100 The pedagogical and technological future of learning

Prof George Siemens, University of South Australia

The venerable university is facing unprecedented pressure, driven by social, technological, and economic changes. For educators, questions arise regarding how teaching practices will be impacted. For administrators, the focus is on “future-proofing” institutions to respond to greater calls for accountability and transparency, while simultaneously confronting growing corporatization of management functions. For society as a whole, the very purpose of universities is undergoing existential questioning. More practically, how do universities respond to the fastest growing segment of the learning population: adult learners who are re-skilling? What can realistically be expected from artificial intelligence in classrooms over the next decade?

This presentation will explore the constellation of changes impacting teaching and learning globally and how universities are responding: competency based learning, online learning, learning analytics, personalized learning, alternative credentials, and work integrated learning. The focus will then turn to what is needed in order to assess and evaluate the impact of these initiatives on core university activities such as the pedagogical models and technological infrastructure that will shape the future of learning and knowledge growth.

101 Medicinal cannabis: current controversies and future therapeutic potential

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A legal framework to allow access to, and manufacture of, medicinal cannabis (MC) products was introduced into Australia in early 2016. Access is relatively complex and tightly restricted with only a relatively small number of patients (< 2000) being granted MC through the schemes overseen by the TGA. It is estimated, however, that more than 100,000 Australians continue to use illicit cannabis to self-medicate a range of conditions, most prominently back pain, insomnia, anxiety, depression, arthritis, PTSD and epilepsy. A vigorous debate continues around the evidence for efficacy of MC in many conditions with some specialist colleges expressing scepticism regarding efficacy and concern around potential adverse effects relating to mental health and addiction. In the meantime, many Australians become entangled in the criminal justice system due to their use of illicit products, and patients are compelled to use artisanal oils, tinctures and plant material of unknown composition.

Access could most likely be improved if Australian GPs were educated in the MC field and empowered to prescribe: a majority of GPs are in favour of this.

Simultaneously, the scientific investigation of cannabis and the cannabinoids has become one of the most exciting frontiers in pharmacology and drug discovery. More than 140 cannabinoids have been identified within the cannabis plant, many with strong therapeutic potential, and most that do not intoxicate. These phytocannabinoids engage a wide range of receptor and enzyme targets within the endocannabinoid system of the brain and body including targets relevant to the pathophysiology of chronic pain, cancer, neurodegenerative diseases and epilepsy. The Lambert Initiative at the University of Sydney is undertaking an ambitious program of drug discovery around phytocannabinoids and their targets that features medicinal chemistry, cellular and in silico screening, and the use of animal models of disease. This talk will describe our drug discovery program and early stage human trials aimed at unlocking the therapeutic potential of novel cannabinoids to alleviate suffering and promote good health.

102 Pharmacy in the community – how are New Zealand pharmacists extending their patient-facing roles?

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Introduction. Internationally, there are changes in pharmacy models of care, services and funding, aimed at better utilising the highly skilled pharmacist workforce. This trend is also reflected in New Zealand (NZ) where national strategies and local initiatives support the development of community pharmacist (CP) roles and services. These have the potential to improve health outcomes and reduce health disparities at both individual and population levels.

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

Methods. All NZ pharmacists and intern pharmacists working in a community or primary health care setting were invited to take part in an online survey in Feb-Mar 2018. Questions included demographic background, current roles, work location, services currently provided by the participant or other staff in the pharmacy, interest in providing additional services in future, and potential barriers and facilitators for extended service provision.

Results. Responses were received from 553 CPs. Most were currently accredited to supply the emergency contraception pill (95%), trimethoprim (85%) and sildenafil (86%), but fewer could currently immunise (34%), undertake a formal Medicines Use Review (23%) or provide the national community pharmacy anticoagulant monitoring service (23%). Pharmacies also provided a wide range of screening and health promotion services, most commonly blood pressure measurement (81%) and smoking cessation counselling (74%). We consider pharmacist and pharmacy attributes (such as level of experience or staffing configuration) that are associated with offering extended pharmacy services.

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

103 Impact of a co-produced e-learning intervention on medication review provision to medically under-served groups

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Introduction. There is a clear need to improve engagement and address health disparities among traditionally medically under-served (marginalised) patient groups (e.g. people with disabilities; from Black, Asian, and Minority Ethnic backgrounds; the homeless; people with mental illness). We use one national English community pharmacy service ‘Medicine Use Reviews’ (MURs), to investigate how effective a co-produced e-learning educational intervention can be at improving medication review provision to medically under-served groups.

Aims. To assess the impact of the co-produced educational intervention on professional behaviour change intention and on reported actual practice change (numbers of MURs offered to medically under-served groups).

Methods. The e-learning intervention was developed through semi-structured interviews and workshops with patients from medically under-served groups and pharmacy professionals. Once produced, community pharmacy staff were invited to complete before and after (3 months) self-completion online questionnaires to assess behaviour change intention (using a validated 12-item measure) and record recruitment of under-served groups to the MUR service.

Results. Of the 237 pharmacies approached in the Nottinghamshire area, 149 participants from 122 pharmacies completed the baseline questionnaire. Ninety six participants from 80 pharmacies completed the follow-up of which two-thirds reported completing the e-learning intervention. When assessing behaviour change intention, out of 5 constructs (intension, social influence, beliefs about capabilities, moral norms, beliefs about consequences) there was a general increased trend in each measure. One construct (beliefs about capabilities) reached statistical significance (p = 0.009). However, there was no significant change in the number of under-served patients receiving MURs.

Discussion. The study showed behaviour change intention is possible, however, transformation of intention into action was not detected. This may have been due to practice barriers (e.g. work-based restrictions) and methodological reasons (e.g. difficulties identifying patients who are medically under-served). The implications for educationalist, organisations and policy makers include addressing the barriers to patient engagement so that pharmacy professionals can make positive changes to their practice and contribute towards a more equitable healthcare service for all.
104  How do pharmacists contribute to the compassionate budget? An investigation of unfunded pharmacy services

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Introduction. To complete and fulfil the healthcare needs of the community there is anecdotal evidence of pharmacists providing free or partially subsidised clinical services. Limited information exists identifying the types of unfunded services provided in community pharmacies.

Aims. To characterise the types of services which pharmacists are providing that are not reimbursed by the government or the patient.

Methods. Semi-structured focus group discussions were conducted stimulating narratives from community pharmacists in New Zealand about the types of services they provide for which no remuneration is received from the government or the patient. Discussions were transcribed verbatim. Recurring patterns and regional differences in unfunded services were identified. Descriptive coding of the data was carried out using QSR International Nvivo 11 for Windows.

Results. Twenty-four pharmacists, in six groups, were interviewed across five regions in New Zealand. Key themes identified were: unfunded services (standalone services), partially funded services and leakages from the current funding model. The provision of unfunded services accounted for 15%-50% of the daily activities of some pharmacists. Pharmacists stated that these services often led to reduction of disease progression, hospitalisations and improved quality of life.

Discussion. It appears that pharmacists offer many professional services without adequate remuneration. In some cases, these services make up a substantial part of the pharmacist’s time. A reduction in pharmacy income from other sources may put these services at risk.

