies to improve metabolic monitoring in hospital patients and train MH clinicians in quality improvement (QI) methodology.

Methods. Invitations for participation were sent to Australian hospitals. A multidisciplinary steering group was established to oversee project design and provide advice. Health and research ethics approval for a low/negligible risk study and individual site specific authorities were obtained. Each site formed a multidisciplinary local advisory group (LAG) to guide data collection, implement QI strategies and identify barriers to best practice adherence. Site details (patient populations, routine healthcare resources and infrastructure) were collated to enable benchmarking. Baseline audit, intervention and post-intervention audit phases will be undertaken.

Results. Sixteen sites across 3 Australian jurisdictions caring for a range of patient populations (acute adult, adolescent, paediatric, forensic and psychogeriatrics) are participating. All LAGs contain at least one pharmacist and, psychiatrists (13) and registered nurses (11) in most. Baseline results from 10 sites range from 0%-42% (mean, 15%). Feedback from sites include the disparities between electronic pathology requests and reports, deficient electronic recording systems, and the need for systems-based approaches to monitoring e.g. waist measurement.

Discussion. Multisite studies are a useful means of providing benchmarking data to drive QI and developing skills in collaborative improvement strategy development and implementation. Baseline results provide evidence of consistent poor adherence across the participating sites with common barriers emerging.

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'Culture is more than what we do around here': influence of basic assumptions on psychotropic medicine use in nursing homes

Mouna Sawan¹, Yun-Hee Jeon², Timothy F Chen¹. Faculty of Pharmacy, University of Sydney¹, Camperdown, NSW; Faculty of Nursing, University of Sydney², Camperdown, NSW

Introduction. Psychotropic medicines have limited efficacy in the management of behavioral and psychological symptoms of dementia and are associated with significant adverse events, however they are commonly used in nursing homes. Studies suggests that organizational culture may influence the use of psychotropic medicines. Schein's theory elucidates that organizational culture is more than 'how we do things around here' but that it comprises of a deeper layer called the basic assumptions. Basic assumptions are the unsaid, taken for granted beliefs and values driving organizational members' behavior and practices.

Aims. To identify the basic assumptions of culture influencing psychotropic medicine use in nursing homes.

Methods. A qualitative study using semi structured interviews was conducted with staff from eight nursing homes in Sydney, Australia. Purposive sampling was used to recruit 40 participants representing a broad range of disciplines and roles. Thematic analysis was used to derive key concepts.

Results. Two basic assumptions were identified: locus of control and the necessity for efficiency or comprehensiveness. Locus of control pertained to whether on-site and visiting staff believed they were helpless to do the right thing by the resident when facing negative work experiences. The necessity for efficiency or comprehensiveness was related to on-site and visiting staff rationing how much time and effort was spent on a given task. Basic assumptions held by on-site and visiting staff were not compatible with the appropriate use of psychotropic medicines when staff believed they were helpless to make changes to their work environment and believed it necessary to be efficient to manage resident load.

Discussion. Basic assumptions of on-site and visiting staff shifted the responsibility from oneself for carrying out non-ideal actions in an environment characterized by staff shortages, time pressure, and complex interactions which subsequently led to the inappropriate use of psychotropic. This study highlights the requirement to recognize that every staff member undertaking resident care shapes the culture and has a responsibility to enhance the quality use of psychotropic medicines.



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Investigation of Hospital Opioid Prescribing among Opioid Naïve Surgical Patients

Luke D Kardell^{1,2}, Jenny Crane³, Sarah N Hilmer^{2,4}, Ross MacPherson⁴, Danijela Gnjidic^{1,2}. Fac Pharmacy, Univ of Sydney¹, Sydney, NSW; Depts Clin Pharmacol and Aged Care, Kolling Inst, Royal North Shore Hosp², Sydney, NSW; Dept Pharmacy, Royal North Shore Hosp³, Sydney, NSW; Fac Medicine, Univ of Sydney⁴, Sydney, NSW.

Introduction. Opioids are commonly used to treat post-operative pain following acute hospitalisation. However, prescribing of opioids can lead to a range of short and long-term adverse effects, and at present it is unclear how post-operative opioid usage contributes to the wider patterns of opioid use, particularly among opioid naïve patients.

Aims. To investigate the utilisation of opioids after hospital discharge amongst opioid naïve surgical patients, and the association between opioid use, pain management and opioid related difficulties experienced in this setting.

Methods. A prospective observational study of opioid naïve patients undergoing elective surgery admitted to the Pre-Admission Clinic at a tertiary hospital in Sydney is being conducted. Data on socio-demographics, medical history, and pain levels using the Brief Pain Inventory (BPI) are obtained at recruitment before their operation. Medications prescribed at discharge are recorded from patients' discharge summaries. Patients are being contacted at 1-week, 1, 3 and 6-months after discharge to assess patterns of opioid use, pain levels and patient-reported problems and concerns using the Prescribed Opioid Difficulties Scale (PODS).

Results. At present, 127 patients have been recruited; 42.5% (n=54) were female with a mean age of 61.7±16.1 years. On preliminary analysis, 40.0% (n=32) of patients have been discharged with an opioid, either oxycodone when required (90.6%, n=29), a fixed combination of oxycodone/naloxone (43.8%, n=14), or both (34.4%, n=11). The baseline mean BPI pain severity was 1.5±2.3 (range: 0-10) and mean pain BPI interference score was 1.5±2.4 (range: 0-9.7). Of those who have completed the 1-week follow up (n=41), 39.0% (n=16) of patients had taken opioids within 1-week, and of 14 followed up within 1-month, 21.4% (n=3), reported using an opioid. A total of 37.5% (n=6) of patients experienced a high level of opioid related difficulties and concerns after 1-week.

Discussion. Our preliminary finding suggests that opioid naïve patients generally experience very little pain preoperatively, but are prescribed opioids frequently after surgery. Use of newly prescribed opioids within 1-week and 1-month following hospital discharge is common among surgical patients. Future studies need to evaluate factors associated with opioid prescribing in this setting.

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How can pharmacists provide medication services to mining sites?

Lynne Emmerton, Laetitia Hattingh, Jeff Hughes, Petra Czarniak, Patricia Filippin. School of Pharmacy, Curtin University, Perth, WA.

Introduction. Our previous research has revealed employees of remote-area resources industries in Western Australia are at risk of insufficient and delayed access to pharmaceutical services. Numerous anecdotes reporting preventable medication-related errors, medication supply issues and sharing of medicines were reported.

Aims. This research aimed to qualitatively explore potential roles for pharmacists to service remote mining sites.

Methods. Interviews were conducted with 20 pharmacy stakeholders connected in some way to the mining industry, identified via advertisements and contacts. Interviews explored pharmacists' professional experiences relating to mining workers, and scoped three potential service models: a fly-in/fly-out metropolitan-based pharmacist, a drive-in/drive-out rural-based pharmacist, and tele-pharmacy (video-linked) services from a metropolitan base. Interviews were recorded with consent and professionally transcribed. Content analysis described and compared the scope of practice, barriers, facilitators and remuneration for each model.

Results. Participants comprised rural pharmacy owners, hospital and poisons information pharmacists, accredited pharmacists and representatives of professional bodies. Despite their experience with mining workers, knowledge of on-site medical services was low, and none of the participants knew of mining companies employing pharmacists. Some pharmacies provided scheduled medication and ancillary medical supplies to mining companies, despite regulatory barriers in doing so. Most in community practice had supplied non-prescription sedatives and/or emergency medicines to mining employees. While there was no consensus in the present study about the ideal service model, the drive-in/drive-out model appeared most practical to overcome regulatory issues around medication supply and improve quality use of medicines on-site. Concerns were raised for all models around inability to develop rapport with transient clientele, indemnity if the pharmacist's role extended recognised scopes of practice, and lack of precedents for remuneration by the government or employers.

Discussion. Due to the identified barriers, further research is required to develop pharmacists' roles to address the medication needs of remote mining workers. Pioneering rural pharmacists are encouraged to build upon any current medication supply services to mining workers to explore the potential for formally-contracted services.



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The feasibility of a pharmacist-led osteoporosis screening program in a Malaysian primary care clinic

Li Shean Toh¹, Pauline Siew Mei Lai², David Bin-Chia Wu³, Bee Yean Low⁴, Kok Thong Wong⁴, Claire Anderson⁵. Division of Pharmacy, University of Tasmania¹, Hobart, TAS, Australia, ² Department of Primary Care Medicine, University of Malaya², KUL, Malaysia; School of Pharmacy, Monash University³, SEL, Malaysia; School of Pharmacy, University of Nottingham⁴, SEL, Malaysia; School of Pharmacy, University of Nottingham⁵, NOTT, United Kingdom

Introduction. Many women with osteoporosis remain undiagnosed until they sustain a fragility fracture. Therefore, osteoporosis screening which aids in the early detection of osteoporosis is the most effective way to prevent these fragility fractures which are associated with increased morbidity and mortality.

Aims. To determine the feasibility of a pharmacist-led osteoporosis screening programme in Malaysia.

Methods. Postmenopausal women aged ≥ 50 years without osteoporosis were recruited via convenience sampling. We measured scientific outcomes [the number of patients who went for a bone mineral density (BMD) scan, who were started on osteoporosis medications and who modified their lifestyle to improve bone health], process outcomes [response rate, follow up rate], resource outcomes [coordination of intervention] and management outcomes [data entry workload]. Patients' osteoporosis knowledge and satisfaction were assessed at months 0 and 2. All patients were assessed for their osteoporosis risk, and were counseled on prevention methods. Patients who were at moderate to high risk were referred to the doctor for a BMD. There were two follow ups at month 0 and 2.

Results. Fifty patients were recruited [response rate=90.9%]. A total of 26/50(52.0%) went for a BMD, 2/50(4.0%), were started on osteoporosis medications and 9/50(18%) modified their lifestyle to improve bone health. Osteoporosis knowledge significantly increased from baseline to month two (46.3 ± 21.4 vs 79.1 ± 14.3 , $p < 0.001$). Patients were highly satisfied with the screening program provided (89.8 ± 12.4). As for process outcomes, the follow-up rates were 83.9 and 100% at months 0 and 2, respectively. The resources and management outcomes were determined to be viable based on the researchers' experience whilst running the feasibility study.

Discussion. Our study found that the pharmacist-led osteoporosis screening program within a primary care setting in Malaysia was found to be feasible. However, before it can be implemented in clinical practice, a randomized controlled trial needs to be conducted to assess the impact of this intervention.

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Stakeholder's experiences of providing remunerated professional pharmacy services under Community Pharmacy Agreements

Andi Hermansyah^{1,2}, Erica Sainsbury¹, Ines Krass¹. Faculty of Pharmacy, University of Sydney¹, Sydney, NSW; Faculty of Pharmacy, Airlangga University², Surabaya, INDONESIA.

Introduction. Since 1990, Community Pharmacy (CP) in Australia has provided a range of Professional Pharmacy Services (PPS) funded under Community Pharmacy Agreements (CPAs). These services are unrelated to the delivery of PBS medicines which forms the foundation of the consecutive agreements. However, with an over-reliance on the dispensing model, and the impact on profitability of Price Disclosure, the viability of CP may be threatened. It is therefore important to investigate the extent to which PPS has impacted on the dispensing volume driven business model.

Aims. To explore stakeholders' views, and experiences of providing PPS funded under the CPAs, including factors influencing the extent to which these services have benefited the operation of CP.

Methods. In-depth, semi structured interviews were conducted with a range of CP stakeholders from practitioners to policy makers between December 2014 and August 2015. Interviews were recorded, transcribed verbatim and analysed for emerging themes. Ethics approval was obtained from the University of Sydney.

Results. A total of 27 key informants participated. Stakeholders recognised the importance and the advantage of delivering PPS in CP. In addition, they viewed that PPS were widely adopted in the last CPA (the 5th) showing a high level of awareness of the growing need to focus on a service model. However, most respondents perceived the limited funding for PPS as a proportion of the overall CPA package contributed to reluctance for CP to change their business model. Moreover, the capping policy for some PPS and the massive expansion of the discount pharmacy model, resulted in concerns about the sustainability of a CP service model. Several participants criticised the lack of evidence surrounding the implementation of PPS suggesting the need to invest in quality assurance of the CPA.

Discussion. While shifting towards provision of PPS is an emerging trend, CPs in Australia still viewed dispensing as the primary business model for CP. Therefore, there is a need for more investment in PPS to ensure reliable provision of PPS under the CPAs. Furthermore, the CPAs need to facilitate the collection of clear and robust evidence showing the value to the health of the community of CP delivering PPS.

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Community pharmacist-led interventions and their impact on patients' medication adherence and other health outcomes: A systematic review.

Aleksandra Milosavljevic¹, Trudi Aspden¹, Jeff Harrison¹. School of Pharmacy, the University of Auckland¹, Auckland, New Zealand.

Introduction. Medication adherence can be defined as the extent to which ones' medication taking behaviour follows that agreed upon by the prescribing physician. The degree to which a patient is adherent can have downstream effects on treatment effectiveness, patient health outcomes, and health care system costs. Increasing evidence has highlighted the positive contribution community pharmacist-led interventions can have on improving patients' adherence and health outcomes.

Aims. To provide an overview of the published literature on interventions that have been implemented in the community pharmacy setting and their effectiveness in improving adherence and health outcomes.

Methods. A search strategy was developed, aiming to retrieve published reports of community pharmacy interventions worldwide. Medline, EMBASE, International Pharmaceutical Abstract (IPA), and Google Scholar databases were searched. Articles meeting the inclusion criteria were collated, relevant data extracted, and a risk of bias assessment undertaken.

Results. Twenty one studies were included in the analysis, and their outcomes were reported in 25 peer-reviewed journal articles. Community pharmacist-led interventions have been shown to improve patients' adherence and contribute to better blood pressure control, cholesterol management, chronic obstructive pulmonary disease (COPD) and asthma control. Studies in this review however, did not report statistically significant effects of interventions on diabetes and depression control.

Discussion. Community pharmacist-led interventions have been shown to contribute to improved adherence and better disease control. Many of the interventions had multiple elements, therefore future research should attempt to better understand which components make the greatest contribution towards improving adherence and health outcomes, for patients with different medical conditions.

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Hospital clinical pharmacy services in Vietnam

Hieu T Trinh^{1,2}, Van TT Pham², Phuong TX Dong², Hai L Ba², Phuong H Ha², Thao TB Cao², Hanh TH Nguyen², Hoa V Dinh², Hai T Nguyen², Parisa Aslani¹, Jo-anne Brien¹, Huong TL Nguyen². Faculty of Pharmacy, Univ of Sydney¹, NSW; Dept of Clinical Pharmacy, Hanoi Univ of Pharmacy², Hanoi, VIETNAM;

Introduction: Clinical pharmacy is key to the quality use of medicines. While there are different approaches in different countries, international perspectives may inform health service development. The Vietnamese Ministry of Health (MOH) introduced policy guidelines to require clinical pharmacy services in December 2012.

Aims: To describe the services, and to explore reported difficulties and enablers in implementing clinical pharmacy activities in Vietnamese hospitals after issuing the MOH policy guidelines.

Methods: An online questionnaire was sent to 39 hospitals in Hanoi, including 22 provincial-level and 17 district-level hospitals. Next, focus group discussions were conducted in ten of these hospitals. The questionnaire and discussions focused on four areas: facilities, manpower, policies and clinical pharmacy activities.

Results: 34/39 (87%) hospitals had established clinical pharmacy teams. Most activities were non-patient specific (34/39 hospitals, 87%) while the preliminary patient-specific clinical pharmacy services were available in only 8/39 hospitals (21%). The most common non-patient specific activities were providing drug information (97%), reporting adverse drug reactions (ADRs) (97%), implementing drug use protocols (51%), and training in drug use (56%). The patient-specific activities varied widely between hospitals and were ad hoc. The main challenge reported were: lack of manpower (0.77 clinical pharmacist FTE/hospital).

Discussion: This was the first mixed-method study to describe clinical pharmacy activities in Vietnam since introduction of the policy guidelines. While most hospitals had hospital-based pharmacy activities, the direct patient care was limited. Training, education and an expanded work forces are needed to improve clinical pharmacy services.



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Moving beyond the four walls: pharmacist roles in New Zealand primary care

Chloë Campbell^{1,2}, Caroline J Morris², Rhiannon Braund¹. School of Pharmacy, Univ of Otago¹, Dunedin, NZ; Dept of Primary Health Care and General Practice, Univ of Otago², Wellington, NZ.

Introduction. Recognition of the benefits of collaborative practice models in primary care and the need to optimise use of pharmacists' skills and knowledge is leading to the emergence of new roles for pharmacists in primary care internationally. In New Zealand, little is known about the extent of this emerging workforce.

Aims. To explore the emerging roles of pharmacists working in New Zealand primary care.

Methods. An electronic survey tool was used to collect quantitative data about the roles undertaken, employment situation and location of work of pharmacists in New Zealand primary care. The survey tool was piloted by two practising pharmacists. Pharmacists working in primary care were invited to participate using an e-mail invitation sent via the Pharmaceutical Society of New Zealand mailing list.

Results. The response rate was 16% (n=467). Most respondents (74%) work solely in community pharmacy; 12% work in a single non-community pharmacy location and the remaining 14% work in a combination of locations. Of respondents who spend time physically located in a general practice (7% of all respondents), a very small proportion (7%) are employed directly by a general practice. Primary Health Organisations (PHOs) are the most frequent employer of these pharmacists (48%). PHOs are funded at a regional level to support the provision of essential primary health care services through general practices. Pharmacists spending time in general practices provide a range of cognitive services. The three most common are: responding to questions about medicines from health professionals (100%), provision of educational activities for health professionals (79%), and transition of care services (79%). Other frequent activities are drug utilisation evaluation or audit (75%) and medication review (64%). Five percent of responding pharmacists spend time in patients' homes; the average time is 5 hours per week.

Discussion. Our findings indicate that pharmacists in New Zealand primary care are involved in work outside the traditional realm of the community pharmacy. PHOs are the most frequent employers of pharmacists undertaking general practice-based work which includes a range of cognitive services. Further research is needed to gain greater understanding of the collaborative practice models in operation, their impact on patient care, and to identify the features of success.

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How do Australian and UK consumers receive and use information about their over-the-counter medicines?

Vivien Tong¹, David K Raynor², Parisa Aslani¹. Faculty of Pharmacy, Univ of Sydney¹, Sydney, NSW; School of Healthcare, Univ of Leeds², Leeds, UK.

Introduction. Information availability, receipt, and use can vary between the contexts in which over-the-counter (OTC) medicine(s) are purchased and/or used by consumers, impacting medication safety. Limited research has explored OTC medicine information receipt and use at different points within the self-management continuum by Australian and UK consumers.

Aims. To explore Australian and UK consumers' receipt and use of spoken and written OTC medicine information.

Methods. Semi-structured face-to-face interviews were conducted between April 2013 and April 2014 with 37 Australian and 39 UK consumers. Participants were asked about: (i) information received with their most recent OTC medicine purchase from a pharmacy, and (ii) how information was used at different times after the medicine was purchased. Interviews were audio-recorded with consent, and transcribed verbatim. Verbatim transcripts were thematically analysed.

Results. The majority of recent OTC medicine purchases made by the participants were repeat purchases. Overall, it was uncommon for consumers to actively seek spoken information about their OTC medicines. Furthermore, minimal spoken information was reportedly provided by pharmacy staff for OTC medicines. Leaflets were not always received or wanted with OTC medicines. OTC medicine information use varied between first-time and repeat purchases. Consumers tended not to read OTC medicine labels or leaflets if they were already familiar with the product. Leaflets also had a less prominent role as an OTC medicine information source for repeat purchases. When labels were consulted, directions for use were commonly read. OTC medicine information in general was infrequently revisited by consumers.

Discussion. Minimal spoken information was reportedly sought and/or received by consumers in Australia and UK. Moreover, familiarity with an OTC medicine resulted in consumers tending not to seek information from medicine labels or leaflets. Minimal spoken information provision by pharmacy staff together with limited consumer use of written information may adversely impact OTC medication safety in consumer self-management.



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Consumers' use of social media for health purposes: a focus group study

Arcelio Benetoli¹, Timothy F Chen¹, Parisa Aslani¹. Faculty of Pharmacy¹, The University of Sydney, Sydney, NSW.

Introduction. The interactive and participatory nature of social media (SM) has afforded consumers not only with the opportunity to access health related information but also to provide and share information. Consequently online patient communities with a common health problem are becoming popular [1].

Aims. This project aimed to investigate how health consumers use SM and other online forums for health purposes and its impact on their health decision making behaviour.

Methods. Five focus groups with 36 participants from Sydney metropolitan area were conducted. All discussions were recorded, de-identified, transcribed verbatim, and thematically analysed.

Results. Consumers accessed SM using several electronic devices (computer, tablets, and smartphones) at home, work, or while traveling. Some preferred to be anonymous and use an alias when using SM for health purposes. A variety of platforms were accessed, such as blogs, disease specific groups on Facebook, organisations' Facebook pages, Wikipedia, and Youtube. Consumers learned about their disease states and treatment options. They also found emotional support and hope from others facing the same health issue. SM use empowered patients by increasing their knowledge, and improved face-to-face interactions with healthcare professionals. Consumers not only reported being more prepared for clinical consultations but also considered that online peer interaction positively impacted their decision-making process. Most participants reported resistance from HCPs or even hostility to their SM use. On the other hand a few reported support and even recommendation of online sources by their HCPs.

Conclusions. SM has expanded consumers' ability to communicate with one another about health. This has improved their knowledge, their social wellbeing and their health-related decision making process. HCPs should be aware of the new digitally informed patient and be prepared to support them in this new health frontier.