105  An investigation of the provision of Home Medicines Reviews (HMR) and Residential Medication Management Reviews (RMMRs) in Western Australia

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Introduction. In Australia, Government funding for Residential Medication Management Reviews (RMMRs) and Home Medicines Reviews (HMRs) commenced in 1997 and 2001 respectively. The extent of provision of these services in Western Australia (WA) is unknown. Aims. To explore the provision of HMR and RMMR services in WA. Methods. A questionnaire was sent to 198 accredited pharmacists in WA in June 2017. Results. Of the 198 questionnaires, 102 (51.5%) were returned. Of these, 35 (34.3%) were male and 67 (65.7%) were female, with many aged between 31-40 years (53; 52.0%). The majority completed their initial accredited pharmacist training with the Australian Association of Consultant Pharmacy (101; 99.0%) and most only offered HMR services (70; 68.6%). Most planned to remain accredited until December 2018 (99; 97.1%). The number of HMRs provided over the previous 12 months ranged from none to more than 101 with one quarter providing either 1-10 (27; 26.5%) or 21-50 (28; 27.5%) reviews. Most conducted the HMR interview themselves (83/102; 81.4%) and most (84/94; 89.4%) reported that they sometimes conducted the interview in a place other than the patient’s home for reasons such as safety and cultural issues associated with interviewing Aboriginal patients and Aboriginals living in crowded houses. Interview duration ranged between 45 - 280 minutes (mean 97 minutes; median 90 minutes) and the duration of report writing ranged between 8 - 800 minutes (mean 163 minutes; median 120 minutes). One third (36/101; 35.6%) agreed that for HMRs, and 13/95 (13.7%) for RMMRs, that the current payment was appropriate. Most agreed that their HMRs (92/96; 95.8%) and RMMRs (26/28; 92.9%) lead to improved patient outcomes. Discussion. Most accredited pharmacists only offer HMRs, some of which were not conducted in the patient’s home. There were wide variations in the time taken for interviews and report writing, which may account for most respondents considering that remuneration is inadequate. Accredited pharmacists strongly perceived their medication reviews contributed to improved patient outcomes.
106 The role of Pharmacist-led Medication Reviews as a tool to achieve optimal chronic pain management

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Introduction. Chronic pain is a complex health burden affecting approximately 25% of the population. It is common practice for chronic pain to be managed with numerous concurrent analgesics, although these regimes are not always optimised. High rates of drug related problems (DRPs) have been associated with commonly prescribed analgesics such as opioids. Pharmacist-led medication reviews specialising in pain management can be used as a preventative measure to minimise DRPs and optimise management strategies.

Aim. To investigate the rate and quality of pharmacists’ recommendations regarding pain management during Home Medication Reviews (HMRs).

Methods. A dataset of 579 consecutive HMR reports were reviewed and grouped according to the presence of pain management recommendations; the type of recommendation was thematically characterized.

Results. This study found that pharmacists provided 783 comments regarding pain in HMR reports for 385 patients; most of these patients (91%) were taking analgesics with 44% of these patients (154/352) taking opioid medications. The most common pharmacist-led pain recommendation was an increased dose of analgesic medication (22%) and the least common recommendation was dose timing alterations (0.3%; see figure). Additionally, it was found that 67 general remarks about pain were given without a recommendation for further management. Interestingly, a further 136 patients that were taking analgesic medicines did not have any pain management comments in their report.

Discussion. The frequency of medication related comments provided in HMR reports suggests that pharmacists are utilizing their clinical skills and scope of practice to address pain management. Some results suggest suboptimal use of HMRs as a tool in achieving optimal chronic pain management with 28% of patients using pain medications but not receiving pharmacist-led recommendations. An extension of this study could investigate strategies to increase utilization of HMRs to address chronic pain and encourage pharmacists to become more involved in chronic pain management.

107 Implementation of the Goal-directed Medication review Electronic Decision Support System (GMEDSS) into Home Medicines Review (HMR) to deprescribe medications in older adults

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Introduction. People with dementia living in the community are prescribed more medicines compared to people without dementia, and may be vulnerable to adverse effects (e.g. confusion) from high-risk medicines (e.g. anticholinergics and sedatives, as measured using Drug Burden Index (DBI)). Computerised Clinical Decision Support Systems (CCDSS) have demonstrated effectiveness in improving appropriate prescribing in older adults. HMR is a government-funded pharmacist-led medicines review service that aims to increase patient benefits from medicines.

Aim. To describe the preliminary baseline data on participants characteristics and DBI from a cluster-RCT of a CCDSS in HMRs to reduce the proportion of patients (with and without dementia) who are exposed to DBI medicines.

Methods. This study is a two-arm, parallel group, cluster-RCT, clustered at the level of accredited pharmacists. The GMEDSS is a CCDSS that incorporates validated deprescribing tools and guides (e.g. DBI, Patient Attitudes Towards Deprescribing questionnaires, and Goals of Care) applicable to patients with and without dementia and their carers. Accredited Pharmacists (AP) were randomised into the intervention (HMR + GMEDSS) or control (HMR only) groups. APs collected data (e.g. medication profile) from up to 10 of their HMR patients at baseline (during HMR interview) and at 3-months follow-up.

Results. To date, 53 APs have been enrolled in the study, recruiting 179 patients. Preliminary analysis of baseline data (n=161): Mean age (±SD) of all patients was 77.7±7.4 years and 86% of patients were female. Proportion of patients with DBI>0 was 64.2% and 80.0% in the control and intervention groups, respectively. Median DBI (IQR) for the control group (n=81) is 0.5(0-1) and intervention group (n=80) is 0.78 (0-0.90).

Discussion. This preliminary baseline data will form part of an analysis of whether addition of the GMEDSS intervention into HMR will reduce anticholinergic and sedative medication exposure.

2018 APSA Annual Conference: Book of Oral Abstracts
108  A systematic review of healthcare professionals’ knowledge, attitudes and confidence in relation to suicide

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Introduction. Suicide is a leading cause of death among adolescents and young adults, globally. Up to 45% of people who die by suicide saw a healthcare professional (HCP) in the previous month (Luoma et al. 2002). Pharmacists frequently encounter people at risk of suicide due to roles in medication supply and access (Murphy et al. 2018).

Aims. To explore HCPs’ knowledge of, attitudes towards, and confidence in caring for people at risk of suicide.

Methods. A systematic search of PubMed, Medline, Embase and PsycINFO for four concepts and their related terms (HCPs, knowledge and attitudes, suicide and confidence with care) was conducted up to April 2016. English primary research publications exploring HCPs’ attitudes, confidence and knowledge in relation to suicide were included. Publications exploring non-suicidal self-injury, assisted suicide, patients’ attitudes and knowledge or suicide among HCPs were excluded.

Results. The search initially yielded 1723 publications. Titles, abstracts and full-texts were screened leaving 48 publications eligible for inclusion, of which 29 were cross-sectional and 19 were intervention studies. Most studies were conducted in the US (n=11) or Japan (n=6) and explored nurse’s (n=30) and non-psychiatrist physicians’ (n=20) knowledge, attitudes and/or confidence. No studies explored these constructs among pharmacists. Studies exploring suicide education and training programs illustrated improvements in knowledge, confidence and attitudes, yet, the sustainability of improvements was unclear. HCPs’ attitudes were affected by their religious, social, political and cultural beliefs, and, their personal experience with suicide. The impact on patient outcomes was not explored.

Discussion. Attitudes, knowledge and confidence are interrelated concepts that may affect HCPs’ care for people at risk of suicide. Training and education are essential for non-specialist HCPs at the forefront of mental healthcare. Further research is required to explore how these concepts ultimately affect care and potentially lead to better patient outcomes.


109  Interventions to optimise prescribing in older people with dementia: a systematic review

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Introduction. Older adults living with dementia may have a higher risk of medication toxicity than those without dementia. Optimising prescribing in this group of people is a critically important yet challenging process.

Aims. To systematically review the evidence for the effectiveness of interventions for optimising prescribing in older people with dementia.

Methods. This systematic review searched Pubmed, Embase, CINAHL, PsycINFO and Cochrane Library for studies that evaluated relevant interventions. Experimental, quasi-experimental and observational studies published in English prior to August 2018 were included. Data were synthesised at a narrative level.

Results. The 18 studies accepted for review included seven randomised, two nonrandomised controlled, five quasi-experimental and four observational studies. Half the studies were conducted in nursing homes and the other half in hospital and community settings. There was great variability in the interventions and outcomes reported and a meta-analysis was not feasible. The seven studies examining medication appropriateness all reported improvements on at least one measure of the outcome. Six studies reported on interventions which identified and resolved drug-related problems. The results for other outcomes, including the number of medications, healthcare utilisation, mortality, quality of life and falls, were mixed and difficult to synthesise because of variability in the study design and measures used.

Discussion. Emerging evidence suggests that interventions in older people with dementia may have positive effects on medication appropriateness and resolution of drug-related problems. However, whether optimisation of medication results in clinically meaningful outcomes remains uncertain.
110 Psychotropic medications use in South Australia: comparison of residential aged care residents with community dwellers

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Introduction. A recent paper published in the Australian and New Zealand Journal of Psychiatry1 reported concerns regarding inappropriate prescribing of psychotropic drugs in residential aged care facilities (RACFs). Analysis of prescribing patterns of psychotropic medications in a large Australian-wide sample showed that regular antipsychotic use has decreased in RACFs but highlighted a higher prevalence of benzodiazepine prescribed in South Australian RACFs.