[1] Eysenbach, G., et al., *Health related virtual communities and electronic support groups: systematic review of the effects of online peer to peer interactions*. *Bmj*, 2004. **328**(7449): p. 1166.

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Does consumer medicines interest reflect medicines use?

Treasure M McGuire^{1,2,3}, David M Pache^{1,2,3}, Mieke L van Driel⁴, Samantha A Hollingworth¹. School of Pharmacy, The University of Queensland¹, Brisbane, QLD; Mater Pharmacy Services, Mater Health Services², Brisbane, QLD; Faculty of Health Sciences & Medicine, Bond University³, Gold Coast, QLD, Discipline of General Practice, School of Medicine, The University of Queensland⁴, Brisbane, QLD.

Introduction. Cost-effective information provision should be targeted to the medicines of greatest concern to the consumer.

Aim. To examine characteristics of callers to National Prescribing Service (NPS) *Medicines Line*, an Australian medicines call centre (MCC); and to determine whether medicines interest corresponds with medicines utilisation.

Methods. Consumer questions were explored between 1 January 2006 and 30 June 2010. Patterns of consumer medicines interest were examined using frequency data for individual medicines and medicines classes involved in MCC calls. These statistics were compared with drug utilisation data, expressed as defined daily dose (DDD), extracted from the Australian Statistics on Medicines (ASM) for the same period. ASM data was first available in January 2006. Medicines were class-matched in accordance with the Anatomical Therapeutic Classification (ATC) of medicines, level 2.

Results. The profile of MCC callers was female, median age 48 years, help-seeking for themselves (71.7%), a child (13.3%) or their partner (5.5%). A third of calls related to safety (34.7%), 24.1% to efficacy and 14.9% to interactions. There were 85,416 calls made to the MCC over this 4.5 year period, with 124,177 counts of individual medicines involved in consumer questions. These distilled to 976 unique 'medicines of interest'. However, approximately half of these individual medicine counts (61,810) were represented in questions by just fifty unique medicines. Nervous system medicines (antiepileptics, psycholeptics, analgesics) and antibacterials consistently ranked highest for medicines interest in relation to their use. In contrast, agents acting on the renin-angiotensin system (RAS), 'statins' and drugs for acid related disorders ranked low for interest despite widespread use. **Discussion.** Medicines use correlates poorly with the medicines of interest to the consumer. To maximise benefit, clinicians should target their education to the relatively small number of medicines of real concern to patients.



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Evaluation of unplanned medication related readmissions within 28 days of discharge

Aatiqah Syed¹, Professor Jeff Hughes¹ and Rachel Thorson². School of Pharmacy, Faculty of Health Sciences, Curtin University of Technology¹, WA; Pharmacy Department, Fiona Stanley Hospital², Murdoch, WA.

Introduction: Currently, no data exists as to the nature and frequency of medication related readmissions at Fiona Stanley Hospital, given it was only commissioned in early 2015. The findings of this study will provide an insight into the incidence and causes of unplanned hospital readmissions, due to medication related complications, adverse reactions and other misadventure. This information will form the basis on which strategies to minimise such readmissions can be developed, and will add to the body of research relating to hospital readmissions in Australia.

Aims: The study aimed to evaluate the frequency and nature of medication related unplanned readmissions within 28 days of discharge at Fiona Stanley Hospital, and the factors that contribute to these readmissions.

Study Design and Methods: Retrospective cross-sectional study of patients readmitted to Fiona Stanley Hospital (Murdoch, Perth, Western Australia) within 28 days of discharge between 4 February 2015 and 14 February 2016, for whom the admission was unplanned. Data were collected from patients' electronic medical records (BOSSnet).

Results: Of the 518 readmissions reviewed, 155 readmissions were deemed medication-related unplanned readmissions. We found that most of the patients readmitted were 65 years or older, were taking six or more medications and more than 10 doses per day, were on high-risk medications, had comorbidities, lacked pharmacist involvement at discharge for previous admission, and had shortfalls in GP and/or patient advice at discharge for their previous admission. The majority of the readmissions were due to side effects of medications (74%), with antineoplastic agents, opioid analgesics and anticoagulants being the major medication classes causing the side effects. The likelihood of readmission was due to medication was evaluated as "Probable" for nearly half of all readmissions reviewed. Just over two-thirds (67.1%) of readmissions were deemed potentially preventable, with a lack of documentation confirming pharmacist involvement at previous discharge found to be a major contributor. However, it should be noted that pharmacist involvement cannot guarantee that adverse effects would not occur.

Conclusions: Knowledge of the factors that contribute to medication related readmissions can be used as the basis for the development of strategies to minimise medication related readmissions.

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N-of-1 trials for assessing the effects of deprescribing medications on short-term clinical outcomes in older adults: a systematic review.

Alexander J Clough^{1,2}, Sarah Hilmer^{1,2}, Sharon L Naismith^{1,3}, Luke Kardell^{1,2}, Danijela Gnjidic^{1,2}. Fac of Pharmacy, Univ of Sydney¹, Sydney, NSW; Dep of Clin Pharmacol and Aged Care, Royal North Shore Hospital², Sydney, NSW; Brain & Mind Research Inst, Univ of Sydney³, Sydney, NSW.

Introduction. Deprescribing research, the investigation of the effects of supervised discontinuation of treatments, is a growing field. Most studies have been randomised controlled trials (RCTs), however methods more applicable to clinical practice that can provide rigorous data on causation and reversibility have been recommended. The N-of-1 methodology may allow this and provide evidence on individual responses to medications – and inform patient-centred care.

Aims. To determine the feasibility of using the N-of-1 method for deprescribing trials in older adults.

Methods. A search was conducted between May 31st, 2016 and September 23rd, 2016 in Embase, PubMed, Informit, Scopus, International Pharmaceutical Abstracts, PsychINFO, Cochrane Central Register of Controlled Trials (CCTR) and CINAHL for studies conducted in older adults (≥ 50 years), deprescribing any long-term treatment conducted over less than a year using the N-of-1 trial method. Two authors independently reviewed all articles for eligibility and extracted data. The review was conducted according to PRISMA guidelines. Quality assessment of trials has been carried out using the PEDro scale.

Results. Six studies of deprescribing any treatment using the N-of-1 method in older adults were found (e.g. theophylline, digoxin, pacemaker use). These trials all investigated the efficacy of treatments for treating diseases including cardiovascular disease, asthma, chronic airflow limitation and skeletal muscle cramps. Four trials resulted in a significant number of patients (44-64%) discontinuing their medication due to non-significant benefits of treatment. Two studies determined that the respective treatment was effective, and the majority of patients continued their treatment.

Discussion. The ability of the N-of-1 method to effectively determine the individual efficacy of long-term treatments was powerful, resulting in strong patient-specific outcomes impacting on care of adults. However, use of the N-of-1 method has rarely been reported in deprescribing trials, although it has been used in other fields.

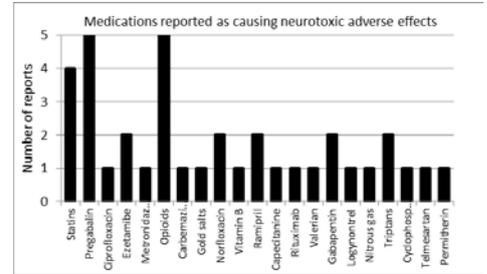


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The effect of medications used by Charcot-Marie-Tooth patients on neuropathic symptoms

Sufia A Toung¹, Astrid Socha Hernandez¹, Alison Shield¹. Pharmacy, University of Canberra¹, Bruce, ACT

Introduction. Charcot-Marie-Tooth (CMT) is an inherited neurodegenerative disorder causing peripheral neuropathy as the disease progress. As a chronic condition CMT patients experience other common diseases for which they may require treatment and/or preventative therapies (such as cardiovascular disease, psychological disorders etc). Some medications used to treat these common diseases carry a risk of neurotoxic side effects and this may present an increased risk of disease progression in CMT patients. Unfortunately there is limited evidence based data outlining which medications may carry the highest risk(s) to CMT patients.



Aims. Identify the perceived risk of medication adverse effects on neuropathy in Australian CMT patients.

Methods. Members of the CMT Australia Association were invited to complete an online survey. This survey collected information on comorbid chronic disease, perceived medication adverse effects, and the medicine safety information resources utilized by CMT patients.

Results. 161 participants completed the survey and 60% regularly had concerns about the safety of medications on their CMT. 92 participants reported comorbid diseases including hypertension or cardiovascular diseases (44%), osteoarthritis (38%) and depression (36%). Various medications were self-reported as worsening neuropathy related symptoms; pregabalin, statins and opioid medications were the most commonly reported (see figure). For 64% of the drugs reported the patient did not believe adverse symptoms had been reversed when the drug was ceased.

Discussion. Some medications can be neurotoxic but the risk is usually minimal or rare when used in the therapeutics range. However these medications might have an increased relative risk of neurotoxicity in CMT patients. Future research is required focusing on the mechanism of toxicity and how this alters CMT patient risk of worsened neuropathy; this will help provide prescribing guidelines tailored for CMT patients.

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Does size really matter? Using big data to examine the patterns and predictors of opioid utilisation in Australia

Natasa Gisev¹. National Drug and Alcohol Research Centre, UNSW Australia, Sydney, NSW

Over the last decade, the use of opioids has increased dramatically in a number of developed and high-income countries, including Australia. Although previously opioids were used primarily for the management of acute and cancer pain, they now also play an important role in the management of chronic non-cancer pain. Coinciding with increases in rates of opioid use, are concerns about potential misuse, diversion and harms. To date, most Australian data quantifying opioid utilisation have been based on pharmaceutical claims processed through the Pharmaceutical Benefits Scheme (PBS). However, these data exclude sales of over-the-counter (OTC) codeine and unsubsidised items or quantities dispensed 'privately'. Wholesale data is a unique data source that overcomes some of these limitations. This presentation will highlight how big data, and in particular, wholesale data, can be used to increase our understanding of opioid use in Australia. The specific focus will be on how these data can be used to quantify the extent of use nationally, examine the impact of remoteness on rates of use, and determine the geographic and socio-demographic factors associated with higher rates of use of different types of opioids.

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Big data for precision medicine: Moving beyond the buzzwords

Sallie-Anne Pearson. Medicines Policy Research Unit, Centre for Big Data Research in Health, UNSW Sydney NSW. Australia.

There is a growing recognition of the importance of observational studies using big data to examine the use and impact of prescribed medicines in routine clinical care. Australia is replete with world-class registries, bio-repositories and whole-of-population administrative data to advance this agenda. In her presentation, Sallie will discuss the state of play in Australia in terms of our capacity to harness big data to examine the ever-changing prescription medicine marketplace, highlight our challenges in undertaking high quality pharmacoepidemiological research and discuss some of the contradictions that exist in the current landscape.



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Using (big?) data to improve the quality use of medicines in residential aged care.

Lisa G Pont, Centre for Health System and Safety Research, Australian Institute of Health Innovation, Macquarie University.

Across health, eHealth is quickly becoming standard practice, generating massive volumes of administrative and health related data aka 'big data'. Such data is providing new opportunities to support clinical and policy decision making within healthcare. To date the implementation of eHealth and the availability of administrative health data in the residential aged care sector has lagged behind that in many other health systems. Yet despite this, big data is being used in residential aged care, not only to understand medication use and identify medication related problems, but also being imbedded in initiatives to improve the quality and safety of the way medicines are used. Residential aged care populations are at high risk of medication related harm due to high medication use, complex comorbidities and aged related physiological and functional changes. Big data represents an opportunity to understand current practice and identify problem areas in this high risk population but also to improve the quality and safety of medicine use. This presentation will focus on the use of administrative data to identify medication related problems and drive quality improvement in residential aged care.

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From Big Genomic Data to Personalized Medicine

Siew-Kee (Amanda) Low^{1,2}. Faculty of Pharmacy, The University of Sydney¹, Sydney, NSW; Laboratory for Statistical Analysis, Centre for Integrative Medical Sciences², Yokohama, Japan.

For the past two decades, familial linkage analysis has successfully identified mutations in high penetrance genes that are associated with disease risk, for example mutations in *BRCA1/BRCA2* genes are associated with hereditary breast and ovarian cancer syndrome. Nevertheless, mutations in these genes are not common in the general population and most probably account for only 5-10% of disease cases. The common disease-common variant hypothesis postulated the cumulative effects of common genetic variations, represented by single nucleotide polymorphism (SNP), are associated with the susceptibility of complex diseases, responsiveness to drugs and likelihood of adverse drug reactions. With the advancement of biotechnology and the development of tagging SNP algorithm, it is now feasible to evaluate the associations of SNPs across the genome by genome-wide association studies (GWAS). Common genetic variations are known for its small effect size and required a large-study population in order to identify significant signal in a study, hence, GWASs are the initial phase of big data establishment in genomic research. With the emergence of next generation sequencing that aim to evaluate all the genetic variations (rare, intermediate and common variations) in the genome have subsequently contribute to the rapid establishment of big genomic data. In this symposium, I will illustrate the utilization of GWAS and next generation sequencing to identify genetic markers that are associated with the susceptibility of breast cancer and pharmacogenomics studies of drug-induced toxicity in breast cancer patients from the Japanese population. In addition, I will also discuss the challenges in curating big genomic data that could be translated towards personalized medicine.

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Rapid identification of bacterial pathogens in clinical samples

Paul W Groundwater,¹ Linda Váradi,¹ David E. Hibbs,¹ Sylvain Orega,² Michèle Babolat,² and John D. Perry,³ ¹Faculty of Pharmacy, The University of Sydney, Sydney, NSW; ²bioMérieux, R & D Microbiologie, La Balme-les-Grottes, France; ³Microbiology Dept., Freeman Hospital, Newcastle upon Tyne, United Kingdom

Introduction. Bacterial antibiotic resistance has been termed an uncontained 'catastrophic threat' that is 'comparable to global warming'. (Davies *et al.*, *Lancet*, 2013, 381, 1606–1609) Easy to use, rapid, reliable, and cost effective methods for the detection of multi-resistant organisms are required as part of an organism-specific approach to the prevention and control of infection.

Aims. We sought to address some of the limitations with current chromogenic methods through the synthesis of fluorogenic substrates, which would result in greatly reduced times to bacterial detection due to their significantly enhanced detection sensitivities.



Figure 1

Methods. We have synthesized and assessed some novel substrates as probes for the identification of *P. aeruginosa*, which is responsible for approx. 20% of nosocomial infections. (Váradi *et al.*, *RSC Advances*, 2016, 6, 58884–58889) These fluorogenic probes are substrates for β -alanyl aminopeptidase (BAP), so that the fluorescence resulting from their hydrolysis is indicative of the presence of BAP-producing organisms such as *P. aeruginosa*.

Results. Fluorescence measurements showed that one of these coumarin substrates, 7-{4-(β -alanyl-amido)}benzyloxy-3-ethoxycarbonylcoumarin trifluoroacetate, was as reliable as a commonly used aminocoumarin analogue, β -Ala-7-AMC, for the detection of BAP producers in agar media, Figure 1, and gave similar times to detection (4–7 hours) in liquid media. The fluorescence signal from the hydrolysis of β -Ala-7-AMC declined over time and this could lead to false negative results. In contrast, there was no decline over time in the fluorescence resulting from the hydrolysis of the novel substrates.

Discussion. 7-{4-(β -Alanyl-amido)}benzyloxy-3-ethoxycarbonylcoumarin trifluoroacetate has advantages over β -Ala-7-AMC as it is retained by bacterial colonies in solid agar applications, and results in similar times to detection, stronger fluorescence intensities, and no decrease in signal over time in liquid media.

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Patient Centred Antimicrobial Stewardship

Fiona F Doukas^{1,2}. Pharmacy & Microbiology/Infectious Diseases Departments, Concord Repatriation General Hospital¹, Sydney, NSW; Faculty of Pharmacy, University of Sydney², Camperdown, NSW.

Introduction. Antimicrobial stewardship (AMS) is an effective, systematic approach to improving the use of antimicrobial agents. This leads to reducing the inappropriate antimicrobial use (which can be up to 50%), improving patient outcomes and reducing adverse effects of antimicrobial use (including antimicrobial resistance, toxicity and unnecessary costs). Evidence-based AMS strategies include providing audit and feedback to prescribers and restricting the use of antimicrobial agents.

Aims. To describe how AMS strategies are used in the Australian healthcare system in order to provide optimal, patient centred-care.

Methods. A novel, prospective audit and feedback round was evaluated based on 5 key performance indicators including the documentation of: (1) indication (reason for use); (2) evaluation at 48–72 hours; (3) a planned duration or review date; (4) whether adequate diagnostic tests were done, including microbiology; (5) appropriateness compared to evidence-based guidelines.

Results. To date, over 1800 patients have been reviewed. Of these, 710 (38%) patients on 949 antimicrobial agents were included in the AMS audit and feedback rounds. The average duration of therapy at the time of audit was 4.7 days. 42% (300/710) of patients were admitted under a surgical team. Over 1000 recommendations were made with the majority being to cease the antimicrobial agent.

Discussion. This system is effective in conducting prospective audit and feedback on the prescribing of antimicrobial agents in settings with an Infectious Diseases physician and a pharmacist. It also provides a means for reporting and providing governance over antimicrobial use.

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Antimicrobial therapy of respiratory infections by inhalation drug delivery

Hak-Kim Chan, Advanced Drug Delivery Group, Faculty of Pharmacy, University of Sydney, NSW

According to the World Health Organisation, bacterial resistance has become a real global issue. With the emergence of the multidrug resistance (MDR) bacteria but no antibiotics coming to the horizon in the near future, new strategies are necessary to tackle the MDR issue. For respiratory infections, administration of therapeutic agents directly to the respiratory tract will significantly increase the local concentration in the airway fluid with minimal systemic exposure to reduce unwanted toxicity. As a result, antibiotics which have significant systemic side effect but are effective in bacterial killing can be re-purposed for use in respiratory infections. A good example is colistin which is a last-resort antibiotic effective against Gram-negative bacteria, but with serious toxicity to the brain and kidney¹. Currently marketed inhaled antibiotics have been administered in relatively large doses of about 100 mg and required multiple dosing per day, which may reduce patient compliance. To overcome the problem, antibiotics such as ciprofloxacin and amikacin are being developed as controlled-release liposomal formulations for once-only daily dosing using nebulisation². Bacteriophage therapy is the use of bacteriophages (phages) which are specific viruses to target and kill bacteria³. The benefits of phage therapy include specific targeting of the bacteria host and being effective against MDR bacteria and biofilms. Thus far, phage research for respiratory infections has mostly been confined to nebulization. However, dry powder inhalers are more convenient for patients to carry and use. Phage powder formulations have been produced either by spray-drying or by freeze-drying, both with a significant loss in biological activity (ranging 1 - 3 log₁₀ titer loss), while freeze-dried powders usually are not dispersible into an inhalable aerosol. Dry powder phage formulations have been processed successfully by spray drying, but long-term stability of these formulations has not been established^{4,5}.

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Polishing the tarnished silver bullet – crowdsourcing new antibiotics

Mark A. T. Blaskovich, Johannes Zuegg, Alysha G. Elliott, Karl A. Hansford, and Matthew A. Cooper, Community for Open Antimicrobial Drug Discovery, The University of Queensland, Brisbane, QLD.

Introduction. The antibiotic pipeline is broken, with a dearth of new antibiotics accompanied by a collapse in pharmaceutical company research. Antibacterial drugs occupy a unique property space that is vastly different to drugs developed for other therapeutic areas. We desperately need to discover new antibiotics by seeking out novel chemical diversity.

Aims. To discover new antibiotics by ‘crowdsourcing’ chemical diversity from academic chemists around the world.

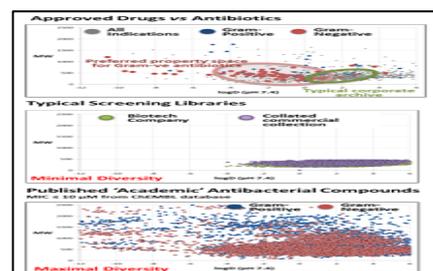
Methods. We have created a Wellcome Trust-supported not-for-profit Open-Access pipeline, The Community for Open Antimicrobial Drug Discovery (CO-ADD), as a global screening initiative to uncover rich chemical diversity held outside of corporate screening collections. CO-ADD provides unencumbered free antimicrobial screening for any interested researcher.

Results. In the last 18 months, over 150 collaborators in 35 countries have submitted nearly 130,000 compounds to CO-ADD, with >50,000 of these tested for their ability to inhibit any one of five bacteria and two fungi.

Discussion. While many antibiotics have been discovered from natural product screening in the past, there is an untapped resource contained in the laboratories of organic and medicinal chemists: synthetic compounds prepared for other projects that have never been tested for their antimicrobial potential. These compounds may have been synthesised to validate new synthetic routes, develop new methodologies, create unusual structures or act on a different therapeutic target, but were not screened for activity against microbes. This presentation will discuss the properties of antibiotic-like compounds, how the organic chemistry community can contribute to solving an imminent threat to public health, and the success of CO-ADD’s crowd-sourcing approach to date.

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Evaluation of the use, efficacy and safety of second line agents in the treatment of uncomplicated type 2 Diabetes

Shalini Adiga¹, Rupam Gill¹, Muralidhar Varma². ¹Dept of Pharmacology, ²Dept of Medicine, Kasturba Medical College and Hospital, Manipal University, India

Introduction: Metformin remains as first-line drug in type 2 diabetes mellitus (DM) management due to its established efficacy and safety. There is no sufficient empirical evidence to support the use of one second-line agent over the other and when to initiate second-line drug is still under discrepancy.

Aims:To evaluate the utilization pattern with reasons for initiation, effectiveness and safety profile of second line agents in diabetes.

Methods:A retrospective study was carried out for a duration of 18 months A total of 240 patients diagnosed with uncomplicated type 2 DM who were ≥ 18 years receiving either metformin or sulfonylurea or combination of both and for the first time initiated on second-line add-on agents and continued for atleast 6 months were included in the study. The study sample was divided into four groups based on the four second-line agents being added to the existing antidiabetic drug namely, pioglitazone, Dipeptidyl peptidase-4 (DPP-4) inhibitor (sitagliptin/vildagliptin), α -glucosidase inhibitor (voglibose) and insulin (pre-mixed 30% regular/70% NPH). Fasting plasma glucose (FPG) and postprandial blood glucose (PPBG) values were taken at baseline, 3 months and 6 months respectively. The adverse drug reactions (ADRs) were recorded. Descriptive statistics along with ANOVA was used for analysis.

Results: Out of 240 patients, 54, 68, 52, and 66 were prescribed pioglitazone; DPP-4 inhibitor, voglibose, and insulin respectively. 61% of patients received triple therapy (metformin + sulfonylurea + second-line drug). The prime reasons for initiation of second-line agent were high glycosylated hemoglobin, obesity and dyslipidemia. The reduction in FPG and PPBG was significant (p -value < 0.001) within each group at each time interval. Maximum number of hypoglycemic episodes were noted for insulin (33) and pioglitazone group (26) respectively, with least in DPP-4 inhibitors. Gastrointestinal (30.66%) and musculoskeletal (26.28%) ADRs were predominant. Dermatological side effects were more common in DPP-4 inhibitor group. **Discussion:** All the four add-on groups exhibited a significant reduction in blood glucose when used as dual or triple therapy. DPP-4 inhibitors are relatively better than other second-line agents in terms of efficacy and safety.

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The content validity and inter-rater reliability of a medication discrepancy classification system.

Enas Almanasreh¹, Rebekah Moles¹ & Timothy F Chen¹. Faculty of Pharmacy, The University of Sydney¹, Sydney, NSW.

Introduction. Medication discrepancies are known to occur at transitions of care where patients often receive new medications or have changes made to their existing medications. Medication reconciliation is an important approach for identifying and resolving these discrepancies. We recently published a systematic review about how medication reconciliation has been conducted and how medication discrepancies have been classified. This review identified significant inconsistencies in reporting, measuring and classifying medication discrepancies and the absence of a well-designed tool to evaluate medication reconciliation outcomes [1].

Aims. The aims of this study are to develop a new taxonomy to classify medication discrepancies, for use by healthcare professionals across transitions of care and to assess the validity and reliability of this system amongst healthcare professionals.

Methods. The instrument was developed based on a systematic review of the literature to identify the existing methods of classification and availability of instruments to classify the medication discrepancies along with the experience of our research team. A group of experts will be asked to assess the content validity i.e representativeness and clarity of the instrument. The instrument will then be utilised by raters on fictitious cases at two times points, to test the inter-rater reliability. The content validity index for each element (I-CVI), (S-CVI) for the whole instrument, percentage of agreement and inter-rater agreement will be calculated.

Results. The study is in progress and results will be presented at the conference.

Discussion. This study will allow for the systematic evaluation of medication reconciliation services using a comprehensive and standardised taxonomy for medication discrepancies.

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Fasting and diabetes: optimising health outcomes for Ramadan observers: A literature review

Hadi Almansour¹, Betty Chaar¹ & Bandana Saini¹. Faculty of Pharmacy, The University of Sydney¹, Sydney, NSW.

Introduction. Globally, and in Australia, diabetes has become a common chronic health condition. Diabetes is also quite prevalent in culturally and linguistically diverse pockets of the Australian population, including Muslims. There are over 50 million Muslims with diabetes worldwide. Diabetes management and medication use can be affected by religious practices such as fasting during Ramadan. During Ramadan, Muslims refrain from oral or intravenous substances from sunrise to sunset. This may lead to many potential health or medication-related risks for patients with diabetes who observe this religious practice.

Aims. This literature review aims to explore the effect of healthcare interventions or health care professionals' intentions to provide interventions to improve outcomes for diabetes patients fasting during Ramadan.

Methods. Using a scoping review approach, a comprehensive search was conducted. Databases searched systematically included PubMed, Medline, Embase and IPA. Studies published in English that described interventions or intentions to provide interventions regarding diabetes and Ramadan fasting were included.

Results. Fifteen published articles that met the inclusion criteria were retrieved and content analysed. Of those, ten intervention studies were regarding diabetes management education. Five studies described professional service intention, four of which were related to the role of pharmacists in diabetes management in Qatar, Australia and Egypt, and one French study related to general practitioners. The intervention studies had promising outcomes for diabetes management during Ramadan. Effect sizes for improvement in HbA1c post intervention were moderate and ranged between 0.13-0.66. Pharmacists appeared to be willing to provide services to help fasting patients achieve safe therapeutic outcomes. Service intention studies highlighted pharmacists' and GPs' need for training prior to providing services from a clinical as well as cultural competence perspective.

Conclusion. Interventions research in this area requires robustly designed and structured interventions that can be tested in different contexts. This literature review revealed many gaps regarding diabetes management in Ramadan. Health professionals are willing to provide services for fasting diabetes patient, but need up-skilling.

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Impact of nutritional status on calcium channel blocker therapy outcome in elderly patients at two primary health care facilities in Bandung, Indonesia

Lia Amalia¹, Pratiwi Wikaningtyas¹, Iis Rukmawati², Jessica Aryanti¹, School of Pharmacy ITB, Bandung, ID¹, The Puter, Primary health care facility, Bandung, ID²

Introduction. Nutritional assessment of the patient is essential for improvement of comprehensive treatment plans, especially for elderly population with hypertension.

Aims. The aim of this study was to observe and evaluate the relationship between nutritional status and outcome of treatment in elderly patients with hypertension who used calcium channel blockers (CCB).

Methods. This research was a descriptive-observational study conducted concurrently and retrospectively at two primary health care facilities, the *Puter* and *Ibrahim Adjie* facilities in Bandung. Data collection was carried out by assessing medical records and interviewing patients. The relationship between nutritional status and therapy outcome was analyzed statistically using independent t-student. Possible adverse drug reactions (ADRs) of CCB were analyzed descriptively. In addition, educational brochures and counseling were given to the patients.

Results and discussions. Total samples were 257 patients dominated by women (69.65%), diagnosed with stage 2 hypertension (39.69%) and myalgia (31.52%) as the most common comorbid. There was a significant difference in reduction of systolic blood pressure between groups with different nutritional status ($p < 0.05$). The averages of decrease in systolic and diastolic pressures in the groups of "at risk of malnutrition" and "malnutrition" were higher than that in patients with normal nutrition group, leading to the possibility of drug toxicity condition. Suspected ADRs of CCB were higher in patients in the groups of "at risk of malnutrition" and "malnutrition" status group, with dizziness (46.69%) as the most frequent of ADR. Results of the present study suggest the necessity of monitoring the use of CCB, in particular in elderly patients who are at risk of malnutrition or malnourished.

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Integration of pharmacists in diabetes care in Nepal- challenges and opportunities

Sujata Sapkota¹, Jo-anne E Brien¹, Parisa Aslani¹. Faculty of Pharmacy, The University of Sydney, Sydney, NSW.

Introduction. Community and hospital pharmacists can facilitate chronic disease management through health promotion and other pharmaceutical interventions.

Aims. To explore diabetes care related pharmacy services in Nepal from the perspectives of patients, doctors and pharmacy staff; and identify the challenges in delivering the services.

Methods. In-depth interviews were conducted with Nepalese patients (n=48) and healthcare professionals (n=17) using study developed interview protocols to investigate diabetes management in Nepal.

Results. Participating patients reported that the services they received from pharmacies were mostly limited to having their prescriptions dispensed with basic counselling on how and when to take the medications; specialised diabetes related services were not provided. Patients' viewed pharmacies as a business rather than a place to receive professional services. Most patients did not trust the information provided in a pharmacy. Participating doctors felt a lack of support from pharmacists in diabetes management. They were unsure of the quality of information provided to patients in pharmacies. Patients' attitudes to, and interest in, information influenced the level of counselling provided by pharmacists. While participating pharmacists accepted current service provision from pharmacies as insufficient, they stated that low salary, time constraints, and patients' distrust made it difficult to engage in effective patient care.

Discussion. The diabetes specific services offered by pharmacists in Nepal was reported to be limited. Therefore, there is scope for utilising and increasing the role of the staff in pharmacies in providing diabetes services in Nepal. A significant effort is however necessary to effectively integrate pharmacists in diabetes care. Pharmacists need to gain patients' trust, and doctors' recognition and appreciation of their skills and abilities, as a first step in effective integration of pharmacy in the overall diabetes management process.

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Health literacy and the decision-making process to use complementary medicine products in pregnancy and lactation

Larisa A.J. Barnes¹, Kirsten McCaffery², Claire O'Reilly¹, Parisa Aslani¹. Faculty of Pharmacy, The University of Sydney¹, Sydney, NSW; Sydney School of Public Health, The University of Sydney², Sydney, NSW.

Introduction: Little is known about the decision-making processes pregnant and breastfeeding women undertake when choosing to use complementary medicine products (CMPs), nor how health literacy influences this.

Aims: This qualitative research aimed to investigate the self-reported health literacy needs of pregnant and lactating women using CMPs.

Methods: Pregnant and lactating women who were currently taking, or had taken CMPs in the previous 12 months, were eligible to participate. Participants' demographic details and health literacy levels were surveyed, before participation in audio-recorded semi-structured qualitative interviews or focus groups. Verbatim transcripts were thematically analysed. Questions explored choices to use CMPs, sources of CMPs information and information wanted and needed, and how easy the CMP information is to understand.

Results: A total of 21 pregnant and / or lactating women from rural Northern NSW, metropolitan Sydney and SE QLD participated. Twenty participants had adequate and 1 had limited functional health literacy levels. The participants' demographic profile matched what is already known about CM users in Australia. The decision-making process to use CMPs was shown to be quite complex and women accessed a variety of sources when choosing to use CMPs. Popular information sources included CM practitioners, midwives and integrative GPs, the Internet, and family and friends. The primary concerns expressed by participants included concerns about safety and the desire to receive information from trusted sources.

Conclusion: All health care professionals need to be aware that pregnant and lactating women incorporate the use of CMPs in their health care practices and undergo a complex decision-making processes when choosing to use CMPs that involves collating information from a variety of sources.



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The WentWest Non-Dispensing Pharmacist Project: Integrating pharmacists in general practice.

Helen Benson, Kylie.A Williams, Daniel Sabater Hernandez, Shalom.I Benrimoj Discipline of Pharmacy, Graduate School of Health, University of Technology Sydney NSW.

Introduction: Previous international studies have shown that the integration of a non-dispensing pharmacist in general practice has led to an improvement in health outcomes and a reduction of medication-related problems (MRPs). However, there have been very few studies conducted in an Australian setting.

The WentWest Non-Dispensing Pharmacist Project was commissioned by a Western Sydney Primary Health Network to examine the impact of integrating a non-dispensing pharmacist in general practice on both patient clinical outcomes and broader health goals. A research team from the Graduate School of Health, University of Technology Sydney has been engaged to conduct an outcome and process evaluation on the pilot study.

Aims: The aims of the evaluation are to establish if integrating a non-dispensing pharmacist into primary practice leads to a reduction in medication-related problems. The process evaluation will examine barriers and facilitators to the effective integration of the clinical pharmacist and make recommendations for improvements to the current model.

Methods: Currently, four pharmacists are being employed across twelve general practice sites in Western Sydney. The project commenced in March 2016 and is due to be completed by December 2016.

The pharmacist intervention involves recruiting identified patients, conducting a clinical consultation, and communicating recommendations in a three-way collaborative discussion between the pharmacist, patient and GP. Patients were included in the study if they met defined selection criteria including patients taking greater than five medications, patients with poorly controlled hypertension, asthma, COPD or diabetes, patients with a suspected adverse drug reaction, an inadequate response to therapy or patients who had recently been discharged from hospital. The pharmacist-patient consultation was a 30-60 minute session including a complete medication history, conducting a medication reconciliation, an adherence assessment, targeted chronic disease management where required and the detection and resolution of MRPs. The pharmacist recommendations were then discussed with the patient and GP and the results of the consultation were recorded. Patients were referred for follow up if they had identified adherence issues, had identified MRPs or required ongoing disease state management. The impact evaluation will examine the impact of the intervention on the detection and resolution of MRPs. The process evaluation will examine both qualitative data from semi-structured interviews with participating project pharmacists and GPs and changes in quantitative data over the course of the project timeframe.

Results: 299 participant patients in the first twelve weeks of the pilot phase of the study were selected using agreed criteria to target priority patient populations, with polypharmacy (i.e., use of more than 5 medicines) being the most frequent reason for recruitment (57%). Other frequent reasons for patient selection were the management of chronic disease (15%) and addressing issues with medication adherence (8%). The selected patients were taking an average of 9.6 ± 4.0 medications and had an average of 6.9 ± 2.6 medical conditions.

In the consultation, the pharmacists conducted medication reconciliation and review and this resulted in the detection of 349 medication record discrepancies, 85 adverse drug reactions and 78 drug interactions (drug/drug, drug/disease state and drug/food interactions).

The pharmacist/patient consultations resulted in 807 pharmacist recommendations. These recommendations included medications being de-prescribed, medication dose reductions, initiation of new medicines and medication dose increases.

Thematic analysis of qualitative data gathered from semi-structured interviews of four of the participating pharmacists and five participating general practitioners resulted in the identification of key barriers and facilitators to enable improvement of the model. These included the importance of communicating and defining the non-dispensing pharmacist role to practice staff, general practitioners and patients, the importance of providing training for the non-dispensing pharmacists in all aspects of the intervention including practice systems, clinical guidelines and data collection procedures and the importance of adequate funding and room availability.

Discussion: The preliminary results of the study support the premise that the integration of pharmacists in general practice leads to positive patient outcomes particularly in the area of the resolution of medication related problems. The qualitative data has enabled WentWest to refine and improve the current model and further data is currently being collected.



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Got milk? Quality appraisal of consensus-based guidelines for lactation

Melinda E Boss¹, Kirilly C Murphy¹, Patrick K Nay¹, Carla D Payne¹, Douglas A Pritchard¹, Peter E Hartmann², Rhonda M Clifford¹. School of Med and Pharmacol, Univ of WA, Perth, WA¹; School of Chem and Biochem, Univ of WA, Perth, WA.²

Introduction. Consensus-based clinical practice guidelines (CPGs) have been developed by the Hartmann Human Lactation Research Group to assist clinicians in the management of lactation problems. To improve methodological rigour, guideline developers sought to evaluate guideline quality using the AGREE II instrument. The AGREE II Instrument is a validated generic guideline appraisal tool consisting of 23 items ranked on a Likert scale from 1 (strongly disagree) to 7 (strongly agree). Items are grouped into 6 quality domains with an additional 2 global assessment items.

Aim. To assess methodological quality of 103 consensus-based CPGs for lactation using the AGREE II instrument.

Methods. To reduce heterogeneity of responses between raters, each completed the online training program and practice exercise provided by the AGREE Collaboration. Each guideline was independently appraised 3 times by 3 different raters. Domain scores were calculated by summing the individual item scores and scaling the total as a percentage of the maximum possible score for that domain. A mean score for each domain was calculated after summing the scores for all 105 guidelines. In line with previous studies, scores >75% and <50% were considered to indicate high and poor quality respectively.

Results. Mean scores for domains 1-6 were 87%, 80%, 54%, 73%, 66% and 89% respectively. The lowest score was domain 3, which considers rigour of development, and further analysis of this domain's item scores showed 'systematic methods used to search for evidence', 'criteria for evidence selection clearly described' and 'strengths and limitations of evidence clearly described' consistently rated poorly (between 2 and 4 on the Likert scale). Examination of the 2 global assessment items revealed a mean overall guideline quality rank of 5.1 on the Likert scale, with raters indicating they would recommend 96% of the guidelines for use.

Discussion. This study showed that the lactation guidelines were rated as high quality in 3 of 6 domains with no domain rating poorly (below 50%). These results will be used to strengthen methodological rigour of guideline development prior to publication, so that users can have confidence in their quality.

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Guidelines for guidelines

Melinda E Boss¹, Kirilly C Murphy¹, Patrick K Nay¹, Carla D Payne¹, Rhonda M Clifford¹. School of Medicine and Pharmacol, Univ of WA, Perth, WA¹;

Introduction. Over 100 consensus-based clinical practice guidelines (CPG) have been developed by the Hartmann Human Lactation Research Group with the aim to assist clinicians in the management of lactation problems. To improve the methodological rigour and transparency of development prior to publication, guideline developers wished to assess their quality.

Aim. To identify a suitable instrument to appraise the methodological quality of consensus-based CPGs for human lactation prior to publication.

Methods. A literature search of the electronic databases Embase and Medline from 1990 to May 2016 was performed followed by a secondary search of Google Scholar and OneSearch. Inclusion criteria required provision of information regarding instrument development, publication in English and applicability to both end users and guideline developers. Complexity of the appraisal instrument and provision of an overall assessment were also documented, but were not criteria for inclusion or exclusion. Duplicates were removed and articles were excluded if they were inaccessible or reviewed a superseded appraisal tool.

Results. A total of 43 articles were extracted from the original OVID search (23 from Embase and 14 from Medline). Duplicate removal and application of inclusion and exclusion criteria returned 4 articles. Three appraisal instruments, AGREE II, AGREE II GRS and iCAHE, were extracted from these articles. The AGREE II instrument is a complex tool that considers 23 key criteria grouped into 6 unique domains of guideline quality as well as an overall assessment. AGREE II GRS and iCAHE are rapid-appraisal instruments that consider 5 items with 2 overall assessment items and 14 items with no overall assessment respectively.

Discussion. This review identified several CPG appraisal tools. AGREE II GRS and iCAHE are condensed instruments designed for use when time and resources are limited. Implementation time is not a limitation for developers prior to publication. Thus, the comprehensive AGREE II instrument was determined to be the most suitable appraisal tool to assess methodological quality of consensus-based CPGs for human lactation.

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An evaluation of Consumer Satisfaction and Experience with Pharmacist-Administered Influenza Vaccination Services in Western Australia

Sarah Burt, Petra Czarniak, Laetitia Hattingh. School of Pharmacy, Faculty of Health Sciences, Curtin University, Bentley, WA.

Background. Pharmacist-administered vaccination services have been available in the United States of America, Canada, the United Kingdom, Portugal and New Zealand for several years. In December 2013, the Pharmacy Board of Australia announced that administration of vaccines was within the scope of practice of Australian pharmacists, following appropriate training. The following year, Western Australia legislation was introduced to allow pharmacist immunisers to administer the influenza vaccine to consumers 18 years and older.

Method. In 2015, 133 pharmacies in WA offered pharmacist-administered vaccinations. Of the 133 pharmacies, a representative sample of 10% (13) were invited to participate in this study. Consumers were given a questionnaire and asked to evaluate the service during the 15 minute observation period following the vaccination.

Results. A total of 434 questionnaires were completed and returned. The majority of consumers (99.5%) were satisfied with the professionalism of the pharmacist and 99.1% were satisfied with the skills of the pharmacist immuniser. Furthermore, 99.5% of participating consumers were satisfied with the service overall, and 97.2% advised they would receive a vaccination from a community pharmacist in the future.

Discussion. Consumer satisfaction with pharmacist-administered vaccinations was positive. Consumers found the service convenient, comfortable and professional. Further expansion of pharmacist-administered vaccination services to deliver a wider range of vaccines should be investigated in WA.

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A preliminary investigation in the use of fingerprick vancomycin levels for therapeutic drug monitoring: Lessons that can be learned

Vincent Chan¹, Kelly A. Cairns², Daniel Guidone², Stephanie Cox¹, Phuong Uyen Hua¹, Eric Huynh¹, Tuan Le¹ and Anh Minh Nguyen¹. ¹School of Health and Biomedical Sciences, RMIT University, Bundoora, VIC; and ²Pharmacy Services, Alfred Health, Melbourne, VIC, Australia

Introduction. In current practice, therapeutic drug monitoring (TDM) is used to monitor and maintain appropriate vancomycin concentrations. However, there are potential limitations with the traditional venepuncture method of TDM. The fingerprick method may provide a less invasive, more cost effective and patient friendly alternative. However, during this study we also encountered several problems that we feel are important to document.

Aims. To compare fingerprick versus peripheral blood sampling techniques in adults undergoing vancomycin therapy requiring TDM.

Methods. This study was conducted at The Alfred Hospital in Melbourne, Victoria, Australia, over an eight week period. Paired fingerprick and venous blood specimens were obtained from adult patients undergoing vancomycin therapy and analysed using the Chemiluminescent Microparticle ImmunoAssay (CMIA) technique.

Results. During the study period, 21 samples were obtained but only 8 were suitable for analysis. A significant correlation between fingerprick and peripheral levels was observed ($r^2 = 0.9245$). A Bland Altman analysis of the results showed a bias of +1.7 signifying a weak agreement of interchangeability.

Discussion. Although the Bland Altman analysis showed a recognisable difference between methods, the study sample size was too small to be conclusive. However lessons learned from this preliminary study included the use of medium or higher flow lancet to obtain better blood volumes, the use of hand warming prior to sampling and training for nurses performing specimen collection to enable the appropriate volume of blood to be collected. Further work is required to establish the validity of using fingerprick samples to determine vancomycin concentrations.