Aims. To compare the prevalence of psychotropic drug use in older South Australians living in three RACFs and those living independently in the community.

Methods. Three hundred and thirteen participants from three RACFs (data collected from drug charts between June 2015 and February 2016) and 213 community dwelling (data extracted from three community pharmacies’ dispensing databases between June and August 2017) older South Australians were included in this study. Additionally, the number of administrations over one month for ‘prn’ medications was collected in the RACF cohort.

Results. In our study, the prescription rate of regular antipsychotics, ‘prn’ benzodiazepines and ‘prn’ anxiolytics was significantly higher in the RACF cohort (21.4 % vs 9.4 %, p value = 3.0 x 10^{-4}, 36.4 % vs 16.0 %, p value = 3.9 x 10^{-7} and 21.7 % vs 8.0 %, p value = 3.3 x 10^{-5} respectively). When actual use in the RACF cohort was compared with prescription records in the community cohort, contrary to prescription rates, ‘prn’ benzodiazepine “use” was statistically significant in the community cohort, specifically due to hypnotics, such as temazepam (8.6 % vs 16.0 %, p value = 0.01 and 2.6 % vs 8 %, p value = 5.8 x 10^{-3} for benzodiazepines overall and hypnotics specifically).

Discussion. This trend in the community dwelling older South Australians is worrying as medications are self-administered in the community rather than administered by professionally trained staff. Unregulated self-administration of ‘prn’ hypnotics could potentially contribute to sedation and falls and lead to tolerance and dependence issues in the community cohort.


111 Determination of the knowledge base of community pharmacy clients in relation to mental health conditions and mental health support services.

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Introduction. Although it is believed that mental ill-health is now less subject to stigma and discrimination, the reality reported by those with mental illness is often very different with manifestations in societal (employment, health care, education) and personal settings.

Aims. To determine the knowledge of community pharmacy clients of mental ill-health and associated supported services.

Methods. Ethics approval was granted to interview clients randomly presenting to three community pharmacies. Questions were focussed on depression and interviewees were asked to indicate, from a list of eleven, its likely presenting characteristics, with additional query on support services and the role of community pharmacists.

Results. Most clients interviewed had some experience of depression (through family, friends or media reporting on public figures), although nomination of presenting characteristics tended to be limited to mood changes and loss of energy. Resources with highest awareness were beyondblue and the R U OK? campaign. There was agreement that community pharmacists could be more involved in support, but limited suggestions offered as to useful approaches.

Discussion. Despite increased promotional activity through a number of advocacy groups, there is still deficient understanding in the community of mental ill-health and depression in particular. This impacts both on timely access to services and to the continuation of stigma and discrimination. The WHO concluded that the gap between need and service delivery to be the joint responsibility of governments, health professionals, and communities. Undoubtedly, promotional activity could be heightened at the community pharmacy level, utilising available resources and the profession’s specific skill base. A model based on medicines management for other chronic illnesses could provide a practical framework for intervention.

(3) Scahill S et al (2015), SAGE Open Medicine, 3: 2050312115603002.
112 Clozapine supply in Australian community pharmacies: what’s happening?

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Introduction. Australian regulatory changes in 2015 allowed clozapine, an antipsychotic used in treatment-resistant schizophrenia, to be supplied in the community for maintenance treatment. There is limited research exploring the uptake of this service in community pharmacies and why some pharmacists have chosen not to dispense clozapine for this vulnerable population.

Aims. To identify the number of Australian community pharmacies providing a clozapine supply service and explore the barriers and facilitators for service implementation.

Methods. A national online survey conducted between November 2017 - January 2018 asked pharmacists whether or not they dispensed clozapine and to identify the factors that influenced this decision. Survey respondents who did not supply clozapine were invited to participate in a semi-structured interview to obtain a more in-depth understanding of barriers and facilitators.

Results. Surveys were completed by 265 pharmacists, with responses from all Australian states and territories. Just over half of pharmacists (n=136; 51.3%) worked in pharmacies that dispensed clozapine, mostly for less than five consumers (n=80; 63.0%) for a period of two years or more (n=68; 53.5%). Consumer demand was both the key barrier and facilitator. Interviews (n=12) involved four pharmacists each from NSW and WA and one pharmacist from ACT, QLD, NT and VIC respectively. Five key themes were identified: attitudes of pharmacists, awareness and knowledge, support, time, and safety. While most participants acknowledged that supplying clozapine would benefit consumers due to convenience, a lack of training and support led to difficulties in service implementation.

Discussion. To our knowledge this is the first study which has explored the uptake of a clozapine supply service, including perspectives of non-providers, in Australian community pharmacies. It is unclear if access to clozapine has improved since the introduction of regulatory changes. While community pharmacists responded positively towards changes in regulation, there was a perceived lack of need at the local level. To overcome this, community pharmacies need further training and support to raise awareness of the service so that eligible clozapine consumers can be transitioned to community-based care.

113 Exploring young people’s lived experiences with mental health medication: a narrative review

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Introduction. The views of adults taking mental health medication are well explored, yet minimal attention has been placed on the experiences of young people who face unique circumstances such as balancing treatment autonomy with parents’ authority. With the growing prevalence of youth mental illness, health professionals need to have some understanding of the social and psychological implications of medication use in this population.

Aims. To provide insight into the perceptions and experiences of young people taking medication for mental illness.

Methods. A literature search for qualitative studies involving young people (13-24 years) taking medication for mental illness was undertaken between July-September 2017 using health-related databases. Terms related to adolescence, mental illness, medication and qualitative research were used. Key findings and quotes related to medication experiences were extracted from each study and coded according to the Medication Experience Model (2017).

Results. Twenty-six studies were included, the majority were conducted in the USA (n=14); involved interviews (n=24) and included participants with depression (n=21). There was minimal reporting of the types of medication used by, and average treatment duration for, participants. Negative experiences included side effects, a loss of sense of self, stigma, lack of involvement in decision-making, and loss of autonomy. Positive experiences included supportive environments and relationships with family, friends and schools, and involvement in treatment decisions. Limited insight was obtained on where young people obtain medication information.

Discussion. Perceived lack of involvement in decision-making and loss of autonomy was of particular relevance to young people. In order to validate and address concerns, and ultimately improve health outcomes, health professionals should consider exploring the beliefs, expectations, and experiences of young people with respect to their mental health medication. Research exploring the intricacies of medication acceptance and disclosure of medication use, particularly as adolescents transition to young adulthood, is also warranted.

114 A novel targeted drug delivery system, folic acid-grafted bovine serum albumin decorated graphene oxide development

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Introduction. A novel hybrid material, as a targeted anticancer drug carrier, was optimised with Folic Acid-grafted Bovine Serum Albumin decorated Graphene Oxide (FA-BSA-GO) in the present study. This is a new approach to construct targeting GO carrier for anticancer drug using FA-BSA as targeting functional group and stabilizer. The clinical usage of doxorubicin (DOX) is limited because it has low selectivity and dose-dependent side effect, such as cardiotoxicity. Therefore, DOX was loaded onto FA-BSA-GO as a targeting agent to improve DOX in clinical treatment.

Aims. To develop DOX loaded FA-BSA-GO for a potential efficient strategy and less side effects to the clinical tumour therapy application.

Methods. The FA-BSA-GO nanocomposite was formed by using an ultra-sonicator after FA-BSA conjugates were generated, and the objective structure of FA-BSA-GO was confirmed with a fourier transform infrared. DOX loaded FA-BSA-GO properties were determined, including morphology, zeta potential and size distribution, drug dissolution profiles in different pH value systems, cytotoxicity assay, and cellular uptake assay.

Results and discussion. The results demonstrated that a novel drug carrier for tumour targeting, FA-BSA-GO was successfully developed and loaded DOX on. The cumulative release of DOX from FA-BSA-GO was quicker in pH 5.0 than that in pH 7.4; the formulation showed pH-dependent drug release profile with a desirable sustained drug release behaviour that achieved the objectives of this targeted drug delivery system. Furthermore, the FA-BSA-GO could specifically release DOX to folate receptor rich tumour cells that was proved by the cellular uptake and cytotoxicity assays.