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The Pharmacological Treatment of Comorbidities in People with Dementia: A Literature Review

Amy Page¹, Vaughan P Clark¹, Xaysja L Hill¹, Stephanie E King¹, Liza J Seubert¹, Christopher Etherton-Beer¹, Kathleen Potter¹, Rhonda M Clifford¹. School of Medicine and Pharmacology, Crawley, WA.¹

Introduction. People with dementia commonly live with multiple comorbidities.¹ They often struggle to reliably report symptoms relating to either medications or diseases, making it challenging to optimise medications.² Moreover, it is not clear if the presence of dementia alters what is considered to be optimal medication management.

Aims. To determine if health outcomes or quality of life are altered for people living with dementia and comorbidities treated with medication. The secondary aim was to assess medication usage patterns.

Methods. Inclusion criteria were: experimental and observational studies, participants diagnosed with dementia and at least one comorbidity, treated with medication, reported outcomes of medication usage, health or quality of life. Interventions or outcomes related specifically to the dementia were excluded. MedLine and Embase databases were searched from inception to March 2016 to find published articles. Three researchers screened the articles and then extracted data using a data extraction sheet. The data was synthesised narratively.

Results. Six studies met inclusion criteria with 25,559 participants (mean age 82.1 ± 2.4 years, 78% female). Four observational studies reported the use of one therapeutic class and one study reported use of two therapeutic classes. The experimental study compared bisphosphonate use with placebo in mid-stage dementia and found a reduced risk of non-vertebral fractures (OR=0.27, 95% CI 0.12-0.61) in the bisphosphonate group.³ Blood pressure, hypertension and cholesterol were managed to similar end-points for people without dementia, though effect on health outcomes were not reported for either group.⁴ Usage patterns of some medications (e.g. antihypertensives) may be affected across all dementia stages, but other medication usage changes were not observed until late stage dementia.^{4,5}

Discussion. Current medication management for comorbidities in dementia is limited. To date, information includes usage patterns and osteoporosis-related fractures. Information is not currently available on what medication management strategies may improve health outcomes or quality of life for patients with dementia.

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Included paper citations available on request

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A simple decision-making guide for assessment and referral of pharmacy clients with bowel symptoms

Lynne Emmerton¹, Deepa Sriram¹, Alexandra McManus², Moyez Jiwa³. School of Pharmacy, Curtin University¹, Perth, WA; Faculty of Health Sciences, Curtin University², Perth, WA; Melbourne Clinical School, The University of Notre Dame Australia³, Melbourne, Vic.

Introduction. Considering the prevalence of bowel conditions in the community and the embarrassment in seeking medical assistance for these symptoms, there is a need for timely, private and efficient consultation about bowel symptoms in community pharmacies, to identify clients requiring medical investigation. A self-completed symptoms checklist, issued by pharmacy assistants and/or pharmacists to guide over-the-counter consultation, was proposed.

Aims. This study aimed to evaluate a validated bowel symptoms questionnaire for use by pharmacy clients and staff.

Methods. The questionnaire, named the Jodi Lee Test (JLT) in acknowledgement of the sponsoring foundation, comprised eight questions exploring symptoms suggestive of serious bowel disease and their duration. Validation against an established, longer instrument has been reported elsewhere (Sriram et al 2014). Staff of 21 community pharmacies in Perth participated in the trial. 'Usual practice' in the management of bowel symptoms was self-documented by staff for 12 weeks. Staff were trained in the research protocol, administration of the JLT and interpretation of client data, prior to the 20-week implementation phase. In both phases, the researcher elicited clients' self-reported uptake of referral recommendations and the resulting clinical diagnoses, where known.

Results. Eighty-four consultations were recorded pre-implementation, and 80 post-implementation. The JLT was associated with a significantly higher referral rate (38% vs 20%) and clients' uptake of referral recommendations (40% vs 6%). Clients referred using the JLT were also more likely to receive a definitive diagnosis. Feedback by staff indicated the template was simple to use and assisted their discussion of sensitive topics.

Discussion. The JLT provided a structured approach to the assessment and referral of clients with at-risk symptoms in community pharmacies. There is potential to produce similar instruments for other symptoms associated with embarrassment, to facilitate medical consultation.

Sriram D et al (2014) *J Eval Clin Pract* 78(6): article 119.



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Compounding buccal delivery dosage forms: consideration of the dose accuracy of troches and ODTs

Rose M Estafanos¹, Esther T Lau², Geoffrey Mitchell³, Hugh Senior³, Kathryn J Steadman¹. School of Pharmacy, University of Queensland¹, Brisbane, QLD; School of Clinical Sciences, Queensland University of Technology, Brisbane, QLD²; School of Medicine, University of Queensland³, Brisbane, QLD.

Introduction. Troches and orally dissolving tablets (ODTs) are dosage forms that are compounded in pharmacies for buccal drug delivery. As part of a larger study into pilocarpine for treatment of xerostomia, compounded pilocarpine troches and ODTs were prepared and their drug content quantified as part of quality control testing.

Aims. To compound troches and ODTs containing 5 mg pilocarpine and to assess their accuracy and repeatability in terms of the dose that they contain.

Methods. Troches and ODTs were prepared using moulds and ingredients sourced from Medisca. Troches were compounded by mixing drug powder into a viscous liquid, pouring into troche moulds (30 troches per batch) and leaving to set. ODTs were prepared by mixing drug powder with other components in powder form, compressing into moulds (60 ODTs per batch) and heating at 110°C for 15 min. Pilocarpine was extracted from ODTs dissolved in phosphate buffer, and from troches dissolved in 70% ethanol with solid phase extraction and reconstitution in phosphate buffer. Pilocarpine was quantified using a validated HPLC-UV method at 214 nm for at least 9 troches and ODTs from each batch.

Results. The preparation of medicated troches and ODTs is a simple technique. However, the amount of the active ingredient in each batch can vary considerably. There was a direct but variable relationship between drug concentration and troche or ODT weight. Even with the intense focus on accuracy of weighing and mixing involved in this study, pilocarpine content of each individual troche or ODT was variable: 69% of the 36 troches tested (across 4 batches) and 100% of the 33 ODTs tested (across 3 batches) contained 5 ± 0.5 mg pilocarpine.

Discussion. It was easier to prepare ODTs that were accurate and consistent in their dose of pilocarpine than troches. Compounded products are rarely assessed for their active drug concentration, but in the absence of testing it is important to be aware of the potential for the delivered dose to vary from the intended dose.

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Community pharmacists' perspectives towards clozapine provision for consumers with schizophrenia

Yuh-Lin Gan¹, Claire L. O'Reilly¹. Faculty of Pharmacy, the University of Sydney¹, Sydney, NSW.

Introduction. Clozapine is a very effective antipsychotic medication indicated specifically for treatment-resistant schizophrenia, but its use is limited due to the risk of agranulocytosis and strict monitoring requirements. From July 2015, clozapine supply for maintenance therapy transitioned from hospital-only to community access. However, little is known to date regarding community pharmacists' attitudes regarding this change.

Aim. To explore community pharmacists' attitudes towards supplying clozapine for consumers with schizophrenia.

Methods. This cross-sectional study was carried out in two phases using a mixed method approach. An online survey was distributed to community pharmacists via ClopineCentral™, one of two mandatory monitoring systems available. Pharmacists' views towards clozapine supply and schizophrenia were explored via Likert-type and open response questions, whereas stigma towards consumers with schizophrenia was measured using the reliable and valid Social Distance Scale. Participants were then invited to participate in a semi-structured telephone interview to further discuss their thoughts and experiences in supplying clozapine.

Results. One hundred and thirty four completed surveys were returned, with a majority of females (57.5%) and pharmacists from New South Wales (54.5%). Most pharmacists indicate positive attitudes towards the adequacy of support received (74.1%), knowledge (86.6%), clinical skills (93.3%) and confidence (89.6%) in dispensing clozapine. A subsample of 13 pharmacists were interviewed. Most pharmacists perceived the ease of access to benefit consumers and financial gains to benefit pharmacists, while better patient-pharmacist relationship and the provision of holistic care were viewed as benefits to both. Administrative issues, particularly in obtaining valid blood test results, posed the most challenges, whereas support and training received facilitated service provision.

Discussion. Community pharmacists responded positively towards supplying clozapine for consumers with schizophrenia. Although the uptake of the supply service was not able to be assessed, various benefits and facilitators as identified by pharmacists supported the feasibility of this service. Nevertheless, challenges faced by community pharmacists prompt future research to explore other aspects of community clozapine supply, such as the views of prescribers or mental health teams.



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We don't know what they don't know: knowledge of pain medication and pain management

Leonard SD Seng¹, Tony Hall¹, Yasmin J Antwertinger¹, Esther TL Lau¹, Lisa M Nissen¹. School of Clinical Sciences, Queensland University of Technology¹, Brisbane, QLD.

Introduction. Do the Australian public believe analgesic medicines can target specific sites of pain? In Australia, the makers of "Nurofen" (Reckitt Benckiser) were found to have misled consumers in advertising that the single ingredient (ibuprofen) could target specific sites of pain. These types of confusing messages add to existing concerns around the general public's baseline health literacy. This lack of understanding about medicines can compound the increasing misuse of over-the-counter analgesics. There is currently limited insight into the general public's knowledge and perceptions of pain medicine and pain management. So, what do they actually know?

Aims. This study aimed to investigate the Australian public's perceptions of pain management and pain medications.

Methods. A survey captured participants' demographic data and their perceptions of pain management and pain medication. Open-ended and Likert-scaled questions were employed and data was analysed using SPSS.

Results. A total of 226 participants completed the survey and misconceptions were present in all demographics of the respondents. Understanding of pain medicine and pain management varied depending upon age, gender, history of persistent pain and self-reported background in health. There was no clear demographic group that consistently answered questions correctly about pain medicine and pain management.

Discussion. Education tools for the general public and healthcare professionals will have a significant role in improving the understanding of pain medicine and pain management. This will ultimately lead to better outcomes for patients living with pain.

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Pharmacists' role in supporting breastfeeding women in the community pharmacy setting: facilitators and barriers

Tin Fei Sim¹, H Laetitia Hattingh¹, Jillian Sherriff², Lisa BG Tee¹. ¹School of Pharmacy, Curtin University, Perth, WA. ²School of Public Health, Curtin University, Perth, WA.

Introduction. Community pharmacists have frequent contact with breastfeeding women. Studies have shown that breastfeeding women are likely to seek advice from a pharmacist.^{1, 2, 3, 4} This presents a unique opportunity for pharmacists to provide on-going support for women. Understanding facilitators and barriers in this context would facilitate care and support provided to breastfeeding women by community pharmacists.

Aims. This study aimed to investigate the factors facilitating or inhibiting pharmacists' role in achieving effective support for women, in particular their role in the provision of evidence-based advice regarding medication use during lactation.

Methods. This Western Australian study involved semi-structured interviews with 30 community pharmacists. Interviews were audio-recorded, then transcribed verbatim. Transcribed data were analysed and NVivo[®] Version 10.0 was used to aid organisation of qualitative data and quotations.

Results. Convenience, accessibility and affordability were recognised as major facilitators. Other facilitators were trust, professionalism and favourable pharmacist-client relationships, positive impacts on job opportunities, and public image of the profession. The key challenge identified was the lack of evidence-based information about medicines' efficacy and safety profiles in lactation, which impacted on pharmacists' ability to make informed recommendations. Examples of other barriers included time constraints, lack of financial compensation, gender issues, and pharmacy layout. Overall, participants' perceptions about their role in supporting breastfeeding women in the community pharmacy setting were favourable.

Discussion. The facilitators and positive attitudes of pharmacists reveal opportunities for role expansion. Nevertheless, the challenges highlighted areas of pharmacy practice which should be addressed and improved in order for pharmacists to provide better support to women and promote breastfeeding in the community.

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Evaluation of *Simple*[®]: an evidence based pharmacist diabetes intervention tool

Shamala Ayadurai¹, Lisa B G Tee¹, V Bruce Sunderland¹, H Laetitia Hattingh¹. School of Pharmacy, Curtin University, Perth, WA

Introduction. Pharmacists' contributions towards improving clinical outcomes of Type 2 Diabetes patients are well documented. However, pharmacist strategies used to deliver diabetes care are inconsistent.

Aims. This research aimed to a) evaluate the application of key elements in a previously developed structured diabetes intervention tool, *Simpler*[®] and b) explore the impact of targeted training on pharmacists' knowledge and ability to deliver consistent evidence based diabetes care.

Methods. Two one hour online and three face-to-face workshops were conducted to train 12 pharmacists from Australia and Malaysia on diabetes management using *Simpler*[®]. Pharmacists' knowledge on diabetes management was assessed pre- and post-training. In addition, they were required to use *Simpler*[®] in their daily practices for one month. Subsequent feedback was obtained through semi-structured interviews.

Results. Pharmacists were from community settings with an average of 5.7 years working experience and < 3 years providing diabetes management services. None was a credentialed diabetes educator. Results showed significantly ($P=0.002$) improved test scores pre- and post-training. Interview analysis revealed facilitating factors namely organised medication reviews, improved knowledge, improved record keeping, improved competence to detect problems in uncontrolled diabetes patients and increased focus on achieving diabetes management targets. Barriers were insufficient information on medication related problems and lack of accessibility to patients' laboratory data.

Discussion. *Simpler*[®] targeted training improved pharmacists' knowledge on diabetes management and supported its use as a structured consistent method to deliver evidence-based diabetes care for Type 2 Diabetes patients.

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Codeine in primary care: improving the use of opioid therapy for pain

Joel M Hillman¹, Carl Schneider¹, Peter R Carroll^{1,2}, Rebekah Moles¹. Faculty of Pharmacy¹, University of Sydney, Sydney, NSW, Sydney Medical School², University of Sydney, Sydney, NSW.

INTRODUCTION. Codeine is the most commonly prescribed opioid analgesic, comprising 65.6% of all opioids used by Australians, with 55.8% of codeine packs being pharmacist prescribed. Codeine has previously been considered to exhibit its action via hepatic CYP2D6 conversion to morphine. Codeine is known to cause radically variable responses in patients, a model for the prediction of which is conspicuously absent in such a ubiquitous drug.

AIM. To characterise the current literature regarding the mechanism of action, pharmacogenomics, and disposition of codeine in the body.

METHODS. A literature search was performed with selection for papers which present novel findings or reviews of the literature on aspects of codeine's mechanism of action. These papers were subjected to analysis and a full review was synthesised addressing all the major issues of codeine presented by the literature.

RESULTS. Significant variation appears in the body of literature regarding codeine's true mechanism of action. The commonly cited morphine-dependent route is now contentious; however, this fact has been only rarely considered, and remains absent from much reference material or late reviews. There are a multitude of alternate mechanistic routes which are not known by the majority of clinicians. The majority of pharmacogenomic research has been performed on CYP2D6, which represents only a portion of the enzymatic and genetic involvement of codeine; further, the site of metabolism is discussed, with the introduction of non-hepatic metabolism to active moieties.

SIGNIFICANCE. This clinical review is a first in presenting the vast majority of currently understood routes of action, metabolic pathways, and endpoints of the most commonly used opioid in Australia, and offers a significant update to the established wisdom. This might lay the groundwork for the synthesis of a model for prediction of response to codeine in the naïve patient, and highlights the lack of understanding which lies behind what most would consider a well-characterised medicine.



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Development and validation of the Dementia-specific Medication review Electronic Decision Support System (D-MEDSS[®])

Lisa Kouladjian-O'Donnell^{1,2}, Emily Reeve^{2,3}, Danijela Gnjidic⁴, Sarah N Hilmer^{1,2}. Cognitive Decline Partnership Centre, Kolling Inst, Sydney Medical School, Univ of Sydney¹, St Leonards, NSW; Dept of Aged Care and Clin Pharmacol, Royal North Shore Hosp², St Leonards, NSW; Fac of Medicine, Dalhousie Univ³, NS Canada; Fac of Pharmacy, Univ of Sydney⁴, Sydney NSW.

Introduction. People with dementia are prescribed more medications compared to people without dementia, and are particularly vulnerable to the adverse effects of high-risk medications (i.e. anticholinergics, antipsychotics and benzodiazepines). Management of high-risk medications for people with dementia can be challenging for healthcare practitioners, patients and their carers.

Aim. To develop and validate a computerised clinical decision support system (CCDSS) that incorporates pharmacological and clinical tools to aid person-centred medication management in dementia.

Methods. We are developing the Dementia-specific Medication review Electronic Decision Support System (D-MEDSS[®]). This study consists of two phases. A) Development: The D-MEDSS will be designed to produce information reports for healthcare practitioners, patients and their carers, and will incorporate three tools: 1) The Drug Burden Index (DBI), a measure of cumulative exposure to anticholinergic and sedative medications that is associated with functional impairment in older adults; 2) The Patients' Attitudes Towards Deprescribing (PATD) questionnaire that explores patients attitudes to deprescribing medications; and 3) a management tool for goals of care for dementia. B) Validation: Focus groups and one-on-one interviews with general practitioners, pharmacists and people living with dementia and their carers will test the D-MEDSS and information reports for usability and provide perspectives on implementation of the D-MEDSS reports in practice. The System Usability Scale and descriptive statistics will be used to summarise the validation phase. The focus groups and one-on-one interviews will be audio recorded, transcribed verbatim and qualitatively analysed to derive conceptual domains.

Discussion. The validated D-MEDSS will reliably identify anticholinergic and sedative medications, incorporate patient's attitudes to deprescribing, and list the patient's goals of care to aid management of high-risk medications for people with dementia and their carers.

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Factors affecting adherence – a new methodology systematic review using Leximancer[™]

Greg J Kyle¹. Discipline of Pharmacy, Queensland University of Technology, Brisbane, QLD

Introduction. Adherence is the major factor in determining improved health outcomes from medicines in the long term. Systematic reviews often target one factor or condition to reduce the workload of reading and analysing hundreds of articles. Leximancer[™] can reduce this workload by providing a textual analysis of a larger number of articles to provide a high level review of key concepts which can then be interpreted by the researcher.

Aims. To use Leximancer[™] software to analyse adherence papers found using a systematic search protocol.

Methods. Medline, EMBASE, CINAHL, and PubMed were systematically searched for all articles on adherence, concordance and compliance was conducted. All references were downloaded to EndNoteX7. Titles not including the 3 key terms above and not related to medication were excluded. Full text was obtained for as many articles as possible through QUT Library with other records excluded. All full-text articles were added to a Leximancer[™] project and the data cloud produced. Part words included in the analysis were removed as were word artefacts resulting from standard formats (eg "Table") and singular/plural versions of the same word were combined.

Results. A total of 1197 were included in the analysis. "Adherence" was more closely associated with "treatment", "clinical", "impact" and "care". "Interestingly, "compliance" was separated from "adherence" and was more closely associated with "data", "analysis" and "variables". "Risk" was closely associated with "mental" (near "health") and also "HIV", but not closely related to (in order of closest to furthest) "depression", "cancer" "asthma", "hypertension", "heart" (failure). "Mental" (health) was also closely associated with "risk" and "social" (next to "support") and also "quality" (next to "life").

Discussion. Many expected relationships were found in the data cloud. Leximancer[™] provided a method to rapidly analyse a large number of full-text documents. Whilst it cannot replace a thorough and carefully analysed systematic review, it can be used to provide a high level overview of the literature and to generate ideas to develop specific targeted systematic reviews using the traditional manual methodology. Specific investigation of the individual disease states identified using the tagging facility will be explored separately based on this analysis.



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What are the responsibilities of pharmacists selling complementary medicine? : A systematic review

Amber Salman Popattia¹, Adam La Caze¹. School of Pharmacy, The University of Queensland¹, Brisbane, QLD

Introduction. There is high consumer demand for complementary medicines in Australia. Consumers use complementary medicines to improve general health or to manage specific health conditions. Many consumers prefer to purchase complementary medicines from pharmacy. The widespread sale of complementary medicines in pharmacy coupled with the limited evidence of effectiveness for many complementary medicines, raises important ethical and professional questions. What are a pharmacist's responsibilities when selling complementary medicine?

Aim. Identify and summarise research that seeks to understand or determine a pharmacist's responsibilities when selling complementary medicines.

Methods. Embase, PubMed, Cinahl, PsycINFO and Philosopher's index databases were searched for English articles published between 1995-2015. The search terms used were *complementary medicine, pharmacy, pharmacist, pharmacists and pharmacy practice*. Empirical studies discussing pharmacist's practices or perceptions, consumer's expectations and normative studies discussing ethical perspectives or proposing ethical frameworks related to pharmacist's responsibilities in selling complementary medicines were included in the review.

Results. Twenty six studies met the inclusion criteria. The literature discussing pharmacist's responsibilities towards selling complementary medicines mainly consisted of empirical studies. The included studies consisted of 8 qualitative, 15 quantitative, 1 mixed method, 1 systematic review and 1 normative study. Pharmacists and consumers identified the pharmacist's role as providing information and counselling to consumers and ensuring safe use of complementary medicines. No ethical framework is explicitly discussed in the empirical research papers, however many appear to implicitly adopt principlism as the ethical framework. The ethical perspectives of selling complementary medicines are mainly described in terms of professional and ethical conflicts faced by pharmacists, especially the conflict between their business and health professional role.

Conclusion. There is a lack of explicit normative advice regarding pharmacist's responsibilities when selling complementary medicines. Progress can be made by providing practical ethical guidance for pharmacists regarding their specific responsibilities towards complementary medicines.

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Pharmacist perceptions and attitudes toward dispensing HIV medicines in the community

Lisa M Nissen¹, Esther TL Lau¹, Chris Campbell^{1,2}. School of Clinical Sciences, Queensland University of Technology¹, Brisbane, QLD; Terry White Chemists², Brisbane, QLD.

Introduction. A priority of the Seventh National HIV strategy 2014–2017 was to reduce new infections and increase uptake of treatment. As part of this, community pharmacies in Australia were allowed to dispense prescriptions for HIV medicines written after 1 July 2015 under the Pharmaceutical Benefits Scheme section 100 (s100) Highly Specialised Drugs Program. This gave patients more flexibility when accessing their medicines, as prior to this, these medicines were only available from public hospital pharmacies.

Aims. The aim of the study was to investigate community pharmacist perceptions and attitudes toward supplying HIV s100 antiretroviral medicines, and providing advice and support to patients taking these medicines.

Methods. A purposive sample of community pharmacists around Australia were invited to participate in an online survey that collected demographic information, and pharmacist perceptions and attitudes toward counselling and dispensing HIV s100 antiretroviral medicines.

Results. The majority of the pharmacists had not received requests for dispensing HIV antiretroviral medicines. They were generally comfortable speaking to patients about HIV medicines, but identified more knowledge would lead to more confidence when talking to patients. Cost and sourcing of the high cost medicines were identified as one of the barriers to dispensing and supplying s100 medicines. Nevertheless, most respondents were of the view that pharmacists play an important role in helping make these medicines more easily accessible for patients.

Discussion. Targeted education would allow more confidence when dispensing these medicines. Community pharmacists have an important role to play in helping to increase access to HIV medicines for ongoing treatment. They could potentially also help patients more easily access medicines in other situations e.g. post-exposure prophylaxis following the initial hospital or clinic visits.



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Community pharmacist perceptions and attitudes toward dispensing Hepatitis B and C medicines

Lisa M Nissen¹, Esther TL Lau¹, Chris Campbell^{1,2}. School of Clinical Sciences, Queensland University of Technology¹, Brisbane, QLD; Terry White Chemists², Brisbane, QLD.

Introduction. Patients with prescriptions written after 1 July 2015 have been able to access their Hepatitis B medicines from their community pharmacist under the Pharmaceutical Benefits Scheme (PBS) section 100 (s100) Highly Specialised Drugs Program. Earlier in 2016, a range of new Hepatitis C medicines was included in the Pharmaceutical Benefits Scheme (PBS) under both the general schedule, and the s100 (Private) Highly Specialised Drugs Program, allowing patients to obtain these medicines from community pharmacies. These changes provide patients more flexibility in accessing their medicines as prior to this, patients could only obtain some of these medicines from public hospital pharmacies; or they were not subsidised on the PBS, meaning the cost of the medicines prohibited many patients from accessing these medicine.

Aims. The aim of the study was to investigate community pharmacist perceptions and attitudes toward dispensing Hepatitis B or C medicines and looking after patients living with hepatitis.

Methods. A purposive sample of community pharmacists around Australia was invited to participate in an online survey. The survey collected demographic information, along with pharmacist perceptions and attitudes toward dispensing and providing information on Hepatitis B or C medicines.

Results. Many pharmacists had not received requests for dispensing Hepatitis B or C medicines. The cost and sourcing of the high cost medicines, especially the newly listed Hepatitis C medicines was identified as a barrier to dispensing and supplying these medicines. Most respondents were of the view that pharmacists play an important role in helping make these medicines more easily accessible for patients, but identified that lack of knowledge contributed to a lack of confidence when counselling and dispensing these medicines.

Discussion. Community pharmacists are play an important role in improving the access and use of these medicines. Structures to facilitate logistics around acquiring these new high cost medicines, and targeted education or training would allow pharmacists more confidence when supplying these medicines.

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A systematic review of healthcare workers' opinions and experiences of administering medicines to people with swallowing difficulties in aged-care facilities

Ayda S Forough¹, Simon YM Wong¹, Esther TL Lau¹, Jose Manuel Serrano Santos¹, Gregory J Kyle¹, Kathryn J Steadman², Julie AY Cichero², Lisa M Nissen¹. Sch of Clinical Sciences, Fac of Health, QUT¹, Brisbane, QLD; Sch of Pharmacy, UQ², Brisbane, QLD

Introduction. Swallowing difficulties can affect up to two-thirds of aged-care residents and is associated with increased risk of medication administration errors such as unsuitable tablet crushing or capsule opening. These practices can put patients at risk of drug toxicity sub-therapeutic doses or even death. However, little is understood about the underlying reasons leading to these sub-optimal medication administration practices among healthcare workers (e.g. nurses or carers). Addressing the existing challenges will be helpful to find strategies to prevent these medication administration errors.

Aims. To conduct a qualitative systematic review on healthcare workers' experiences and opinions about barriers and facilitators of administering medicines to aged-care residents with swallowing difficulties.

Methods. A thorough search in PubMed, CINAHL, EMBASE, Scopus, Mednar and ProQuest dissertations databases was conducted. Inclusion criteria were qualitative studies reported in English investigating opinions and experiences of healthcare workers who administer medications in aged-care facilities (ACFs). The review considered studies that focused on qualitative data including designs such as phenomenology, grounded theory, and action research.

Results. An initial search in the databases identified 747 articles. Articles that did not meet the inclusion criteria were excluded. Some of the common barriers are knowledge gap, time constraints, cost and unavailability of alternative pharmaceutical formulations. Improving information flow among healthcare professionals and providing pharmaceutical references specialised in medication dosage form modification were some of the possible facilitators that may require further investigation.

Discussion. The identified barriers and facilitators describe a framework of practice which could benefit from the design of a pharmacy intervention in medication management for residents in ACFs. Whilst further research is needed for an effective design, the pharmacy intervention should focus on promoting communication and education in a cost-effective manner that optimises the care of residents in ACFs.



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The effectiveness of components of swallowing assessments for identifying people with swallowing difficulties: a systematic review for quantitative evidence

Simon YM Wong¹, Aida S Forough¹, Jose Manuel Serrano Santos¹, Lisa M Nissen¹, Kathryn J Steadman², Julie AY Cichero², Esther TL Lau¹. School of Clinical Sciences, Queensland University of Technology¹, Brisbane, QLD; School of Pharmacy, University of Queensland², Brisbane, QLD.

Introduction. Clinical bedside assessments (CBA) are often used first-line for diagnosing swallowing difficulties. CBAs are a variety of tools e.g. questionnaires, checklists, swallow tasks, and portable devices with each containing a series of components that help assess an individual's ability to swallow. However, the effectiveness of the components in these tools have not been synthesised systematically in the literature.

Aims. To conduct a systematic review to identify and evaluate the effectiveness of components of CBAs in screening and identifying people who are experiencing or are at risk of developing swallowing difficulties.

Methods. A systematic search for CBAs for swallowing difficulties was conducted in PubMed, Embase, CINAHL, PsycINFO and Scopus. Studies in English that used CBAs as the index test, and gold standards as the reference test e.g. videofluoroscopy or fiberoptic endoscopy were considered for inclusion. Publications that evaluated CBAs that were written in languages other than English were excluded from this analysis.

Results. The initial search of the databases returned 16,685 articles. A total of 13,036 articles were excluded after a screen of titles and abstracts, and 100 papers remained after the full-text was examined. Preliminary results showed that screening components such as bolus swallowing tests, measurement of oxygen saturation, acoustical analysis, and voluntary cough tests presented with high sensitivity and specificity in predicting swallowing difficulties.

Discussion. These findings suggest that the identified screening components seem important in identifying swallowing difficulties and the associated complications e.g. aspiration. Detection of aspiration remains as the main aim for the majority of tools, but its identification in CBAs is still complex. Future research could focus on exploring new approaches that utilise these identified screening components to easily and more accurately identify people who are experiencing or are at risk of having difficulty with swallowing.

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Patient satisfaction with information and adherence to topical corticosteroids

Ling Lee¹, Stephen R Carter¹. Faculty of Pharmacy, Univ of Sydney¹, Sydney, NSW

Introduction. Adherence to topical corticosteroids (TCS) among patients treated by dermatologists is suboptimal.¹ Satisfaction with Information about Medicines Scale (SIMS) evaluates patient's level of satisfaction with medicine information and greater satisfaction level is associated with higher reported adherence.² However, SIMS has not yet been applied to study patient's satisfaction with information specifically about TCS.

Aims. (1) To develop SIMS items to assess satisfaction level with information about TCS; (2) Test the hypothesis that dissatisfaction with TCS-related information would be associated with higher concern beliefs and lower self-reported medication adherence.

Methods. A cross-sectional survey was piloted by recruiting respondents through community pharmacies. Inclusion criteria included those who had used TCS, whether prescribed by doctors or supplied by pharmacist, within the previous one month. SIMS, Medication Adherence Report Scale (MARS), and Beliefs about Medicines Questionnaire (BMQ) were adapted to context. Statistical analyses were performed using SPSS v23.

Results. The surveys were completed by 32 respondents. The measurement scales showed good internal consistency, with Cronbach's alpha values ranging between 0.60 and 0.90. Reported adherence to TCS was lower than previous research.¹ Respondents were more satisfied with information about the actions and usage of TCS than issues dealing with side effects.

Discussion. Ongoing data collection is underway in order to test the hypotheses and further characterise satisfaction with information about TCS. Preliminary findings show that adherence to TCS and satisfaction with TCS-related information are overall low. Healthcare professionals, such as pharmacists, have a role in providing more explicit counselling about TCS and enhance patient's self-efficacy to apply TCS.

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Efficacy of statins in obese asthmatics

Bharti Chogtu Magazine¹, Dipanjan Bhattacharjee², Rahul Magazine^{3,1,2} Dept of Pharmacology. ³Dept of Pulmonary Medicine, Kasturba Medical College, Manipal University, Manipal, Karnataka, India

Introduction: Obese asthmatics are resistant to asthma controller drugs as proinflammatory environment blunts the efficacy of treatment. Statins, the lipid lowering agents, have anti-inflammatory effects and can be used in obese asthmatics.

Aims. The aim of this study was to evaluate the effect of statins on obese asthmatics.

Methods. It was a retrospective cohort study on patients with asthma. The patients who received statins in addition to antiasthma medications for at least one year was the exposed group and those who did not receive statins was the unexposed group. The clinical characteristics including peak expiratory flow rate (PEFR), absolute eosinophil count (AEC), absolute neutrophil count (ANC), total leucocyte count (TLC) and frequency of acute exacerbations were recorded at baseline (time of statin initiation) and at 6 months and one year post statin initiation. Repeated measures ANOVA was used to find the difference between two groups at different time points.

Results. A total of 330 patients were included and of these 42 were obese. 18 of the obese patients were on statins and 24 were not on statins and were analysed. PEFR, AEC, ANC, TLC showed a significant increase ($P < 0.001$) at 1-year post statin treatment in exposed group. Also acute exacerbations reduced significantly ($p < 0.001$) in exposed group at one year as compared to unexposed group.

Discussion. Statins as an add on therapy can be beneficial in obese asthmatics. Long term use shows beneficial effects in terms of decreasing the inflammatory markers and improving lung functions.

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Medication Safety Information for Lactating Women: A Systematic Review

Alyson McClatchey¹, Greg Kyle^{1,2}, Lynn Cheong¹, Gabrielle Cooper¹, Alison Shield¹. Discipline of Pharmacy, University of Canberra¹, Bruce, ACT; Discipline of Pharmacy, Queensland University of Technology², Brisbane, QLD.

Introduction. Some breastfeeding women may require medication for acute or chronic health conditions. This medication may be a prescription, over-the-counter (OTC) or complementary and alternate (CAM) medicines. The need for medication can become a barrier to breastfeeding if appropriate management is not applied. Medication safety information during lactation varies with some medications having extensive safety profiles and others having limited or no recorded safety information. In addition to this the available safety information and related management guidelines can be conflicting.

Aims. To explore the literature published on medication safety during lactation from both the health professional and breastfeeding women's perspective.

Methods. A literature review was conducted using PRISMA guidelines applied to PubMed, Scopus and Google Scholar databases. Medication safety resources and published guidelines for medication management during lactation were collated.

Results. This review revealed 60 articles investigating aspects of medication use that could become a barrier to breastfeeding. These articles outlined numerous resources available that discuss medication safety during breastfeeding and lactation; these resources were both freely available and subscription services. Twenty one guidelines were identified with the most commonly suggested guideline being to 'pump and dump' breast milk for brief drug exposures.

Discussion. There is a paucity of research data that identifies how to minimize the need for medication as a barrier for breastfeeding. This can make seeking or providing advice about medication use while breastfeeding complicated and as a result can lead to unnecessary cessation of breastfeeding.



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A comparative analysis of cancer drugs pricing

Shahrzad Salmasi¹, Kah Seng Lee², Long Chiau Ming², Chin Fen Neoh³, Muhammad Abdul Hadi⁴, Mahmoud E Elrggala⁵, Zaheer-Ud- Din Babar⁶, Tahir Mehmood Khan¹. School of Pharmacy, Monash University, Selangor, MALAYSIA¹; Pharmacy, School of Medicine, University of Tasmania, Hobart, TAS, Australia²; Faculty of Pharmacy, Universiti Teknologi MARA, Selangor, Malaysia³; School of Healthcare, University of Leeds, Leeds, United Kingdom⁴; College of Pharmacy, Umm-Al-Qura University, Makkah, Saudi Arabia⁵; School of Pharmacy, The University of Auckland, Auckland, New Zealand⁶

Introduction. Cancer drugs are a substantial burden on healthcare systems because of their high acquisition cost.

Aims. This study aims to compare and analyse the cancer drug retail prices across countries in the South-East Asian, Western Pacific and Eastern Mediterranean regions.

Methods. The price data of the ten included countries in Asia was retrieved from official pricing authorities or the respective Ministry of Health websites. Drug retail prices across countries in the South-East Asian, Western Pacific and Eastern Mediterranean Regions were used in this study. Price data was presented in national currencies and converted to United States Dollar (\$) using PPP (purchasing power parity). A total of 26 formulations were included in this study.

Results. The final number of the included formulations was 26. Using PPP-adjusted mean unit prices, six formulations (23.08% of the samples) had a mean unit price below \$100.00, and nine formulations had a mean unit price between \$100.00 and \$500.00. Eight formulations had a mean unit price higher than \$1000.00, of which the mean unit price of one formulation (canazitaxel) was more than \$5000.00 (\$11832.93/tab).

Discussion. There was a direct relationship between income category of the countries and their mean unit price; lower income countries had lower mean unit prices. The average PPP-adjusted unit prices for countries based on their income level were as follows: low income countries \$708.75, low middle income countries \$919.39, high middle income countries \$1150.63, and high income countries \$1148.19. These discrepancies indicate that greater price transparency can help procurement officials to make better choices. This information provides an evidence base for policymakers to decide whether further policy measures related to drug prices are needed.

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Evidence-based Therapy of Neuropathic Pain in a Paraplegic Type-2 Diabetic patient undergoing End-Colostomy: Global Year against Neuropathic Pain 2015

Yogi Mishra¹, Fiona Lee², Toufic El-Khoury³, Department of Pharmacy¹, Stoma Therapy², Colo-Rectal Surgery³, Westmead Hospital, NSW 2145.

Introduction: Neuropathic pain is difficult to manage especially in patients presenting with several co-morbidities leading to enormous financial and social burden on society. Due to challenges faced in selection of evidence-based therapy of neuropathic pain, The International Association for Study of Pain (IASP) declared year 2015 as 'Global Year against Neuropathic Pain'.

Aim: Apply appropriate pharmacotherapy for neuropathic pain in a 39 year old Caucasian female patient with spinal cord injury with several co-morbid clinical challenges.

Methods: The patient was admitted for planned end-colostomy to manage her personal hygiene. The co-morbid challenges included traumatic paraplegia, poorly controlled type-2 diabetes, lower limb deep vein thrombosis & pulmonary embolism, hypopituitarism secondary to Rathke's cyst, gastro-oesophageal reflux disease, obstructive sleep apnoea, neurogenic overactive bladder, chronic left hip dislocation, pressure-induced sacral ulcer, obesity, hypercholesterolemia and depression. Pharmacotherapy for neuropathic pain comprised step-wise introduction and response-guided dose-escalation of amitriptyline, pregablin, tramadol and duloxetine. The co-morbidities were managed with baclofen, temazepam, oxybutynin, frusemide, metformin, insulin, atorvastatin, cholecalciferol, lactulose, Movicol, & Coloxyl-Senna.

Results and Discussion: This patient's neuropathic pain was successfully managed with judicious selection and combination of medications without need for strong opioids as they may not be suitable for her in the long term and can cause dependence and side effects such as constipation leading to complications with functioning of stoma appliance.

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A change reaction? Patient safety risks of a hybrid system for allergy documentation

Rayan Nahas¹, Sarah Green¹. Dept of Pharmacy, Royal North Shore Hospital,¹ Sydney, NSW

Introduction. Correct documentation of known allergies or adverse drug reactions (ADR) should be available at the point of care. The introduction of electronic medical records (eMR) has commenced in the health service, but medication documentation will not be paperless until 2018.

Aims. To investigate discrepancies in the documentation of known medication allergies and ADRs between the National Inpatient Medication Chart (NIMC), medication management plan (MMP) and eMR.

Methods. A cross-sectional analysis of inpatients from a total of 16 wards at a tertiary referral hospital was undertaken. Data collected included completeness of NIMC allergy/ADR documentation including signing, dating and printing name, and the use of ADR stickers. Additionally, documentation of allergies/ADR including drug name, severity, type and time of reaction between NIMC and eMR was captured. Data was analysed using descriptive statistics (Microsoft Excel).

Results. From 236 patients, 121 (51.3%) were found to have at least one known allergy/ADR on NIMC and 129 (54.7%) on eMR. Allergies/ADRs were documented on 99.6% of NIMCs, 89.0% of eMRs and 96.8% of MMPs. The allergy/ADR documentation on NIMC was fully signed, name printed and dated in 91.9% of patients. Full compliance with ADR alert sticker on NIMC was 9.1%. On average, reaction severity and time of reaction was documented for more patients on eMR than the NIMC (30.7% vs 8.2%) whilst drug reaction and type of reaction was documented for more patients on the NIMC than eMR (39.9% vs 35.5%). A total of 118 discrepancies between NIMC and eMR documentation were identified. These discrepancies were characterised as a difference in NKDA status, number of allergies and completeness of documentation.

Discussion. The discovery of a large number of discrepancies between paper and electronic records suggests a potential patient safety issue. Further analysis of discrepancies is required to develop processes to improve consistency of documentation.

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Exploring accredited pharmacists' work processes during Home Medicines Reviews

Marea Patounas¹, Esther TL Lau¹, Greg J Kyle¹, Debbie Rigby¹, Vincent Chan², Lisa M Nissen¹.

Faculty of Health, Qld University of Technology (QUT)¹, Brisbane, QLD; RMIT University², Melbourne, VIC.

Introduction. The Home Medicines Review (HMR) Programme in Australia aims to enhance quality use of medicines and improve patient health via collaboration between accredited pharmacists (APs) and general practitioners (GPs). Little is known about APs' perspectives of work processes during the various stages of HMRs.

Aims. The aim of this project is to evaluate APs' perspectives of HMR work processes e.g. time spent on HMRs, use of technology, and adverse drug reaction (ADR) reporting.

Methods. An online national survey was distributed to APs via three key professional pharmacist organisations. The survey explored APs' opinions relating to the three key stages of HMR processes: (a) pre-interview i.e. preparation prior to the patient interview, (b) home interview, and (c) post-interview i.e. HMR report preparation and provision.

Results. Most survey respondents were female, graduated in 2000-2009, and were from community pharmacy background. They were accredited for 11-15 years, had conducted 100-499 HMRs and were not integrated into GP clinics. They spent an average of 0-30 minutes pre-interview, 45-60 minutes during the home interview, and 1-2 hours post-interview. The majority did not use a laptop for information gathering during the home interview, and did not use devices/technology to educate patients and provide information. Most APs asked the patient to sign the Privacy Notification Form at the end of the home interview. A minority of APs have reported an ADR detected from a home interview to the health authorities or drug sponsor. Most APs spent 1-2 hours around HMR report preparation and on average, HMR reports were 2 pages in length.

Discussion. Deeper insight into APs' work processes will improve quality use of medicines in patients. Additionally, this valuable gain in knowledge around pharmacy practice issues, and health care workforce issues linked with patient home visits can inform future potential funding models. In taking a team-based approach, the perspectives of other health professionals regarding HMR work processes e.g. GPs could also be explored.



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Expressing emotions related to chronic disease states in open Facebook groups

Nanda Puspita¹, Arcelio Benetoli¹, Parisa Aslani¹ Faculty of Pharmacy, The University of Sydney¹, Sydney, Australia

Introduction: The use of Facebook for health purposes is escalating and many people are utilizing this social media platform to express their emotions related to their diseases.

Aims: This study explored how disease-specific Facebook (FB) group members expressed emotions in relation to their chronic diseases on open FB group pages.

Methods: A total of 83 open Facebook groups were identified using the keywords "chronic disease states + Australia"; and 9 groups which met the inclusion criteria (patient support FB groups which had published a latest post in January 2015) were selected and their contents over a 2 week period, analysed.

Results: The selected FB groups covered 5 chronic disease states; type 1 diabetes (n=2), cancer (n=3), chronic pain (n=1), asthma/COPD (n=1), and mental disorders (n=2). From 238 threads of posts, 118 quotes showing emotions were identified. Quotes containing positive emotions (n=69) outnumbered the negative ones (n=49). Group members expressed positive emotions in connection with encouragement and optimism in managing the chronic diseases. Conversely, the negative emotions were found to reveal anger, sadness, and hopelessness in the chronic disease battle. The group members expressed feelings mostly in relation to their current disease states, long-term therapies, and changed diet and lifestyle.