115 Bibenzyl compound of Dendrobium chrysotoxum inhibit proliferation of prostate cancer cell

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Introduction. Dendrobium sp are extensively used in traditional Chinese medicine to enhance immunity, lower blood glucose level and as a gastric tonic. Recent studies have demonstrated the anti-cancer potency of D. chrysotoxum in some cancer cell lines. However, its bioactivity on prostate cancer has not yet been reported.

Aims. To explore anti-cancer potency of D. chrysotoxum constituents on prostate cancer cell lines.

Methods. Dried stem of D. chrysotoxum was extracted with pure ethanol. Chromatographic purification by column chromatography and preparative TLC structure elucidation by NMR. Anti-proliferative activity assay was conducted with MTT method on three prostate cancer cell lines, LNCaP, PC3 and DU145 cells.

Results. Bibenzyl compounds isolated included chrysotobilbenzyl and erianin. The ethanol extract of D. chrysotoxum showed greatest anti-proliferative activity on LNCaP cell, IC50 0.67µg/mL), followed by DU145 and PC3 with IC50 3.04µg/mL and 3.10µg/mL at 72 hours. The most potent anti-proliferative activity on prostate cancer cell lines was shown by erianin with IC50 of 31.71nM on LNCaP cells. Interestingly, despite the structure similarity, chrysotobilbenzyl showed no significant effect on prostate cancer cells.

Discussion. This finding indicates that erianin an active anti-cancer constituent of D. chrysotoxum. This confirms previous studies identifying that the anti-cancer activity of dendrobium is related to its bibenzyl compounds.

116 Synthesis and characterization of a novel inulin hydrogel for delivery of fluorouracil

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Introduction. A common strategy in the treatment of colorectal cancer (CRC) involves the use of anticancer drug at high doses mostly via intravenous route. Unfortunately, systemic delivery of such toxic therapies results in severe adverse side effects. Therefore, the development of a drug delivery system targeted to the colon using biodegradable hydrogels for CRC treatment is highly desirable.

Aims. To develop inulin-based hydrogels for localized delivery of fluorouracil (SFU)

Methods. Injectable and degradable Inulin-based hydrogels were prepared through oxidation of the inulin with sodium periodate and subsequent crosslinking with adipic acid dihydrazide (AAD). The physicochemical properties of the hydrogels were evaluated using colorimetry Fourier-transform infrared spectroscopy (FT-IR), $^1$H nuclear magnetic resonance ($^1$HNMR) spectroscopy, differential scanning calorimetry (DSC), thermal gravimetric analysis (TGA). The in-vitro drug release of SFU and degradability of the hydrogel were evaluated using high performance liquid chromatography (HPLC) at two different pHs (5.0 and 7.4).

Results. The novel hydrogel was formed within 2 minutes at 37 °C by crosslinking oxidized inulin with AAD. The initial degree of oxidation was determined to be 25.6% by colorimetric and $^1$HNMR spectroscopic analysis and FTIR spectroscopy was used to confirm covalent crosslinking by AAD with a new band at 1573cm$^{-1}$ for bending of NH. The hydrogel formation resulted in changed thermal properties detected using DSC and TGA. The in-vitro release rate of SFU from the hydrogels batches (INUAAD2.5, INUAAD5, and INUAAD10) exhibited initial burst release followed by a controlled release pattern (Figure 1). The hydrogels are degradable both hydrolytically at physiologic conditions and by the inulinase enzyme found only in gut bacteria.

Conclusion: These findings demonstrate that this novel hydrogel could serve as delivery system for anticancer drugs in the treatment of CRC.

117 Natural product derivatives nanoformulations with brain cancer in vitro cytotoxic activity

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Introduction. Glioblastoma is the most aggressive type of brain cancer and the current standard chemotherapy temozolomide is inadequate due to tumour resistance and recurrence. Natural products including triterpenoids, have previously shown cytotoxicity against glioblastoma cells. However, their poor physiochemical properties, pharmacokinetics and pharmacodynamics have restricted their use in brain cancer patients.

Aims. In this study, different nanoformulations of natural products derivatives were prepared to improve their in vitro solubility and cytotoxicity.

Methods. The cytotoxicity of natural product nanoformulations alone or in combination against U87MG glioblastoma cells was evaluated using in vitro cell viability assays. The particle size and loading capacity of the fabricated nanoparticles were assessed by using dynamic light scattering and HPLC, respectively.

Results. The highly soluble nanoformulations were shown to enhance the cytotoxicity of natural products derivatives (p <0.05). Excitingly, the nanoformulations significantly lowered the dose (IC50) of glioblastoma chemotherapeutic temozolomide required in combination experiments (p <0.05).

Discussion. Natural product derivatives nanoformulations successfully improved the brain cancer in vitro cytotoxic activity. Brain cancer in vitro temozolomide sensitivity also improved when used in combination. This suggests that we could potentially combine the natural product derivatives nanoformulations with temozolomide in brain cancer patients. By utilising the increased sensitivity to temozolomide, we could reduce brain cancer resistance and recurrence, reduce the dose required (reduced side effects), thus improve brain cancer patient outcomes.
118 Development of a non-vascular stent-mediated localised drug delivery system for colorectal cancer

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Introduction. Colorectal obstruction and/or stenosis appears in up to 29% of CRC patients which require emergency surgery to restore the colonic luminal patency. Self-expandable metal stents (SEMS) have become popular in relieving such obstructions and increasing the survival of CRC patients. However, stent blockage caused by tumour growth is a major problem in these patients because traditional non-vascular stents work as simple endoluminal scaffolds, without providing anti-tumour activity. 

Aims. To develop a drug-eluting colorectal stent which can provide controlled release of anticancer drugs (e.g., 5-fluorouracil (5-FU)) locally within the colonic lumen over a sustained time period (>30 days).

Methods. 5-FU-loaded trilayered films have been prepared to demonstrate the feasibility of achieving long-term controlled release of anticancer drugs from polymer-based stent coatings. Here, the 5-FU-loaded poly(vinyl acetate) (PVAc) layer was prepared via film casting and the two drug-free PEVA (vinyl acetate 40 wt %) layers were prepared by hydraulic compression of melted PEVA. Finally, the 5-FU-containing layer was incorporated in the middle of two drug-free PEVA layers via melt welding between the internal faces of the drug-free PEVA layers.

Results. The drug-loaded trilayered films exhibited a cumulative release of 56.80 μg (5.49%) of 5-FU over 42 days in vitro. The cytotoxicity of the 5-FU-loaded film formulations is currently being investigated in vitro with HCT-116, a human colorectal cancer (CRC) cell line.

Discussion. A combination of PVAc and PEVA polymers can be used through a three-layer spray coating process for developing drug-eluting colorectal stents for controlling the release of anticancer drugs over 30 days.


119 Esophageal drug-eluting stent as localized controlled drug delivery platform: a comparison of polymer structure on controlled release of Docetaxel

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Introduction. Esophageal cancer (EC) is one of the most devastating cancers worldwide. A majority of EC patients is diagnosed in advanced stages of the disease when palliative care remains the only treatment option. Non-vascular stenting is the most widely used approach for immediate relief of dysphagia. The use and benefit of esophageal stenting are often limited by stent reocclusion problems due to tumour growth.

Aims. The aim of this study is to determine the most appropriate DTX-polymer combination through compatibility and release studies to fabricate a drug-eluting esophageal stent.

Methods. DTX impregnated polymer films were prepared using Polysiloxane(Si), polyurethane (PU) and poly(ethylene-co-vinyl acetate) (PEVA). The films were prepared using a solvent casting method, with various drug loadings (1, 5 and 10% w/w). The physicochemical properties including drug loading, thermal, spectral and mechanical characteristics, and in-vitro drug release were interpreted in terms of the drug-polymer interactions.

Results. The thermal and spectral analyses suggested that all three polymers were physically and chemically compatible with DTX. The in-vitro drug release studies exhibited that PU could sustain the release of DTX at above three drug loading rates.