Discussion: Positive and negative emotions were spontaneously expressed by the members of the FB groups. They were probably associated with the emotional status of group members and their needs, as impacted by their experience with a chronic disease. Understanding subjective factors, such as emotions, of people with chronic diseases (and their caregivers) expressed on FB groups can assist healthcare providers to better understand patients' needs. These factors may positively impact service delivery, counselling, educational materials, and strategies to support chronic disease management.

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Medications affecting alertness: beliefs and perceptions of consumers

Xiao Ern Bernice Liew¹, Fatema-Tun-Naher Sake^{1, 2}, Keith Wong^{2, 3, 4}, Bandana Saini¹. Faculty of Pharm, The Univ of Sydney¹, Camperdown, NSW; Woolcock Institute of Medical Research, The Univ of Sydney², Glebe, NSW; Sydney Medical School, The Univ of Sydney³, Sydney, NSW; Dept of Respiratory and Sleep Medicine, Royal Prince Alfred Hosp⁴, Camperdown, NSW

Introduction: Consumption of alertness impairing medications can have serious consequences while performing activities demanding psychomotor vigilance. A better understanding of how patients perceive the risks of using medications that affect their alertness would help to design communication tools for patients to ensure the safe use of such medications.

Aims: This study aimed to explore beliefs about medications and the risk perceptions of consumers using medications that cause impaired alertness.

Methods: This study involved a point of purchase survey of patients using medications that affect alertness. Participants were recruited from randomly selected pharmacies in New South Wales (NSW). Survey items included questions about patient's perceptions of the riskiness of key daily activities such as driving after consuming alertness impairing medications as well as their beliefs about the medications. Data obtained from the patients was entered into the SPSS package and descriptively explored.

Results: Ninety-six patients taking alertness impairing medications were recruited. The mean age of the participants was 44.5 years and 51.6% were female. While nearly 22% of the respondents expressed concern (strongly agreed) about long-term consequences of their medications, 10.6% were worried about becoming dependent on the medications. About 11.8% and 29.2% of the participants perceived that driving a motor vehicle and handling machinery respectively within 3-4 hours of taking their medications are not risky at all.

Discussion: There was concern among patients about the side effects of their medications. However, risk perception about driving a car or operating machinery shortly after taking alertness impaired medications was low for some patients. Given the serious consequences of undertaking activities that need motor coordination whilst on these types of medications, development of a risk communication tool can be beneficial for identifying patients with low-risk perception as well as facilitating effective communication to improve risk perception.



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A study of modification to first line antiretroviral therapy in treatment naive, HIV positive patients in a tertiary care hospital

Smita Shenoy¹, Chaithanya Malalur¹, Dhairya Shrivastava¹, Muralidhar Varma², Kavitha Saravu². Dept. of Pharmacol,¹ Kasturba Medical College, Manipal Univ, India; Dept. of Medicine,² Kasturba Medical College, Manipal Univ, India

Introduction. The durability of first line antiretroviral therapy (ART) is important in developing countries as the number of regimens available is limited.

Aims. To study the time to first modification, type and predictors of modification of first line antiretroviral therapy following its initiation in HIV positive patients in a private tertiary care hospital in south India.

Methods. A retrospective study of the case files of adult HIV positive patients started on first line antiretroviral therapy between January 2012 and September 2014 was conducted. Statistical methods included Chi-square test and binomial logistic regression for identification of predictors for change in regimen.

Results. Of the 202 patients initiated on first line ART, 54 (26.73%) had modification of therapy which ranged from drug substitution to switch in regimen. The reasons were adverse drug reactions 43(79.62%), treatment failure 5(9.25%), comorbidities 3(5.55%) and physician decision 3(5.55%) to improve compliance with single tablet of tenofovir based regimens. The median time to modification was 173 (152.25, 293.50) days. Adverse drug reactions and non-tenofovir based regimens were significantly associated with change in regimen ($X^2 = 47$, $p < 0.001$ and $X^2 = 12$, $p = 0.001$), respectively. Age, gender, baseline hemoglobin, weight and CD4 values were not significantly associated with change in ART.

Discussion. Factors that can influence the duration of initial antiretroviral regimen should be identified so as to attempt to modify these factors with a view to achieve better durability of first line therapy.

Abah IO et al (2015) J Int Assoc Provid AIDS Care 14(4):348-54

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The use of herbal medicines during breastfeeding in an Australian population

Jenny Lee¹, Alyson McClatchey¹, Alison Shield¹. Pharmacy, University of Canberra¹, Bruce, ACT.

Introduction. A large proportion of Australian women report using herbal medicines. Despite this increasing popularity, the prevalence and safety of herbal medicine use in breastfeeding women is inadequately researched. Studies to date have focused primarily on use of conventional medicines during lactation or herbal medicine use in the general population.

Aims. To investigate the utilization of herbal medicines and information-seeking behaviours during breastfeeding in Australia.

Methods. This study was conducted using a self-administered online questionnaire. Participants were recruited by advertising at various pharmacies, naturopath clinics, health food stores and online platforms, such as Facebook mothers groups. Participants were 18 years or older, currently breastfeeding or had breastfed in the past 12 months and utilized herbal medicines. Statistical analysis was performed using the Qualtrics software to provide descriptive statistics.

Results. A total of 118 questionnaires from eligible participants were analysed. Of these women, 81% used at least one herbal medicine during breastfeeding. Herbal mixes were most commonly used by 48% of women with Fenugreek (18%) and Echinacea (14%) the most frequently reported individual herbs. Nearly half (45%) of the respondents perceived herbal medicines to be safer than conventional medicines whilst 80% had previously refused or avoided conventional drug treatment due to concerns regarding the safety of their breastfed infant. Naturopaths (32%) were the most frequently consulted for safety information and information from general practitioners (22%) was reported as being the most difficult to understand.

Discussion. Herbal medicines use is common among breastfeeding women although evidence based safety information is often lacking. This study highlights that breastfeeding women have limited knowledge on the risks or benefits of these plant derived products. Improvements of current information sources should be made, to empower breastfeeding women in making informed choices, with regards to herbal medicine use.



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Medication information needs on discharge in a rehabilitation ward- A patients' perspective

Karina J Fildes¹, Heather Parsons², Joy Spark¹. Department Pharmacy and Applied Science, La Trobe University¹, Bendigo, VIC; Pharmacy Department, Castlemaine Health², Castlemaine, VIC.

Introduction. Avoidable medication-related cost to Australia's health care system can be reduced by effective communication between health professionals and patients. A step in the medications management cycle involves understanding patients' and carers' medication information needs at discharge from hospital.

Aims. To explore patients' discharge medication information needs and whether their needs were met in a rural hospital setting.

Methods. Patients in a rehabilitation ward were interviewed pre-discharge to determine their individual medication needs, this was followed by a telephone interview 3-7 days post discharge to explore if these needs were met. Interviews were semi-structured, following an interview guide and were audio-taped and transcribed verbatim to allow for thematic analysis of data.

Results & Discussion. 21 semi-structured interviews were conducted involving 13 participants (13 pre-discharge and 8 post-discharge). Pre-discharge patients mostly wanted to know the indication for the medication prescribed and the side effect profile. There were varied responses as to how they wanted to receive their medication information. The requirement for medication information that was either verbal, written or both appeared to depend on the patients' perception of their cognitive ability. The majority of patients did not have a preference of brands and identified generic brands as "the cheaper brand". Disempowerment of patients own medication management as a consequence of the hospital setting was found with patients not knowing what medication they were taking or why. Post-discharge patients claimed to be satisfied that they had received adequate information on discharge. These patients had access to a written discharge medication summary sheet once home which aided in the management of their medications. However, a few patients had confusion around medication self-management once home from the hospital. Therefore consideration of the individual patient needs involvement of patients with their own medication management to empower patients prior to discharge may help reduce confusion experienced at this care transition point.

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Assessing community pharmacists knowledge of popular herbal/nutrient weight-loss medications

Meng-Wong Taing¹, Alexandra M. Clavarino¹, Treasure M. McGuire^{1,2,3}. School of Pharmacy, The University of Queensland¹, Brisbane, QLD; Mater Pharmacy Services, Mater Health Services², Brisbane, QLD; Faculty of Health Sciences & Medicine, Bond University³, Gold Coast, QLD.

Introduction. Australian pharmacists are obligated to ensure they provide the best available information to consumers for complementary medicines with regards to evidence for efficacy, drug interactions and risks of harm including potential side effects.

Aim. Assess community pharmacists' knowledge regarding evidence for efficacy, drug interactions and potential side effects for popular herbal/nutrient weight-loss complementary medicines (WLCMs).

Methods. A knowledge-based questionnaire was developed relating to three popular WLCMs – garcinia, green tea and chromium. Community pharmacists from a randomly selected sample of 214 pharmacies located in the Greater Brisbane region, Queensland, Australia were invited to complete the online questionnaire.

Results. In total, 99 pharmacists completed the survey. Only 10% of respondents selected the appropriate effectiveness ratings for green tea, while 40% selecting the appropriate response for garcinia and chromium. A mismatch was observed between what pharmacists recognised as adverse effects and interactions for the three common WLCMs compared to published findings, with a bias towards nervous system (i.e. insomnia and headache), gastrointestinal side effects and interactions with warfarin.

Discussion. Our results suggest that the majority of pharmacists in this study were unable to identify the appropriate effectiveness rating, adverse drug effects or drug interactions for three commonly sold/recommended WLCMs. These findings support local and international studies, highlighting pharmacists have limited knowledge not only of popular complementary medicines (e.g. glucosamine, black cohosh and *Ginko biloba*), but also extends to commonly used/sold WLCMs.



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Pharmacists' perceptions of career opportunities in Australia

Hayley J Taylor¹, Greg Kyle², Lynn Cheong¹. Dept of Pharmacy, Univ of Canberra¹, Canberra, ACT; Dept of Pharmacy, Queensland Univ of Technology², Brisbane, QLD.

Introduction: Anecdotal reports of an oversupply of pharmacy graduates are a growing concern for Australian pharmacists. However, limited data exists regarding pharmacists' employment experiences and perceptions of current career opportunities in Australia.

Aim: To understand Australian pharmacists' and pharmacy interns' employment experiences by exploring their satisfaction and perspective of current employment opportunities.

Method: An electronic survey was distributed to pharmacists and pharmacy interns across Australia between March to July 2016. National professional organisations for pharmacists assisted with distribution of the survey. Follow-up interviews were conducted to further explore survey findings.

Results: A total of 306 individuals completed the survey (83% pharmacist; 17% interns). A majority of pharmacists and interns reported high satisfaction with current employment and professional practice opportunities; however, there is a misalignment between their rated satisfaction and perspective of future employment prospects. Key themes that emerged included personal networks for employment, salary and location, and concerns for the future of the profession.

Discussion: This study provided valuable insight to the Australian Pharmacist workforce, by improving our understanding of pharmacists' employment experiences and perspectives. Further exploration of themes identified in this study is required to better inform the future of pharmacy professional practice and employment.

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The association between frailty and medicine use over time

Imaina Widagdo¹, Nicole Pratt¹, Elizabeth Roughead¹. Quality Use of Medicine and Pharmacy Research Centre, Sansom Institute for Health Research, University of South Australia¹, Adelaide, SA

Introduction. Frailty and medicine-related problems are common among the older population and have been associated with an increased risk of adverse outcomes. Frailty assessment has been identified as an important effort in improving the safe use of medicines in older people.

Aims. To examine whether there was a difference in frailty scores over time with the changes in medicine use.

Methods. Frailty scores and medicine use information were assessed from the Australian Longitudinal Study of Ageing (ALSA), data at baseline (wave 1) and at wave 3 were used. Frailty scores were assessed at both waves using a modified version of the Frailty Index. Medicine use was categorised into continued or stopped by comparing use at wave 3 to use at wave 1. A t-test was used to compare the mean changes in frailty scores between the two groups, with a p-value of <0.05 considered to be significant.

Results. Data from 1679 participants were included in the analysis. Participants who stopped any preventive medicines were found to have a higher increase in mean frailty scores changes than those who continued using them (p=0.01). Stopping beta blockers or potassium-sparing diuretics was associated with a greater increase in frailty score than continuing these medicines.

Discussion. There was a difference in frailty scores over time with the changes in the use of certain medicines, however, further study is needed to assess whether the increase in frailty scores was due to medicine cessation or whether the cessation of the medicine was due to frailty progression.

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Preparation, solid state characterization of etravirine co-crystals with improved solubility

Muddukrishna Badamane Sathyanarayana¹, Karthik Aithal¹, Aravind Pai², Krishnamurthy Bhat¹. ¹Department of Pharmaceutical Quality Assurance, Manipal College of Pharmaceutical Sciences, Manipal University¹, Manipal, Karnataka, India. ²Department of Pharmaceutical Chemistry, Manipal College of Pharmaceutical Sciences, Manipal University¹, Manipal, Karnataka, India.

Introduction. Preparation of binary cocrystals of Etravirine (ETR) by using Tartaric Acid (TAR) as a conformer was the main focus of this study. Etravirine is a Class IV drug having low solubility and low permeability, as per the BCS classification system. Principle behind cocrystal formation is hydrogen bonding between C=O and N-H group of Etravirine and COOH groups of tartaric acid, which is varified by FTIR, XRD and DSC results.

Aim. To prepare cocrystals of etravirine with tartaric acid with inproved solubility.

Methods. Cocrystals were prepared by slow evaporation technique. A mixture of total 500mg of ETR: TAR was weighed in molar ratios of 1:1 (371.72mg of ETR and 128.27mg of TAR). Saturated solution of Etravirine was prepared in Acetone: Methanol (50:50) mixture in which tartaric acid is dissolved by sonication and then this solution was stirred using a magnetic stirrer until the solvent got evaporated. Shimadzu FTIR – 8300 system (Kyoto, Japan) was used to acquire the FTIR spectra of the cocrystals prepared. Shimadzu (TA – 60WS) thermal analyzer was used to achieve DSC measurements. Rigakuminiflex 600 X-ray diffractometer (Rigaku Co., Tokyo, Japan) was used to obtain the X-ray powder diffraction pattern. Shake flask method was used to determine the equilibrium dynamic solubility of pure, physical mixture and cocrystals of ETR. USP buffer (pH 6.8) containing 1% of Tween 80 was used as the medium. The pure, physical mixture and the optimized cocrystal of ETR were accurately weighed sufficient to maintain the sink condition and were filled in hard gelatine capsules (size 4). Electrolab-Tablet Dissolution tester using basket apparatus at a rotational speed of 50 rpm and USP phosphate buffer (900 mL, pH = 6.8, 37 °C) + 1% Tween80 as a dissolution media was used to carry out dissolution. Shimadzu LC-10 series chromatographic system (Shimadzu Corporation, Kyoto, Japan) was used to perform the analysis. The system contained a controller unit(SCL-10A VP), a degasser unit(DGU-20A5), a quaternary gradient pump(LC-20AD), a refrigerated autosampler(SIL20AC HT) and a PDA detector(SPD-M10AVP). An Hypersil BDS C₁₈ (150mm x4.6 mm x5 μm) column was used for separation with mobile phase comprising of a mixture of acetonitrile and phosphate buffer (20mM, containing 2.72 g of potassium dihydrogen phosphate and pH adjusted to 3.2 with 85% orthophosphoric acid) in the ratio 60:40 v/v. The flow rate was 1.0mL/min and column temperature was set to 30°C. The detection was carried out at304 nm for ETR.

Results and discussions. The cocrystals were subjected to various solid state characterization like FTIR, DSC and PXRD and the results confirmed the formation of cocrystals. The C=O stretching vibration (1741cm⁻¹) in tartaric acid was disappeared in the cocrystal and the peak broadening of primary amine indicates hydrogen bond formation. The difference in the melting point of cocrystals when compared to pure Etravirine (265 °C) indicates interaction between the drug and the cofomer which proves that first ordered transformation i.e. melting endotherm has disappeared. The difference in 2θ values of pure drug and cocrystals indicates the interaction between the drug and the cofomer. Dynamic solubility and dissolution studies were also conducted by shake flask method and USP apparatus one respectively and 3.6 fold increase in the dynamic solubility were observed shown in figure 1 and *in-vitro* dissolution study shows four fold increase in the solubility for the ETR: TAR (1:1) cocrystals. shown in figure 2. The ETR: TAR (1:1) cocrystals shows improved solubility and dissolution as compared to the pure drug which was clearly showed by solid state characterization and dissolution studies

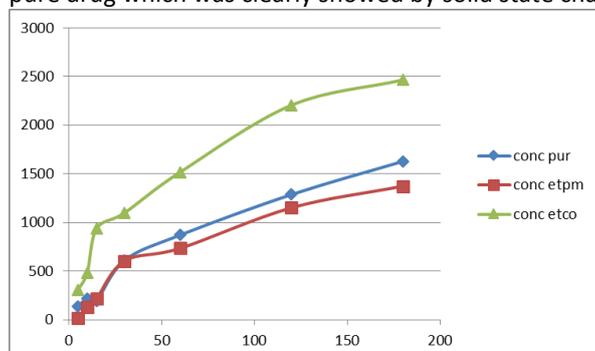


Figure 1: Dynamic solubility data of ETR: TAR (1:1) Figure 2: Dissolution study data of ETR: TAR (1:1)

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Development and Validation of an LC-MS/MS Bioanalytical Method for Quantification of Dexmedetomidine in Samples of Human Plasma

Sussan Ghassabian¹, Seyed Mojtaba Moosavi¹, Kiran Shekar², John F Fraser², Maree T Smith^{1,3}.

¹Centre for Integrated Preclinical Drug Development, University of Queensland, Brisbane, QLD, ²Critical Care Research Group, Adult Intensive Care Services, The Prince Charles Hospital, Brisbane, QLD, ³School of Pharmacy, University of Queensland, Brisbane, QLD.

Introduction. Dexmedetomidine (DEX) is a selective central α_2 -agonist used as a sedative and anxiolytic in the ICU.

Aims. To develop and validate an LC-MS/MS method to measure DEX in the plasma samples collected from patients on extracorporeal membrane oxygenation (ECMO).

Methods. Aliquots of 0.1% formic acid (FA) in water (100 μ l) containing DEX-d4 as the internal standard (10 ng/mL) were added to samples of human plasma (50 μ l) and 0.1% FA in water (50 μ l). Samples were mixed and loaded on HLB solid phase extraction cartridges (Waters) which were pre-conditioned with methanol (1 mL) and 0.1% FA in water (1 mL). Cartridges were washed with 30% methanol in water (1 mL), followed by elution with the mixture of 5% isopropanol, 10% acetonitrile and 85% methanol in glass tubes contained 20 μ l of 0.5% bovine serum albumin. Eluents were evaporated under the steam of nitrogen at room temperature and were reconstituted in 20% acetonitrile in 0.1% FA in water (200 μ l) and transferred to the silanized glass vials from which 5 μ l were injected onto a X-Terra[®] C18 150 x 2.1 mm, 5 μ m analytical column with a 7.5 min run time and the mobile phase comprising 0.1% FA in water and acetonitrile. The MRM transitions were 201.1 \rightarrow 95.0 and 204.9 \rightarrow 99.0 for DEX and the DEX-d4, respectively.

Results. The method showed acceptable within-run and between-run precision and accuracy (>85%) for quality control (QC) samples (n=6, at three different days). DEX was stable in QCs after three cycles of freeze and thaw, 5 h at room temperature, and at least 112 days in freezer at -20 $^{\circ}$ C. The recovery was 86% and the method was linear over the range of 0.5-20 ng/mL. Matrix effect was tested using spiking low and high concentrations of DEX in plasma samples from 6 individuals (precision > 96%).

Discussion. Small sample volume required for the analysis, using a stable isotope as the internal standard, and minimising adsorption to glass and plastic tubes are the main advantages of our fully validated bioanalytical method.

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The function of M26V ρ 1 GABA_C mutant receptor

Ester Kopp, Nathan Absalom, Mary Collins, Jane R Hanrahan. Faculty of Pharmacy, University of Sydney, NSW.

Introduction. GABA_C receptors are ligand-gated ion channels found in distinct areas of the CNS¹ and implicated in the pathophysiological of many disorders. A family-based association analyses identified an alcohol dependence associated mutation correspond to GABA_C ρ 1 M20V.² The effect of this mutation on GABA_C ρ 1 receptor function is as yet unknown.

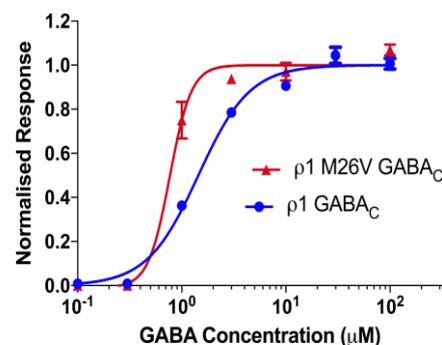
Aims. To study the effect of GAB in the presence and absence of ethanol at WT and M26V GABA_C receptors expressed in xenopus oocytes.

Methods. A single point mutation was introduced using site-directed mutagenesis. The effect of the mutation was evaluated using 2-electrode voltage clamp methods on recombinant WT and M26V ρ 1 GABA receptors expressed in Xenopus oocytes.