Discussion. PU-based films appear to be a promising candidate for covering esophageal stents and thereby achieving a controlled release of DTX for a sustained period of time (e.g 30 days).

120 Phantom pharmacists and mysterious medications: educating graduate nurses on the role of a hospital pharmacist, pharmacy services and medication resources

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Introduction. Understanding multidisciplinary team member roles is vital for optimising patient outcomes during hospital admission. Within our tertiary hospital graduate nurses report limited education regarding pharmacy roles and services, potentially reducing opportunities for pharmacist intervention and collaboration.

Aims. To improve graduate nurses understanding of the pharmacists’ role, pharmacy services and medication resources available, via a pharmacist-led workshop.

Methods. A pharmacist-led 60 min interactive workshop was developed and presented to 110 graduate nurses over 6 sessions within the Transition to Profession Practice Program. Content covered the role of a pharmacist, local pharmacy services, and use of medication resources. Pre- and post-session questionnaires assessed participant’s baseline understanding and knowledge gained, and provided feedback regarding workshop delivery.

Results and discussion. All workshop participants completed the pre, post and feedback questionnaires. All participants rated session educational quality as good (27%) or very good (73%); while 83% and 84% agreed or strongly agreed the session increased their understanding of pharmacy ordering process, and the role of the pharmacist, respectively. Post session participants could list on average 1.4 additional pharmacist roles, and an overall broader range of roles. Participant’s knowledge of a hospital medicines formulary improved, with less than 4% identifying the correct definition and over 60% having never heard of the formulary pre-session, vs 58% identifying the correct definition post-session. Awareness of medicine resources improved post session; 35% of participants identified the Australian Medicines Handbook as a resource for drug dosing and adverse effects pre-session vs 82% post-session.

Conclusions. Pharmacists should readily utilise their educational skills to improve understanding of their role, pharmacy services and medication resources, within multidisciplinary teams.

121 Interprofessional education: Delivery, barriers and approaches to facilitate implementation between dentistry and pharmacy students

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Introduction. Interprofessional education (IPE) between dentistry and pharmacy students is an approach to teach effective collaborative practice between a team of future healthcare providers. A two-way collaborative relationship between dentists and pharmacists can improve health outcomes by identifying medication errors and increase patient awareness of how dental physiology can affect overall health. The significance of interprofessional collaboration between pharmacy and dentistry students has been taught through various IPE delivery methods internationally. Many studies have identified methods or suggestions to overcome barriers to IPE implementation as they have been encountered.

Aims. The aims of this narrative review were to: (1) consolidate and discuss the range and efficacy of various IPE initiatives/methods between pharmacy and dentistry students internationally and; (2) identify the perceived barriers to delivery and the methods used to overcome such hurdles.

Methods. A systematic search was performed within Pubmed, Cochrane, Embase and Web of Science databases. Articles were selected using search terms ‘dentistry’, ‘pharmacy’, ‘students’ and ‘interprofessional education’. Data extraction was conducted and results reported in a narrative style.

Results. 41 studies were identified worldwide. The most common methods of IPE delivery were case studies or clinical rotations. Eight barriers were identified across studies. Approaches to overcoming these barriers to implementation were also reported.

Discussion. The most common approaches to delivering IPE were case studies and clinical rotations, however other methods such as student competitions and peer to peer teaching were also used. The perceived barriers included participation by faculties, timetabling and location, resources and funding and measuring outcomes. Approaches to reduce the barriers were identified with many suggesting to implement a validated method for evaluation of IPE as the current heterogeneity of studies makes it difficult to assess its effectiveness.
122 Exercise physiology and physiotherapy medication management and scope of practice extension.

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Introduction. Due to increased patient accessibility for analgesics and non-steroidal anti-inflammatory drugs there is discussion about scope of practice extension into medication management for allied health professions. Currently in Australia, accredited exercise physiologists (AEP) and registered physiotherapists (PT) do not have medication management rights and legislatively should not discuss, recommend or counsel on any medications. Aims. To identify the extent of patient-initiated medication-related inquiries received by exercise physiologists and physiotherapists; and to assess the level of medicines knowledge (and potential areas of deficit) for AEP and PT. Methods. Online surveys were distributed to physiotherapists and AEP as well as physiotherapy students (PS) and exercise physiology students (EPS). The surveys investigated: demographics, health professional medicine-related behaviours, profession-specific medicines knowledge (timed section), and views on scope of practice extension. Results. 90% of physiotherapists and 7% of exercise physiologists offered medicine advice and suggested medicines to patients; 60% of students had encountered medicine conversations during clinical placement. The most commonly discussed medications included ibuprofen (35% PT, 19% AEP, 28% PS+EPS), immediate release paracetamol (44% all groups) and topical diclofenac (28% PT, 23% AEP, 26% PS+EPS). Schedule 3 and 4 medicines such diclofenac and pregabalin were also discussed. Areas of deficit in medicines knowledge included medication-related specifics such as dose, frequency and side effects. A majority of physiotherapists (76% PT, 81% PS) and fewer exercise physiologists (42% AEP, 43% EPS) indicated a desire for scope of practice extension into medication management/non-medical prescribing. Discussion. This data suggests that some exercise physiologists and physiotherapists are suggesting medications despite it being outside of current scope of practice. There appears to be interest for expansion of practice into medication management, however fewer practicing exercise physiologists agree; lack of medicines knowledge regarding contraindications was cited most frequently for the reason.


123 Time for Ward-Based Pharmacy Assistants-The Long and Winding Road

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Aim: To illustrate the multiple factors involved in creating sufficient human resource capacity in a busy metropolitan hospital pharmacy to undertake ward-based assistant services without additional resources.

Method: The Queen Elizabeth Hospital (TQEH) pharmacy has historically not provided a ward based pharmacy assistant service. No increases in staffing were available, so capacity needed to be found within the bounds of the dispensary via increases in efficiency, service delivery, workflow and assistant upskilling. With the support of SA Pharmacy Executive, TQEH dispensary achieved a 15% efficiency dividend via a program predicated upon:

Support and commitment
- Strategic plan and management commitment statement
- Appointment of anOPS3 assistant service coordinator
- Acceptance of assistants on ward by clinical teams

Assistant upskilling
- Education and competency validation for delegated tasks
- Targeted continuing education program
- Competency validation in the use of the SA Pharmacy Medication Profiler software

Dispensary and workflow re-design
- Analysis of tasks undertaken by the assistant workforce
- Process and workflow improvements
- Changes to the rostering system and daily staff assignments
- Imprest review program

Conclusion: The package of changes commenced in January 2018 building on the success of an upskilling program provided by the Calderdale Framework delegation strategy. By mid-2018 sufficient capacity had been generated to commit to providing ward-based assistant services each morning Monday to Friday. The assistant plays an integral role in supporting the clinical pharmacist in their engagement with patients via the provision of medication profiles and counselling. We aim to expand the support to include medication history taking in the future.

2018 APSA Annual Conference: Book of Oral Abstracts
124  Management of oral medication in patients with swallowing difficulties: a joint effort for pharmacists and nurses.

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Introduction. Swallowing difficulties affect 16% of the Australian population (1), 13.4% of infants (2) and up to 30% of people over 65 years old (3). Pharmacists and nurses look to resources for recommendations on alternative oral medicines, alternative routes of administration, altering solid-dose formulations or even discontinuation of treatment when administering medicines or providing advice to patients. The use of specialised pharmacy resources has been shown to improve the care provided by nurses and other healthcare professionals (HCPs) to people with swallowing difficulties(4) but this practice has not been explored with Australian resources relevant to national guidelines.

Aims. The aim is to identify the awareness, usability and acceptability by HCPs of design changes to the 3rd edition of Don’t Rush to Crush, a specialised resource for the administration of medicines to people with swallowing difficulties.

Methods. Exponential snowball sampling techniques were employed for the completion of a 7-item online survey.

Results. A total of 680 HCPs (pharmacists 9.6%, nurses 87.9%) completed the survey. The majority of the participants (57.4%) were unaware of the resource or had never used it in contrast to those reporting its use several times a week (13.3%). Up to 80% of participants supported a new design that also included concise instructions on part-dosing.

Discussion. While significant efforts are made to optimise the quality of available resources, effective promotion, dissemination and use of these evidence-based recommendations should become part of the joint professional development of pharmacists and nurses in order to improve practice.


125  Is ward round participation by clinical pharmacists a valuable use of time and money? A time and motion study

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Introduction. Participation in multidisciplinary ward rounds (WRs) by clinical pharmacists can be time-consuming. While the benefits of pharmacists’ involvement in WRs have been demonstrated, no previous studies have compared these benefits with those of other clinical activities.

Aims. To assess the impact of different clinical pharmacist activities using clinical interventions as an indicator. The objectives were to analyse pharmacist patterns of practice based on WR involvement, and to assess the timing and significance of clinical pharmacist interventions.

Methods. In a prospective time and motion study, clinical pharmacists servicing six specialty areas in a large quaternary public hospital (four areas involving WRs, two not) were observed between February and April 2018 and their activities documented using TimeCat 3.9. Clinical interventions were self-recorded by pharmacists, then assessed by an expert panel for significance and potential cost savings. Pharmacists’ workflows and interventions were analysed for WR pharmacists during their time ‘on’ and ‘off’ WRs, and for non-WR pharmacists.

Results. During 169.97 hours of observation, 267 clinical interventions (53.9% minor, 40.1% moderate and 6.0% major) were recorded. WR pharmacists spent 24.3% of their time on rounds; 64.8% of their interventions were made during this time (intervention rates: 4.48/hr on WR vs. 0.78/hr off WR vs. 1.34/hr for non-WR pharmacists). Significant differences in workflow patterns were observed, although the activities performed by all pharmacists were similar overall. WR involvement was significantly associated with interventions being completed in < 1 minute (p<0.001). All major interventions were made by WR pharmacists; 80% were made on the round. Major interventions were assessed as having resulted in decreased lengths of hospital stay, requirements for intensive care and procedure costs.

Discussion. Overall, clinical pharmacists performed similar activities, providing equivalent patient care, regardless of WR involvement. Despite some perceived inefficiencies, WR participation was associated with more significant and timely interventions and significant potential cost savings. Coupled with the less tangible benefits of WR participation observed during the study, these findings support the value of clinical pharmacist WR participation to patients, pharmacists and the healthcare system.
Indigenous people’s knowledge about the therapeutic uses of plants has provided leads for discovering many medicinal products used in Western and complementary medicine. Over thousands of years, the Aboriginal peoples of Australia have developed detailed knowledge of the places and environments in which they have lived. This includes distinct systems of knowledge about the plants found in these environments and their uses. While there is significant potential to develop new medicinal and food products based on this knowledge, often Western scientific research on Australian plants has given limited recognition, involvement or benefit-sharing to Aboriginal traditional owners.

In this presentation, perspectives and findings from two projects examining the bioactivity and chemistry of Australian native plants will be given. The Kuuku I’yu medicinal plants project is a collaboration between Aboriginal and University-based researchers. This project was driven by Chuulangun Aboriginal Corporation, which represents particular Aboriginal traditional owner families of the Kuuku I’yu homelands in Central Cape York, Queensland. The Corporation initiated the project to share both Aboriginal and Western scientific understandings of the medicinal activities of plants. Research conducted on the homelands has been led by Traditional Owners and ethnographic research methods have been utilised. Laboratory-based studies of plant extracts have examined anti-inflammatory and anti-microbial effects and activities relevant to diabetes, as well as the bioactive constituents of some of these plants. The “Desert-loving Therapeutics” project is led by the Plant Biochemistry Laboratory, University of Copenhagen. This interdisciplinary project brings together botany, taxonomy, evolutionary phylogeny, plant biochemistry and pharmacology to understand the chemistry and bioactivity of the Australian plant genus *Eremophila*. A number of *Eremophila* species have importance in Australian Aboriginal medicine systems from different regions of Australia, and some have been shown to have pharmacological activities including anti-microbial, anti-inflammatory and enzyme-inhibitory activities. An aim of this project is to establish a Trust to support Australian Indigenous culture.

**127  Real-world use of Tyrosine Kinase Inhibitor treatment in patients with Chronic Myeloid Leukemia: An Australian experience**

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Introduction. Tyrosine kinase inhibitors (TKIs) have revolutionised the treatment of chronic myeloid leukaemia (CML), but a large proportion of patients still experience treatment-limiting toxicities or therapeutic failure.

Aim. This study investigates real-world prescribing and outcomes of imatinib, dasatinib, nilotinib and ponatinib in CML patients in Australia.

Methods. A retrospective cohort study was conducted of CML patients commencing a TKI between 2001-18 in haematology clinics at two Australian teaching hospitals. Demographic and clinical characteristics, treatment details, tolerability and efficacy outcomes were extracted and analysed from individual medical records.

Results. Of the 237 CML patients identified, 149 met the eligibility criteria and data for the first 100 patients are presented. Median age was 56.3 years (IQR 26.1), 58% were male and most were of European ancestry (66%), followed by East Asian (20%) and South Asian (7%) ancestry. Of these patients, 57% required 1 line of TKI treatment, 24% required 2 lines, and 19% required ≥3 lines of therapy to achieve molecular response without treatment-limiting toxicities. The most common first line TKI was imatinib (56%), then nilotinib (24%) and dasatinib (15%). There were 152 treatment courses (61 imatinib, 48 nilotinib, 40 dasatinib, 3 ponatinib). Dose modifications were required by 69% of patients on imatinib (median 3 per treatment, IQR 3) including dose reductions (41%), increases (39%) and treatment interruptions (18%). Dose modifications were required in 50% of patients using dasatinib (median 2, IQR 3; 41% reductions, 20% increases, 34% interruptions) and 63% using nilotinib (median 3, IQR 3.75; 40% interruptions, 38% reductions, 18% increases). Only 52.5% of patients on imatinib, 67.5% on dasatinib, and 66.7% on nilotinib received 80 to 120% of their intended cumulative dose. Reasons for dose modification were adverse events (48.6% imatinib, 68% dasatinib, 68% nilotinib) and poor response or relapse (22% imatinib, 14% dasatinib, 10% nilotinib).

Discussion. These findings demonstrate the need for further research to identify factors that may influence response to these TKIs and to better inform initial dose and drug selection in CML patients.
128 Medications: Common and potentially modifiable but infrequently considered risk factors for delirium

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Introduction. Medicines are potentially modifiable precipitants of delirium which are associated in more than one-third of delirium cases. However, data on the prevalence of use of medicines potentially precipitating delirium prior to admission in hospitalised patients with a diagnosis of delirium is sparse. There has also been limited information on the extent of inclusion of medication data in risk prediction models.

Aims. To determine the prevalence of use of medicines that may increase the risk of delirium prior to hospitalisation in older Australians admitted with delirium and to evaluate if risk prediction models for postoperative delirium consider medications.

Methods. A retrospective observational study was conducted to assess the use of medicines potentially associated with increased risk of delirium using medication data of patients eligible for all subsidised health services by the Australian Government Department of Veterans’ Affairs. Studies that developed risk prediction models for postoperative delirium were systematically searched from Medline, EMBASE and CINAHL to evaluate whether medications were considered.

Results. Three-quarters of 22,923 patients were taking at least one of the medicines that potentially trigger delirium, the most frequently used medicines known to be associated with delirium being psycholeptics, opioids and tricyclic antidepressants. The systematic review revealed that only nine of the 19 risk prediction models considered medication data, with medications appearing as predictor variables in five models.

Discussion. Medications were not adequately considered in predication models despite their frequent use and modifiable nature of medication risk factor.

129 Evidence-based clinical practice guideline for deprescribing cholinesterase inhibitors and memantine in people with dementia

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Introduction. Ensuring optimal medication use in people with dementia involves both prescribing medications that will help achieve care goals and deprescribing (supervised withdrawal) of medications for which risk outweighs benefit. A lack of drug-specific deprescribing guidelines has been reported by health care professionals as a significant barrier to optimising medication use.

Aims. The purpose of this project was to develop a guideline to assist healthcare professionals to determine when it might be suitable to trial withdrawal of cholinesterase inhibitors (ChEIs) and memantine.

Methods. The Guideline Development Team (GDT) consisted of content experts, end-users, methodology experts and consumers. We followed the process of developing class-specific deprescribing guidelines, based on a comprehensive checklist for successful guideline development, the AGREE-II criteria and GRADE (Grading of Recommendations Assessment, Development and Evaluation).