Results. On WT ρ 1 GABA_C receptors ethanol inhibited the GABA response. The M26V mutation did not alter the efficacy of GABA, however the Hill slope increased significantly from 1.8 to 4.7 (p<0.001), with a decrease in EC₅₀ from WT 1.4 μ M to M26V 0.77 μ M (p<0.001).

Discussion. Interestingly, alcohol inhibits the GABA response at GABA_C receptors, compared to GABA_A and GABA_B receptors where alcohol enhances the GABA response. Current studies are investigating the effect of alcohol on the GABA response at M26V. Although the efficacy of GABA was not affected by the M26V mutation, the increase in Hill slope suggests increased cooperativity between the receptor and GABA.

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Systematic development of Type IV self-nanoemulsifying drug delivery systems of Mangiferin:

Cellular uptake studies and mechanistic pathways on resistant cells

Rajneet Kaur Khurana¹, Kamalinder K Singh², Bhupinder Singh¹; ¹University Institute of Pharmaceutical Sciences, Panjab University, Chd, India 160014 and ²School of Pharmacy and Biomedical Sciences, University of Central Lancashire, Pr, UK

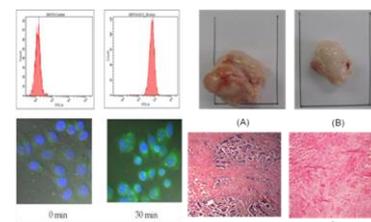
Introduction. Mangiferin, naturally occurring glycosylxanthone has gained rapid importance as an antioxidant by reducing free radical species and inhibiting cancer cells by inducing apoptosis. It exhibits low oral bioavailability (<12%), ostensibly owing to its poor aqueous solubility, extensive hepatic first-pass metabolism and P-gp efflux.

Aim. The current studies entail the Formulation by Design-based development of Type IV self nanoemulsifying drug delivery systems (SNEDDS) of mangiferin for enhancing its oral bioavailability.

Methods. Preformulation studies were carried out employing equilibrium solubility and pseudoternary phase titration studies in various surfactants, and/or co-surfactants followed by factor screening studies. Cremophor & Labrafil M2125 (i.e., surfactant) and PEG, (i.e., cosolvent) were selected as the CMAs for Type IV SNEDDS. QbD-based optimization of the SNEDDS was carried out by employing I-optimal mixture design, evaluating their CQAs like globule size, emulsification efficiency, drug release in 15 min and percent permeated in 45 min.

Results. The optimized formulation was selected using numerical optimization desirability function exhibiting miniscule globule size (<100 nm), excellent emulsification time (<1 minute), rapid drug release (>80% within 15 min) and enhanced intestinal permeability (>85% in 45 min). Figure illustrates the in vitro cell line data on MDA-MB-231 cells at varying time points. Further, the uptake studies through flow cytometry analysis and confocal microscopy construed the superior uptake potential for the prepared formulations. The figure also shows in vivo tumor efficacy and histopathology slides.

Discussion: It was revealed that Type IV SNEDDS followed clathrin mediated pathways. In situ perfusion and in vivo pharmacokinetic studies performed in Wistar rats revealed remarkable improvement ($p < 0.001$) in the extent of oral bioavailability for Type IV-SNEDDS (i.e., 7-folds) vis-à-vis pure drug.



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Long circulation of quantum dot loaded PLGA-nanoparticles surface modified with poloxamer

Diky Mudhakhir, Patihul Husni. School of Pharmacy, Institut Teknologi Bandung (ITB), Bandung, Indonesia

Introduction. Main drawback of drug loaded nanoparticles delivery by intravenous administration is rapidly eliminated in the bloodstream due to opsonisation by reticuloendothelial system (RES). Hydrophilic modification on the surface nanoparticles is considered essential to overcome the problems. **Aim.** To design long circulating polylactic glycolic acid nanoparticles (NP) loading quantum dot as a sensor by modifying the nanostructure with poloxamer. **Methods.** PLGA-poloxamer nanoparticles were prepared by nanoprecipitation method. Poloxamer concentrations used were 3, 5 and 10%. Characterization, pharmacokinetics and biodistribution study in mice of nanoparticles were performed. **Results.** Particles had a size of around 90-150 nm with encapsulation efficiency more than 90%. Blood concentration of the use 5% poloxamer (NP5%) and 10% (NP10%) were 15.15 and 10.35%ID/mL, respectively after 12 h administration. Those were higher than that of control of approximately 5.85%ID/mL. The higher poloxamer, the higher AUC value and the lower clearance. Moreover, accumulation of the NP5% and NP10% in RES organ such as liver and spleen was significantly decreased comparing to that of control. **Discussion.** Insertion of particularly 5% and 10% poloxamer to the surface of PLGA-nanoparticles provided steric barrier so that it has long circulating in blood with low accumulation in RES organ.

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Thermo- and magneto-sensitive drug delivery carriers for the treatment of lung cancer

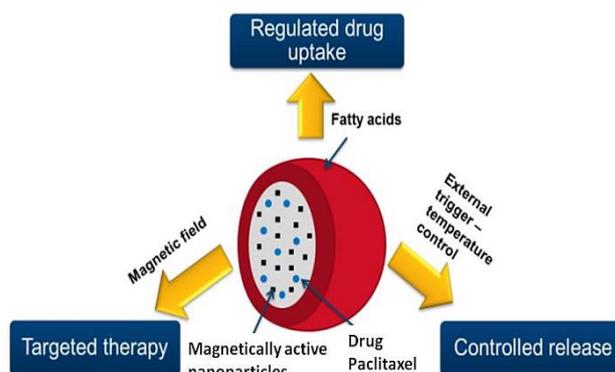
Katarzyna Reczyńska^{1,2}, Elżbieta Pamuła¹, Wojciech Chrzanowski². AGH University of Science and Technology Faculty of Materials Science and Ceramics¹, Kraków, PL; University of Sydney, Faculty of Pharmacy², Sydney, AU

Introduction. The ability to use external stimulus to localize and then trigger drug release is a major challenge in the development of advanced drug delivery systems (DDS).

Aims. The main objective was to develop stimuli-responsive inhalable fatty acid-based microparticles (MPs) that will enhance the efficacy of lung cancer treatment. The idea of DDS is shown in Figure.

Methods. MPs containing 1-5% magnetic nanoparticles were produced by oil-in-water emulsification from lauric acid (LAU), myristic acid (MYR) and mixture of MYR and palmitic acid (MYR:PAL, 60:40) and characterised by DLS, DSC, SEM, AFM. The influence of MPs on A459 human lung carcinoma cells was evaluated up to 8 h by resazurin viability test, live/dead and DAPI/phalloidin staining.

Results and Discussion. MPs were spherical and their size was in the range of 1-6 μm , i.e. suitable for inhalation. Melting temperatures of MPs made of LAU, MYR and MYR:PAL were 45, 54 and 48°C, respectively, showing that it is possible to adapt their melting and thus release of encapsulated drug to hyperthermia conditions. MPs were easily phagocytosed by the cells and were not cytotoxic for the doses lower than 0.25 mg/ml. Mobility tests showed that it is possible to target the MPs by external magnetic field. To sum up, developed MPs had suitable properties for inhalation, localized accumulation and triggered drug release using external magnetic field.



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Extraction methodologies and phytochemical analysis of Australian *Pittosporum angustifolium*

Anuja Patil¹, M Fitzgerald², MO Parat¹ and PN Shaw¹

1: School of Pharmacy, The University of Queensland; 2: School of Agriculture and Food Sciences, The University of Queensland.

Pittosporum angustifolium Linn also known in the literature as *P. phillyraeoides* and has been widely used in Aboriginal medicinal practice wherein it is known as “gumby-gumby”. The medicinal uses for the plant render it of significant interest. The *P. angustifolium* species was reinstated by Cayzer et al. (2000) and its identification was confirmed on the basis of both phylogenetic and morphological analyses. *P. phillyraeoides* and *P. angustifolium* are also differentiated on their history of collection and geographical distribution.

Aims. The aim of the current study is to examine extraction methodologies on a number of different *P. angustifolium* samples and to perform qualitative phytochemical analysis on extracts to determine the extent and range of any chemical variation.

Methods Leaf samples of *P. angustifolium* from Queensland and South Australia were provided by Dale Chapman (Five Kungkas). Juice and decoction extracts were prepared and phytochemical tests were performed.

Results and Discussion- Juice and decoction extract yields were different between the three cultivars examined. Less variation was observed in the decoction extracts yields when compared to the leaf juice yields. Phytochemical analysis revealed clear differences in juice and decoction for both tannins and saponins.

Reference

Cayzer LW, Crisp MD, Telford RH. Revision of *Pittosporum* (*Pittosporaceae*) in Australia. *Aust Syst Bot.* 2000;13:845-902.

Acknowledgement: The contribution and assistance of Dale Chapman (Five Kungkas) is gratefully acknowledged



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Bioanalytical method development and validation of Aminophylline in rat plasma using RP-HPLC – An application to preclinical pharmacokinetics

D. Viswanath Guptha¹, Raghavendra Shetty², S G Vasantharaju*¹, ¹Dept. of Pharmaceutical Quality Assurance, Manipal College of Pharmaceutical Sciences, Manipal University, India, ²Bioanalytical wing, Ecron Acunova, K H Clinical Research center, Manipal, Karnataka, India.

Introduction. Aminophylline is a methylxanthine derivative belonging to the class bronchodilator. From the literature survey, reported methods reveals the solid phase extraction and liquid liquid extraction which is highly variable, time consuming, costly and laborious analysis.

Aims. To develop a simple, highly sensitive, precise and accurate high-performance liquid chromatography method for the quantification of Aminophylline in rat plasma samples.

Methods. Reverse Phase high-performance liquid chromatography method.

Results. Selectivity: Aminophylline and the internal standard were well separated from the co-eluted components and there was no interference from the endogenous material at the retention time of analyte and the internal standard. The LLOQ measurable with acceptable accuracy and precision for the analyte was 0.5 µg/mL.

Linearity: The developed and validated method is linear over the range of 0.5-40.0 µg/mL. The coefficient of determination was found to be greater than 0.9967, indicating the linearity of this method.

Accuracy and precision: The accuracy and precision values for intra and inter day studies at low, medium and high quality control samples concentrations of aminophylline in the plasma were within the acceptable limits

Extraction recovery: The method produced consistent extraction recovery at all 3 QC levels. The mean extraction recovery of aminophylline was 93.57 ± 1.28% while that of internal standard was 90.70 ± 1.30%. **Stability:** The results show that aminophylline is stable in rat plasma under the studied stability conditions and that it is also stable for about 30 days when stored at -80°C.

Pharmacokinetic studies: The method was successfully applied to the quantitative estimation of aminophylline rat plasma following its oral administration to rats.

Discussion. Preclinical studies require a rapid and sensitive method for estimating the drug concentration in the rat plasma. The method described in our article includes a simple protein precipitation extraction technique with ultraviolet detection for quantification. The present method is simple and robust for fast high-throughput sample analysis with less analysis cost for analyzing aminophylline in biological samples. In this proposed method, no interfering peaks were observed at the elution times of aminophylline and the internal standard. The method also had sufficient selectivity, specificity, precision and accuracy over the concentration range of 0.5 - 40.0 µg/mL. An isocratic separation technique was used underlining the simplicity of the presented method.

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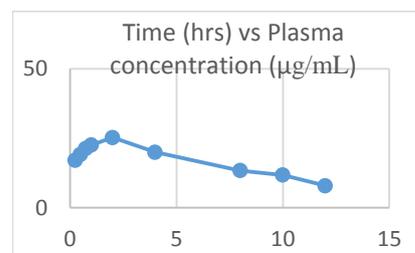


Figure 1:

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Gliclazide-Ciprofloxacin Interactions in Rats: Mechanism Study of P-glycoprotein Role Using Quinidine

Lucy Sasongko¹, Azalea A Djuli¹, Jeffry Adiwidjaja¹, Neng F Kurniati², Margaretha Leo¹, Yeyet C Sumirtapura¹ Pharmaceuticals¹, Pharmacology & Clinical Pharmacy² Research Group, School of Pharmacy, Institut Teknologi Bandung, INDONESIA.

Introduction. Patients type II Diabetes Mellitus along with complication of urinary tract infection are usually treated by a combination of gliclazide and ciprofloxacin. Our previous study showed that gliclazide caused inhibition of ciprofloxacin's elimination. It was assumed that the interaction involving *P-glycoprotein* (P-gp). **Aim.** To study the role of P-gp in the interaction between gliclazide and ciprofloxacin using quinidine, a widely accepted P-gp inhibitor. **Methods.** Rats were divided into 4 groups given gliclazide or ciprofloxacin, with or without quinidine. Plasma samples were analyzed by HPLC. **Results.** Quinidine caused a significant change ($p < 0.05$) in ciprofloxacin PK, a decrease in β (0.24 ± 0.03 to 0.07 ± 0.01 h⁻¹) and clearance (16.67 ± 3.89 to 9.44 ± 1.51 l/kg/h), respectively. In contrast, no significant impact of quinidine on gliclazide PK. **Discussion.** P-gp in kidney plays a role in drug efflux into the urine. A study in transfected cells showed uncertain results whether ciprofloxacin is a P-gp substrate. These findings showed that inhibition of P-gp caused a decrease in ciprofloxacin elimination. While this study did not show that gliclazide was a P-gp substrate, gliclazide inhibition on ciprofloxacin elimination suggested gliclazide as an inhibitor of P-gp and/or other transporter(s) that might involve in ciprofloxacin elimination.

Park MS et al (2011) Arch Drug Info 4:1–9



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Effect of storage on release from delayed release sodium diclofenac tablets

Dorothy J Saville School of Pharmacy, University of Otago, Dunedin, New Zealand

Introduction. Delayed release (enteric-coated) tablets of sodium diclofenac are intended to release drug only once in the small intestine. *In vitro* testing involves an acid first stage (representing the stomach) and then a buffer stage (pH 6.8 phosphate buffer). Storage at different temperature and humidity may lead to coating failure, either in the acid stage or in the buffer stage.

Aims. To determine whether storage conditions influence release from two brands of delayed release sodium diclofenac (50 mg) tablets.

Methods. Tablets from two brands were stored (unpacked) for 14 days at 5, 40 and 60°C and for 28 days at 25°C in 75% RH and 100% RH. Release from 3 tablets stored under each condition was monitored using the USP delayed release tablet testing procedure with extra samples taken during the buffer stage. Diclofenac content was determined by UV spectroscopy.

Results. No tablets (from either Brand in the different temperatures and humidities) showed coating rupture in the acid stage. In the buffer stage there were only small Brand differences found except when stored at 100% RH at 25°C. Usually tablets met USP requirements for release in the buffer stage (no less than 75% released in 45 minutes). However, one Brand released only an average of 8% diclofenac in 45 minutes after storage at 100% RH. The tablets swelled up but the coating did not rupture.

Discussion. This limited storage experiment was carried out as an undergraduate Elective project. Further study for different time periods should be determined and the mechanism, by which release from one Brand in pH 6.8 buffer has been much reduced by storage at high humidity, should be investigated.

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Effect of humidity on release from carbamazepine tablets

Dorothy J Saville, School of Pharmacy, University of Otago, Dunedin, New Zealand

Introduction. Dissolution of carbamazepine (CBZ) tablets has been reported to be reduced after exposure to moisture, thereby leading to clinical failure. This reduction in dissolution was linked with the conversion of CBZ to the dihydrate (lower solubility), together with significant reduction in available surface area for dissolution as fine CBZ particles were converted to CBZ DH whiskers. Subsequently, some CBZ tablets were packed in individual blisters to reduce the risk of exposure to moisture.

Aims. To determine whether exposure to humidity influences the dissolution rate of 200 mg CBZ tablets of one brand.

Methods. CBZ tablets were stored at 30°C for 25 days. Some were stored in original blister strips while others were removed from strips and exposed to 100% RH in airtight containers. Weight change at the end of the storage period was determined and dissolution in 1% sodium dodecyl sulphate medium according to the USP procedure was determined, with samples taken at 15, 30, 45 and 60 min. CBZ content was analysed by UV spectroscopy.

Results. The tablets stored exposed to moisture showed some increase in weight, due to moisture uptake, but no visible changes to the exposed tablets were noted. Dissolution of the exposed tablets was slightly reduced, compared to the controls, but this was not found to be statistically significant. All tablets met USP dissolution requirements.

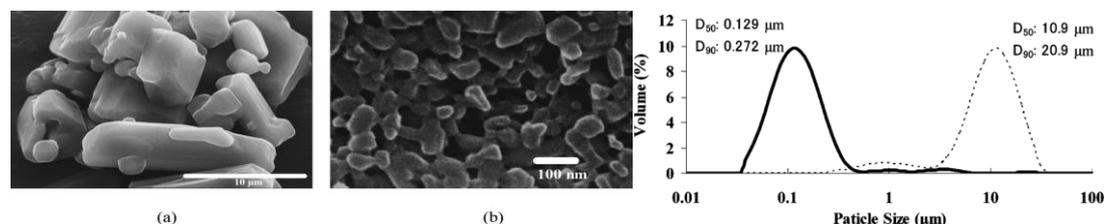
Discussion. This limited storage experiment (at 30°C) was carried out as an undergraduate Elective project. Further investigation at different temperatures could be undertaken. The resistance of the tested brand to dissolution changes resulting from humidity exposure at 30°C would suggest there is little risk of clinical failure of this brand of CBZ tablets stored outside their blister packs. However, testing of other brands should be undertaken.

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Nanosizing of Poorly Water Soluble Compounds Using Rotation/Revolution Mixer

Takayuki TAKATSUKA,^a Tomoko ENDO,^a Yao JIANGUO,^a Kayo YUMINOKI,^b and Naofumi HASHIMOTO*

^a Thinky Corporation; 3-21-5 Kandasamkuma-cho, Chiyoda-ku, Tokyo 101-0025, Japan; and ^b Setsunan University, 45-1, Nagatoge-cho, Hirakata, Osaka 573-0101, Japan.



In this study, nanoparticles of various poorly water soluble compounds were prepared by wet milling that was carried out using a rotation/revolution mixer and zirconia balls. To be compared with Beads mill, rotation/revolution mixer has superior in very quick process (5 min) and needs very few amounts of zirconia balls (2.4 g) for pulverizing drugs to nanometer range. Phenytoin, indomethacin, nifedipine, danazol, and naproxen were selected as the standard poorly water soluble compounds. Various parameters of the rotation/revolution mixer were studied to decide the optimal pulverization conditions for the production of nanoparticles of the abovementioned compounds. The rotation/revolution speed, shape of the mixing vessel, amount of zirconia balls, and volume of the vehicle (methylcellulose solution) mainly affected the pulverization of the compounds. Using the mixer, phenytoin could be pulverized to nanoparticles within a few minutes. The particle size was confirmed by using a scanning electron microscope and a particle size analyzer. The crystallinity of the pulverized phenytoin particles was confirmed by X-ray diffractometry (XRD) and differential scanning calorimetry (DSC). It was observed that the pulverized phenytoin particles retained their crystallinity, and amorphous phenytoin was not detected. Particles of other poorly water soluble compounds were also reduced to the nanometer range by using this method.

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Simulating the response of liposomes exposed to ultrasound using the finite element method (FEM)

Himang Mujoo¹ Paul Harris². Ian G Tucker¹. School of Pharmacy, University of Otago, Dunedin, New Zealand¹; Callaghan Innovation, Wellington, New Zealand².

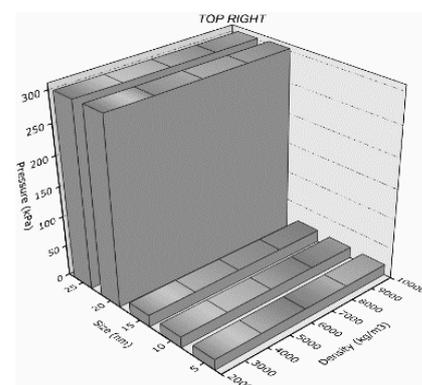
Introduction: Inclusion of particles in liposomes may increase the sensitivity of those liposomes to external triggers such as ultrasound (US) for drug delivery [1, 2]. Based on the linear elastic properties of the materials, FEM can simulate the behaviour of liposomes on exposure to US and so may be used for screening purposes.

Aims: To use 2-dimensional FEM to simulate the mechanical interactions between a single liposome containing a single particle and an US wave.

Methods: Simulations were performed on a laptop using PZFlex (Weidlinger Associates Inc, California USA). The interaction between a US cycle (1.1 MHz, 1.2 MPa) with a liposome (200 nm diameter) containing an encapsulated particle (density, diameter and position were varied) within a 300 × 300 nm water box was simulated.

Results: The closer the particle was to the liposome wall, the greater the pressure observed across the wall on exposure to US. Particle diameter had a greater influence than its density on this pressure (Fig).

Discussion: FEM is an *in silico* method to screen behaviours of delivery systems on exposure to triggers (e.g. US) which cause mechanical perturbations which may stimulate drug release. It predicts pressure of 300 kPa across the liposomal wall on exposure to US and when a particle is located near the wall. Such pressure may lead to drug release from the liposome since pressures >100 kPa, have been shown, *in vitro* to rupture lipid bilayers [3-5].



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Unlocking mechanisms implicated in drug-induced bizarre idiosyncratic behaviours: Learning from people and molecules

Carmen K. Wong¹, Bandana Saini¹, Romano A. Fois¹, Samuel S. Ho¹, Jane R. Hanrahan¹, Mary Chebib¹, David E. Hibbs¹. Faculty of Pharmacy, Univ of Sydney¹, Sydney, NSW

Introduction. Zolpidem, an imidazopyridine hypnotic, which acts on GABA-A receptors has been associated with the development of a number of disturbing neuropsychiatric adverse drug reactions (ADRs) including parasomnias, amnesia and hallucinations. Although other non-hypnotic medications are also implicated in the induction of such adverse events; the mechanism behind these ADRs remains elusive and have been postulated to arise from off-target receptor or pathway activation. Such off-target promiscuous receptor or pathway activation may arise from structural similarities collectively shared amongst agents associated with these ADRs.