Results. Four recommendations and three practice points were developed to guide deprescribing of ChEIs and memantine. The recommendations assist clinicians to identify individuals who may be suitable for a trial of deprescribing (such as those who do not have an appropriate indication, those who have never experienced a benefit, those who appear to be no longer benefitting, and those who have severe/end stage dementia). The practice points provide tapering and monitoring recommendations and other situations in which trial deprescribing could be considered. The guideline recommendations have been approved by the NHMRC and are published with supporting material at http://sydney.edu.au/medicine/cdpc/resources/deprescribing-guidelines.php.

Discussion. While there were limitations to the available evidence, the GDT was able to provide recommendations to guide deprescribing of ChEIs and memantine with the aim of improving quality of life in people with dementia. The recommendations should be considered in the context of the individual and deprescribing should be conducted as a process with consumer engagement throughout.
130  Audit on the incidence and management of drug-related hospital admissions for drug-induced gastro-intestinal bleeding.

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Introduction. There are an estimated 230,000 drug-related hospital admissions in Australia annually. In 2016, these admissions costed the national healthcare system approximately AU $1.2 billion. Drug-induced gastrointestinal (GI) bleeding is the most common adverse drug reaction (ADR) requiring hospitalisation and is the leading cause of death in patients presenting to hospital due to an ADR.

Aims. 1) To assess the prevalence of GI bleeding admissions to hospital that are drug-related. 2) To determine potentially reversible risk factors and 3) To identify management patterns for the treatment of drug-induced GI bleeding.

Methods. A multi-site retrospective study was conducted at three South Australian metropolitan hospitals between July and December 2017. Patients case notes and medical discharge summaries were utilised to gain comprehensive data from drug related GI bleeds due to anti-platelets and anticoagulants, selective serotonin reuptake inhibitors/serotonin-norepinephrine reuptake inhibitors (SSRIs/SNRIs) and non-steroidal anti-inflammatory drugs (NSAIDs).

Results. During the data collection period, a total of 327 patients were admitted to the three hospitals for GI bleeds, of whom 207 (63.3%) were taking at least one medication of interest. The most prevalent drug class of interest were anti-platelets (50.2%), followed by anticoagulants (31.4%), SSRIs/SNRIs (18.5%) and lastly, NSAIDs (15.0%).

Discussion. GI bleeds may be life-threatening. In our study, mortality rates ranged from 3% to 14%, with older age and comorbidities increasing this risk. GI bleeding could be caused or exacerbated by a range of common medications. This serious adverse effect should prompt clinicians to always consider the indication for prescribing drugs of interests and potential alternatives.

131  Proton pump inhibitor use in residential aged care services: does it pass the acid test?

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Introduction. While proton pump inhibitors (PPIs) are generally considered safe and well tolerated, frail older people who take PPIs long-term may be susceptible to dose-dependent adverse events.

Aims. To determine the prevalence of PPI use in residential aged care services (RACs) and factors associated with high dose PPI use in this setting.

Methods. A cross-sectional study of 383 residents in six Australian RACSs was conducted. Clinical, diagnostic and medication data were collected by study nurses. The proportions of residents who took PPIs for more than eight weeks, those with documented indications and residents receiving a concurrent medication associated with increased bleeding risk were calculated. Age and sex-adjusted logistic regression models were used to identify factors associated with high-dose PPI use compared to standard/low doses.

Results. 196 (51%) residents received a PPI, with 46 (23%) prescribed a high dose. Overall, 173 (88%) PPI users had documented clinical indications or received medications that can increase bleeding risk. Three quarters of PPI users with gastro-oesophageal reflux disease or dyspepsia had received a PPI for more than eight weeks. High dose PPI use was associated with increasing medication regimen complexity (odds ratio (OR) 1.02, 95% CI 1.01-1.04 per one point increase in Medication Regimen Complexity Index score) and a greater number of regular charted medications (OR 1.11, 95% 1.01-1.21 per additional medication).

Discussion. Half of all residents received a PPI, of whom nearly nine in ten had documented clinical indications or received medications that may increase bleeding risk. Residents who received a high dose PPI were more likely to take multiple medications or have complex regimens. Most PPI use was consistent with guidelines but confirmation of clinical indications for residents taking PPIs >8 weeks and ‘step-down’ approaches for high dose PPI users may reduce the likelihood of adverse events.
132 Automated screening of look-alike, sound-alike medicine names for safety

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Introduction. Look-alike, sound-alike medicines continue to present risks in medicines management. Previous methods to identify and prioritise confusable medicine name pairs have required manual calculation of orthographic (look-alike) similarity and expert consensus on the consequences of erroneous selection.

Aims. To design and test software to compute similarity of medicine name pairs, with a view to proactively identify LASA medicines and inform update of the National Tall Man Lettering List (the List).

Methods. Review of international literature identified software used by America’s Food and Drug Administration for screening of proposed medicine names. Australian academic researchers replicated and refined this software to screen all medicines in the Australian Register of Therapeutic Goods (ARTG). Composite LASA similarity scores (0.0000-1.0000) were computed. Collaboration with safety and quality experts enabled two comparisons:

1. Computed scores vs manually-calculated scores that had used a different mathematical formula and underpinned development of the 2011 version of the List
2. Computed risk category vs expert consensus risk category that also underpinned the 2011 List.

Results. Complete screening of the ARTG identified 7,750 drug pairs with at least moderate (≥0.6600) similarity scores. Examples are primaxin vs primacin (0.9034) and mitomycin vs minomycin (0.9019). The most commonly implicated medicines used the prefix ‘pro-’ and/or suffixes ‘-accord’, ‘-eine’, ‘-ine’ or ‘en’. Computed scores and resulting risk categories demonstrated significant correlation (p<0.05) with both the manually-calculated scores and the expert-consensus risk categories. However, the expert consensus tended to amplify the consequence and significance of the name similarity and safety of LASA medicines.

Discussion. The Australian software demonstrated high sensitivity in identification of potentially confusable LASA medicines, and is recommended to supplement incident reports in the dissemination of safety alerts and application of Tall Man lettering in clinical practice.

133 Supersaturated silica-lipid hybrid (super-SLH) oral drug delivery systems: balancing drug loading and in vivo performance

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Introduction. Solidification of lipid-based formulations (LBF) for oral delivery of poorly water-soluble drugs is advantageous over conventional liquid-state LBFs. However, solidification through the incorporation of solid carriers leads to low drug loading. Supersaturated silica-lipid hybrid (super-SLH) drug carriers are a recently established strategy to overcome low drug loading, however they are yet to be studied in vivo.

Aims. To investigate the in vivo pharmacokinetics (PK) of super-SLH containing the model drug ibuprofen (IBU), analysing the influence of supersaturated drug loading on bioavailability and assessing in vitro – in vivo correlations (IVIVC).

Methods. Fasted male Sprague-Dawley rats were administered formulation suspensions (10 mg/kg IBU) via oral gavage and blood samples were acquired and analysed for drug over 24 hours.

Results. Super-SLH (8% and 16% w/w IBU) and spray dried SLH all enhanced the systemic IBU exposures 2.2-fold in comparison to Nurofen; this effect diminished for super-SLH at higher drug loadings (25% w/w IBU).

Discussion. High drug loads can be achieved in super-SLH, however these supersaturated drug loads are associated with increased crystalline IBU content. This influences the in vitro and in vivo performance of super-SLH which exhibit strong IVIVC. The ideal super-SLH drug load was 16% w/w, as it possessed the highest drug load and retained bioavailability enhancing properties. Super-SLH is an improved oral formulation strategy for poorly water-soluble drugs, possessing higher drug loading and requiring reduced doses that cannot be achieved by other solid LBF.

134 Improved solubility of crystallized Ibuprofen at low ethanol contents with co-solvents of excipients

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Introduction. Ibuprofen, a non-steroidal anti-inflammatory drug, used in various dosage forms in the treatment of various diseases, is poorly soluble in water. To overcome the solubility problem of Ibu, the application of various excipients to enhance its solubility in water (W) - ethanol (E) co-solvent systems has been explored.