Aims. Using a novel multidisciplinary approach, we aim to investigate relationships between these rare idiosyncratic ADRs (parasomnia, movement-based parasomnia, non-movement based parasomnia, amnesia and hallucination) by identifying similarities in the chemical structure amongst drugs that share these reactions.

Methods. Retrospective disproportionality analysis of pharmacovigilance data obtained from the Food and Drug Administration Adverse Event Reporting System (FAERS) revealed drug-event associations (DEAs) for drugs associated with the following ADRs; amnesia, hallucination, parasomnia, movement-related parasomnia and non-movement related parasomnia. Drugs identified subsequently served as probe molecules in an *in silico* pharmacophore determination using Schrodinger's Phase program to elucidate possible structural similarities.

Results. Pharmacophore hypotheses generated were shared among large proportions of the investigated active drug structures that possess DEA signals for amnesia, hallucinations and parasomnias. In particular, a 5-point pharmacophore hypothesis comprising of two hydrogen acceptors, one hydrophobic group, one positive group and one aromatic ring was returned for drugs associated with movement-based parasomnias.

Discussion. These shared structural features or motifs may enable diverse drugs to participate in a pharmacological reaction with a mutual target receptor or pathway. By combining human population pharmacovigilance data with *in silico* computational techniques, insights into mechanisms underlying idiosyncratic reactions or toxicities can be elucidated.

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South Asian ancestry: Implications for global drug development

Rebecca Y Wong¹, Carwyn Davies², Annette S Gross², Faculty of Pharmacy, The University of Sydney¹, Sydney, NSW; Clinical Pharmacology Modelling and Simulation, GlaxoSmithKline R&D², Sydney, NSW.

Introduction. The population of South Asia is ethnically diverse and contains a populace that lives in different environments with unique cultures and genetic profiles. Consequently, extrinsic and intrinsic factors which could influence drug response, and therefore the results of global clinical studies, differ between the populations in South Asia and the West. At present, information on the profile of these factors in clinical trial participants of South Asian ancestry relative to subjects of European ancestry is limited.

Aim. To investigate and compare demographic factors between clinical trial participants of South Asian ancestry in South Asia and European ancestry in the West.

Methods. Key demographic data were extracted for South Asians (N=2961) and Europeans (N=25221) with non-communicable diseases (NCD) from 24 GSK clinical studies, and for South Asian (N=173) and European (N=162) healthy subjects from 13 Phase 1 studies. Glomerular filtration rate (eGFR, mL/min/1.73m²) was estimated in an NCD subgroup (South Asian: n=1842, European: n=9360) using the body surface area-normalised Cockcroft-Gault (BSA-CG), MDRD, CKD-EPI and either one of two South Asian-specific equations [1, 2]. Male NCD, female NCD and healthy subjects were evaluated separately and the eGFR and demographic data were reported as mean (SD).

Results. Body weight (65.8(13.0) vs. 88.5(17.4) kg), height (165(7) vs. 174(7) cm) and body mass index (24.1(4.3) vs. 29.3(5.2) kg/m²) were lower in South Asian than European males with NCD. The eGFR was higher in South Asian than European males with NCD (BSA-CG: 79.4(23.3) vs. 75.8(20.4); MDRD: 80.3(22.1) vs. 71.1(15.9); CKD-EPI: 83.0(19.5) vs. 73.4(16.5)). South Asian-specific equations showed higher (Srinivas: 88.5(5.7)) and lower (Jessani: 74.1(18.3)) eGFR for South Asian males with NCD in comparison to the three other equations. Similar trends were observed for the South Asian vs. European female subjects with NCD and in the healthy subjects.

Discussion. Clinical trial participants of South Asian and European ancestry have exhibited differences in demographics and eGFR which could influence disease severity classification and clinical trial eligibility. Therefore, subjects of South Asian ancestry should be considered as a distinct population in drug development programs.

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A review of the effects of central nervous system active drugs on sleep spindles and sleep-related memory consolidation

Bandana Saini^{1,2}, Celeste WY Leong¹, Helena Cheung¹ & Angela L D'Rozario^{2,3}. Fac of Pharmacy, Univ of Sydney¹, Sydney, NSW; CIRUS Centre for Sleep and Chronobiology, Woolcock Inst of Med Res, Univ of Sydney², Sydney, NSW; School of Psych, Fac of Science, Brain and Mind Centre and Charles Perkins Centre, Univ of Sydney³, Sydney, NSW.

Introduction. Sleep spindles are oscillatory events that are observed in an electroencephalogram during non-rapid eye movement sleep with a characteristic frequency of 9-15Hz. Spindles have a key role in memory processing. Spindle deficits are associated with memory impairment and it is known that some drugs can enhance or dampen spindle formation, and therefore, these drugs may indirectly affect memory processing.

Aims. This review aimed to integrate studies that provide insight into the feasibility of manipulating sleep spindles and sleep-related memory using psychoactive drug classes. The important drug classes of interest focused on in this review included 1) hypnotic and sedatives, 2) antipsychotics and 3) antiepileptic drugs.

Methods. Given the heterogeneity of the research designs involved in this area of research, the review employed a scoping method. Searches were conducted using keywords and MeSH terms in Pubmed, Medline, Embase, Scopus and the Web of Science databases, which were screened up till the 7th of April 2016. Data extraction, tabulation and review of studies by a panel of experts followed the search.

Results. The search yielded 951 articles, however, only 24 articles were finally reviewed following stringent inclusion and exclusion criteria. Standardised methodological approaches in spindle activity quantification were not evident in the literature. In this review, zolpidem had the most therapeutic potential with preliminary evidence (n=2 studies) showing the feasibility of enhancing declarative memory through boosting sleep spindle activity. Most benzodiazepines and other Z-drugs may also enhance sleep spindle activity unlike other drug classes reviewed. However, how these spindle enhancements translate into improved sleep-dependent memory remains unclear.

Discussion. Standardised methods of spindle characterisation and robust controlled trials are needed to confirm the memory improvement potential of pharmacological agents, however preliminary data shows promise.

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Pharmacy Perspectives of pharmacy students, pharmacy academics and practicing pharmacists on interprofessional education and collaborative practice: a comprehensive systematic review

Alla El-Awaisi^{1,2}, Lesley Diack², Sundari Joseph², Maguy El-Hajj¹. ¹Qatar University, Doha, Qatar. ²Robert Gordon University, Aberdeen, UK².

Introduction. Healthcare is provided by a large number of different healthcare professionals including pharmacists who are key element in the collaborative working process. Although pharmacists are an integral member of the healthcare team, yet their perspective towards interprofessional education and collaborative practice is largely unknown.

Aims. The aim of this systematic review is to examine the perspectives, attitudes, views and experiences of pharmacy students, pharmacy academics and practicing pharmacists towards interprofessional education and collaborative practice through quantitative and qualitative evidence.

Methods. Systematic review. Four electronic databases were searched for articles published in English between 2000 – 2015.

Results. Twenty-nine articles were identified meeting the inclusion/exclusion criteria from the first initial search of 8512 articles.

Discussion. Overall, the findings suggest that pharmacy students, practicing pharmacists and faculty valued interprofessional education and collaborative practice and had positive attitudes towards it. Four themes have been identified from this review: inconsistency in reporting IPE research, professional image of the pharmacist, lack of longitudinal follow-up and lack of interprofessional educational research on faculty. These findings will provide an opportunity to stakeholders and policy makers to develop and implement IPE activities that are meaningful, comprehensive and unique. Sustained effort are required not just in undergraduate curricula but also in healthcare settings to improve and promote an interprofessional culture at individual and organisational level.



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Perceptions of Pre-Diabetic, Obese and Overweight Patients on Complementary Medicine, Dietary Supplements to Promote Weight Loss: Results from a Phone Survey

Misha S. Kaura, BA (Hons)¹. The Boden Institute of Obesity, Nutrition, Exercise, and Eating Disorders, Charles Perkins Centre, University of Sydney¹, Sydney, NSW.

Introduction. Dietary supplements remain an area fraught with controversy, particularly amongst their largest consumer set: obese and overweight patient populations.

Aims. Determine the perceptions of complementary medicine, dietary supplements that promote weight loss by pre-diabetic, obese and overweight patients.

Methods. A swath of 127 pre-diabetic patients that were recruited to a nationally administered clinical trial on complementary medicine were interviewed with a survey via telephone. The survey featured items requesting information about the referral pathway into the clinical trial, as well as their individual perceptions on dietary supplements that promote weight loss. Respondents were asked to rate their perceptions about the weight loss trial using a Likert Scale, and all results were then quantified via SAS.

Results. Statistically significant results were found with the overwhelming majority of patients approving of the use of dietary supplements more than other, more invasive appetite suppressant medications and bariatric surgery techniques.

Discussion. Given the high cost of prescription-only weight loss medication and the high risks associated with bariatric surgery, it is not surprising that patients prefer natural and complementary medicine alternatives. The findings from this study are directly applicable to further work in academia, in pharmaceuticals, and in the complementary medicine industry, in that the consumers of weight loss programs and supplements have indicated that they strongly prefer natural and herbal remedies over alternatives such as surgery or prescription medication. Further research could investigate whether there are demographic factors that influence the finding, and expand the study to a greater geographic range for further investigation.



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Pharmacist Tutors: Development and delivery of a training program

Gillian J Knott¹, Linda Crane², Ian M Heslop¹, Beverley D Glass¹. Pharmacy, James Cook University¹, Townsville, QLD; Faculty of Health Sciences and Medicine, Bond University², Gold Coast, QLD.

Introduction. Pharmacist tutors have increasingly been involved in teaching into pharmacy programs at universities, playing a pivotal role in bridging the gap between theory and practice. However, the training and support of these staff, referred to in pharmacy as tutors, has often been neglected.

Aims. To develop and deliver a training program for pharmacist tutors involved in pharmacy student education at James Cook University (JCU).

Methods. In the development of the tutor training program, consideration was given to the results of a study conducted by Pharmacy at JCU which investigated the training needs of pharmacist tutors, but also took into account the opinions of students and academic staff. In addition, the general university policy requirements for sessional staff as well as JCU specific requirements were considered.

Results. The resulting training program, which combined the general JCU sessional staff induction with a pharmacy specific program, consisted of a face-to-face session, which was supplemented by a tutor information manual and an online tutor community support website. In addition to the general induction conducted by the JCU Department of Teaching and Learning Development, the pharmacy specific component included an overview of the JCU Pharmacy program, followed by an outline of the specific areas for tutor involvement, which included extemporaneous dispensing, clinical dispensing and clinical counselling. An activity on the topic of assessment and marking was also included as this has been highlighted as a problem area for tutors. To conclude, tutors were provided with information regarding sessional staff facilities and support. Opportunities for social interaction with other tutors and staff were provided during the course of the program to encourage integration of tutors into the teaching team.

Discussion. This pharmacy specific tutor training program has been developed to address the training and support needs of new and existing pharmacist tutors, with the ultimate aim of optimising student education. It is anticipated that feedback from this program may assist in further improving and refining future tutor training programs for the benefit of the students and the profession of pharmacy.

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Public perceptions on dikir farmasi: A qualitative exploratory study

Kah Seng Lee¹, Salmah Bahri¹, Shahrzad Salmasi², Muthu Kumar Murugiah¹, Mohammad A Adenan¹, Tahir M Khan², Chin Fen Neoh³, Long Chiau Ming⁴. Pharmaceutical Services Division, Ministry of Health, Selangor, Malaysia¹; School of Pharmacy, Monash University Malaysia, Selangor, Malaysia²; Faculty of Pharmacy, Universiti Teknologi MARA, Selangor, Malaysia³; Pharmacy, School of Medicine, University of Tasmania, Hobart, TAS, Australia⁴

Introduction. Dikir Farmasi (DF) is an edutainment programme that combines the elements of dikir barat (a type of traditional folk song rhythm) and traditional sketches which are popular in the state of Kelantan, Malaysia.

Aims. We aimed to seek the opinion of the general public regarding the quality and impact of DF as a health promotion tool in Malaysia and compiled their thoughts and suggestions to identify areas in need of improvement so that this health promotion tool can be used to its full potential in the future.

Methods. Data was collected through semi-structured interviews with the general public as individuals (face-to-face) and in focus groups. Participants were divided into three focus groups based on their age: two focus groups of adults and one focus group of high school students. Interviews were conducted with each focus group and then with each of the individual participants. Interviews were conducted in the Malay language. Each interview lasted approximately 40-60 minutes. Ethical approval was obtained from Ministry of Health Malaysia. All respondents provided a written consent for participation. After analysis, the codes were sorted into categories, which were then grouped into themes. Thematic content analysis was performed on the data.

Results. The themes identified from the interviews were: 1) The dialectal and linguistic terms used in DF; 2) The content of DF; 3) The audiovisual features of DF; 4) The stumbling block of DF; and 5) Weaknesses and recommendations of DF.

Discussion. The respondents are optimistic about the feasibility of DF to be utilized in the future. The study identified both positive and negative views on DF. Certain weaknesses of DF have been raised and the health authorities could utilize this information for an improvement; significant effort must be made to improve the publicity and dissemination of DF to ensure that it reaches the target population, so it is used to its optimum potential.



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Folk songs for health education: Implementation and qualitative evaluation

Kah Seng Lee¹, Salmah Bahri¹, Muthu Kumar Murugiah¹, Mohammad A Adenan¹, Tahir M Khan², Muhammad A Mohammad Nasir¹, Long Chiau Ming³. Pharmaceutical Services Division, Ministry of Health, Selangor, Malaysia¹; School of Pharmacy, Monash University Malaysia, Selangor, Malaysia²; Pharmacy, School of Medicine, University of Tasmania, Hobart, TAS, Australia³

Introduction. Dikir Farmasi is a new edutainment effort to expand and intensify the dissemination of information about the regulation of legitimate use of drugs and cosmetics. The Dikir Farmasi initiative may offer a useful template on health promotion using folk song that needs to be explored consistently in other cultures worldwide. No documented literature has been reported about the conduct and organization of this public educational campaign.

Aims. We conducted this qualitative study to explore the opinions of Pharmacy Enforcement Division staff on Dikir Farmasi program. The outcome of this study, for the first time, will reveal the perspectives of the organisers of a large scale health campaign. The study will provide an in-depth understanding of the organisers' attitudes and behaviours with regards to public health campaigns in general and Dikir Farmasi in particular.

Methods. A qualitative study using semi-structured interviews, which were audio recorded, transcribed. Thematic analysis was performed to identify the themes and sub-themes from the transcripts of the interviews.

Results. In total nine pharmacy officers from Kelantan Pharmacy Enforcement Division participated in semi-structured interviews. According to the officers, Dikir Farmasi-related activities are time-consuming and disrupt their core duties. Despite Dikir Farmasi being the innovation of the Kelantan Pharmacy Enforcement Division, the officers lacked appreciation towards the contents of Dikir Farmasi. They did not display great interest and enthusiasm in implementing Dikir Farmasi program. The officers also discussed the shortcomings of Dikir Farmasi, namely the language barrier, the entertainment elements distracting the audience from obtaining the actual messages of Dikir Farmasi, the lack of awareness about Dikir Farmasi despite its presence for years, and the lack of research that reviews the impact and cost-effectiveness of Dikir Farmasi.

Discussion. Generally, the pharmacy officers were not very optimistic towards using edutainment to disseminate health information. The shortcomings of Dikir Farmasi have been identified from the interviews and efforts should be made to tackle them and improve Dikir Farmasi.

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Teaching approaches in Pharmacy courses: an observational study.

Elia Barajas Alonso¹, Esther TL Lau¹, Lisa M Nissen¹, Michelle Mukherjee² and Jose Manuel Serrano Santos¹, 1 School of Clinical Sciences, Faculty of Health, Queensland University of Technology, Brisbane, QLD, Australia, 2 School of Curriculum, Faculty of Education, Queensland University of Technology, Brisbane, QLD, Australia.

Introduction. Universities across the world have shifted their teaching approaches in Health tertiary education in response to health professions having even a stronger focus on patient-centred care. This change demands higher order attributes for our graduates. In pharmacy curriculum, the trends have moved towards programs that embed integrated learning in a collaborative student-led environments within a framework of professional competences. This contemporary environment is mostly supported by pedagogical principles of Connectivism and Social Constructivism in contrast to the Behaviourism, Cognitivism and Humanism that was predominant in more traditional programs. However, the implementation of an effective transition towards contemporary curricula has not been explored, and it requires a through assessment of the pedagogical principles supporting the delivery of teaching activities in traditional and contemporary programs. This investigation may provide those academics involved in curriculum design with a "roadmap" that facilitates that transition into contemporary courses.

Aim. To describe the teaching approaches utilised by pharmacy academics in a traditional and a contemporary pharmacy curriculum.

Methods. A mixed methods cross-sectional design was used for the generation of data. Academics from the Discipline of Pharmacy in the School of Clinical Sciences were invited to participate in an observational study to identify the teaching approaches used during their teaching activities. A checklist with the five most common pedagogical theories was used to generate the quantitative data, and field notes were taken for the qualitative data.

Results. The results of this study will identify the pedagogical theories that support traditional and contemporary pharmacy curricula.

Discussion. The study can help providing a starting point for current and future analysis of pharmacy undergraduate education. In addition, it can help the pharmacy curricula to better meet the needs demands of the pharmacy profession. This research can also be useful for other Health disciplines in the transition to contemporary curricula.



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Development of integrated modules within the revised BPharm curriculum at the University of Auckland: Dermatology as an example.

John Shaw, Rhys Ponton, Manisha Sharma, Janie Sheridan. School of Pharmacy, University of Auckland, Auckland, NZ.

Introduction. One of the goals of the recent review of the Auckland BPharm curriculum was to achieve a high degree of integration of subject content and assessment. This has been achieved by replacing individual courses in, for example, pharmacology, medicinal chemistry and pharmacotherapeutics, with 'integrated' systems- or population-based modules, for example, Dermatology, Oncology, and Care of the Elderly.

Aims. The development and implementation of the integrated module Dermatology is described.

Methods. The Dermatology module is the first integrated module that students encounter in the revised BPharm curriculum. It is one of five modules that comprise the 60-point, Semester 2 course PHARMACY 213. It was chosen as it provides a good model for integration featuring an emphasis on applied pharmaceutical sciences as well as clinical considerations. Students are on day-release experiential learning placements during this semester, so it also provides early context to their learning, especially in community pharmacy settings. During the four weeks of the module, students are provided with multidisciplinary lectures and workshops that cover all aspects of skin conditions and their treatment. Much of the work is case-based and students present their care-plans to experts, in this case a consultant dermatologist. Horizontal integration with Clinical and Professional Skills occurs with relevant activities, for example, dispensing dermatology medicines, or providing dermatology primary health care.

Results. The Dermatology module was offered for the first time in Semester 2, 2016. There was a two-hour Exit Test comprising multiple-choice and short-answer questions. The mean mark for the Exit Test was 79%. The module was evaluated using the standard University student evaluation tool and the response to the statement 'Overall, I am satisfied with the quality of this module' was 100% Agree + Strongly Agree.

Discussion. The first offering of an integrated module within the revised BPharm curriculum was successful in terms of student achievement and evaluation. A number of templates and processes which are applicable to future modules have been developed, and valuable lessons on how to operate this model of learning have been obtained.

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Does admission performance from a Health Science programme predict performance as a pharmacy student?

James M Windle¹, Rachel A Spronken-Smith², Jeffrey K Smith³, Ian G Tucker¹. School of Pharmacy, Univ of Otago¹, Dunedin, Graduate Research School, Univ of Otago², Dunedin, College of Education, Univ of Otago³, Dunedin.

Introduction. The School of Pharmacy at the University of Otago mainly selects candidates to enter the second year of the BPharm programme on the basis of their academic performance in a prescriptive Health Sciences First Year (HSFY). UMAT and interviews are not used. This paper reports on the relationship between academic performance in the HSFY and academic performance in each of the three subsequent years of the BPharm programme.

Aims. The primary aim of this study was to investigate associations between academic performance in the prescribed HSFY (year 1) and academic performance in years 2, 3 and 4 of the University of Otago BPharm programme. A secondary aim was to determine whether demographic characteristics of students were predictors of academic performance in the years of the BPharm programme.

Methods. A retrospective longitudinal dataset was created containing the academic records of 548 students admitted into the second year of the BPharm in the years 2008-2012 based on their performance in the HSFY. Multivariate linear regression models were used to investigate relationships between grade weighted averages from years 2, 3 and 4, with the following covariates: HSFY average, sex, age, ethnicity, citizenship and high school qualification. Significance was reported at $p < 0.05\%$. The study was approved by the University of Otago Ethics Committee.

Results. This study found low student attrition rates (3.4%) and high on-time completion rates (91.9%). Regression models all showed significance for predicting year 2, year 3 and year 4 grade weighted averages with 56%, 42% and 37% of the variance in grade weighted averages respectively being accounted for by the predictor variables. HSFY admission grades, sex, ethnic status and high school qualification were significant predictor variables within each model. Age group and citizenship status did not contribute significantly to any of the models.

Discussion. Admission entry grade from HSFY was a predictor for year 2, 3 and 4 academic performance however achievement throughout the BPharm programme was not uniform across sex, ethnicities or high school qualification. Support measures for groups identified at particular stages of the programme can be considered.