Aims. The objective of this study was to determine the effect of hydroxypropyl methylcellulose (HPMC), leucine, D-mannitol and Pluronic F127 (Pl F127) on the ibuprofen (Ibu) solubility in various components of water (W) - ethanol (E) co-solvent systems. Methods. Using UV spectrophotometry, the solubility of Ibu was measured in water (W) - ethanol (E) mixtures from 0 to 50% w/w ethanol at 10, 25 and 40 °C.

Results. The Ibu solubility without excipients in water (zero ethanol) was extremely low (~ 50 ppm); however, it increased nearly exponentially with increasing ethanol content. The excipients caused to increase the Ibu solubility up to 1173 ppm without ethanol and the maximum solubility (1726 ppm) was observed in a solvent containing 1.52% leucine, 5.22% mannitol, 0.25% HPMC, 1.55% Pl F127 and 10.75% w/w ethanol. At 40 °C, there was a phase separation between 34% and 63% w/w E/(E+W).

Discussion. The Pl F127 itself showed significant influence on enhancing the solubility of Ibu. The effects of individual leucine, mannitol and HPMC on Ibu solubility were limited; however, the combination of these excipients significantly raised Ibu solubility (1726 ppm) at low ethanol content. The solubility effect of these excipients is important in designing the crystallization technique for Ibu with enhanced solubility.

135 Helping patients to swallow their tablets: is Gloup appropriate for use in dysphagia?

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Introduction. A medical device named Gloup is available in Australia that is designed as a medication swallowing aid for people who find it difficult to swallow tablets and capsules whole. Recently, a thicker product, Gloup Forte, has been designed to be suitable for use by patients with dysphagia (swallowing difficulties), with whole or crushed medicines.

Aims. To assess the complete range of Gloup products in terms of thickness suitability for patients with dysphagia, and compare it with other medication swallowing lubricants available internationally.

Methods. Thickness was determined according to testing methods from the International Dysphagia Diet Standardization Initiative (IDDSI) framework, and also apparent viscosity values at 24°C at constant shear rate 50 s⁻¹ measured using a stress controlled remoter. Consistency was compared using a Bostwick consistometer, and texture features (cohesiveness, adhesiveness, hardness, and gumminess) were obtained using a texture analyser.

Results. Gloup Cherry, Strawberry-Banana and Orange were classified as IDDSI level 3, with Cherry being the thinnest and Orange the thickest of the three in terms of both the viscosity (Fig. 1) and consistometry. Gloup Forte (vanilla) had the highest viscosity (Fig. 1) and consistency and ranked as an IDDSI level 4 product.

Discussion. Gloup Forte has an appropriate thickness for use in patients with dysphagia who are able to safely swallow products with IDDSI level 4 thickness. Comparison will be made with thickened fluids and medication lubricant products available internationally.

Fig. 1. Viscosity of Gloup products available in Australia
136 LC-MS/MS Method Development and Validation of Esomeprazole in Horse Plasma

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Introduction. Omeprazole has been widely used to treat equine gastric ulcer syndrome (EGUS) for many years. However, there has been little to no advances in EGUS treatment, due to the known efficacy as well as difficulty in formulating this unstable API. Therefore, novel esomeprazole (ESOMP) formulations were developed and evaluated by our team.

Aims. To develop and validate a sensitive LC-MS/MS bioanalytical method to quantify ESOMP in horse plasma to evaluate the developed novel ESOMP formulations.

Methods. ESOMP and the internal standard, Pantoprazole, were extracted from equine plasma via protein precipitation. Chromatographic separation was conducted on a C18 column with gradient conditions. Followed by detection with ESI-MS/MS in positive ion mode, monitoring at m/z 346.1→198.1 and 384.3→200.2 for ESOMP and pantoprazole, respectively. Two novel oral formulations of ESOMP were prepared and administered to four horses along with a commercial ESOMP product in a pilot clinical trial. Collected plasma samples were analysed by the aforementioned LC-MS/MS method to determine the AUC and pharmacokinetic profiles.

Results. The resulting method had a linearity of 3-640 ng/mL, with precision and accuracy having a CV less than 7%. Recoveries were 100 ± 10 %. The pharmacokinetic results indicated high variation between horses for all formulations.

Discussion. A new method for the quantification of ESOMP in horse plasma was developed and validated. The method was used in a pilot pharmacokinetic study. In the future a larger cohort will be tested to enable relevant scientific conclusions to be made with confidence.

137 Stability of fish oil capsules in dose administration aids

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Introduction. Fish oil supplements are commonly used to manage diseases such as arthritis and heart disease. Dose Administration Aids (DAAs) are used to improve adherence to medicines, including supplements. However re-packaging of medicines invalidates the physicochemical stability guaranteed by the manufacture.

Aims. The aim of this study is to determine the physicochemical stability of fish oil supplements stored in dose administration aids.

Methods. Fish oil capsules were repackaged in DAAs and stored at in-use condition (on a laboratory bench), at 25°C/60 % relative humidity (RH) to simulate controlled room temperature (controlled RT) conditions and 40°C/70 % RH (accelerated). Physicochemical stability was determined at 2 weeks, 4 weeks and 8 weeks of storage. Physical stability was determined using weight and disintegration tests. Chemical stability was determined using oxidation assessment tests specified in the European Pharmacopoeia.

Results. At baseline the fish oil capsules disintegrated within 6 minute, however after 8 weeks of storage at accelerated stability conditions the time required for disintegration increased to 15 minutes. Capsules tend to burst when stored at accelerated conditions. Peroxide values and anisidine values showed a high level of oxidation with storage at accelerated conditions and following storage at controlled room temperature for prolonged periods.

Discussion. Physical and chemical stability of fish oil capsules are affected by storage condition and duration. If capsules are repackaged, they can be stored for up to 2 weeks at 25°C/60 % RH or below.

138 Effect of different pH buffers on wound healing

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Introduction. Wound healing is a complex process of biochemical events responsible for restoring the function of both the epidermis and dermis layer. The process of wound healing is postulated to be greatly influenced by both intrinsic and extrinsic factors such as surface pH of wounds. Changes in wounds microenvironmental pH affects the proliferation and migration rate of keratinocyte and fibroblast cells.

Aims. To determine and evaluate the effect of pH during wound healing process using in-vitro cell line models.

Methods. HaCaT keratinocyte and HFF fibroblast cells were grown in Dulbecco’s modified Eagle’s medium (DMEM) supplemented with 10% foetal bovine serum and 1% penicillin-streptomycin solution in a humidified cell culture incubator with controlled environment of 37°C and 5% CO2/95% air. Both cell lines were treated with different acidic pH buffers of pH values ranging from pH 3 to pH 7 for a duration of 24 hours. Thereafter, all treatments were removed, and replaced with fresh DMEM growth medium. At the end of the incubation time, migration rate of cells was imaged, and proliferation rate were studied by incubating with 2 mg/ml MTT solution for 4 hours.

Results. Changes in microenvironmental pH was found to increase proliferation and migration rate of both keratinocyte and fibroblast skin cells.

Discussion. Physiological pH of the human skin is maintained at a slightly acidic milieu with pH ranging from 4.0 to 6.0. The presence of wounds on the skin disrupts the acidic milieu of the skin, thus restoration of surface pH is a significant process for proper wound healing. Therefore, results indicate that restoration of skin acidic milieu at wound bed can aid in wound regeneration process.

139 Development, implementation and evaluation of an innovative, project-based assignment for pharmacy and pharmaceutical science students, relating to advanced drug delivery systems

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Introduction: Pharmacy students must be able to efficiently integrate and apply knowledge gained during their training. Traditional forms of didactic teaching (DT) have been criticized as educator centred with passive transmission of information, leading to surface learning and poor student motivation. Project-based learning (PBL) is an alternative pedagogy that provides a structured approach to learning. Students are given a question or problematic scenario to answer through investigation and their own critical thinking and problem-solving skills. In contrast to DT, PBL is considered challenging, motivating and enjoyable, leading to improved learning outcomes. This approach was assessed in a third year Pharmacy/Pharmaceutical science course.

Aim: To assess the impact upon final year pharmacy students learning of a novel PBL based assignment requiring investigation and reporting of a novel drug delivery system (NDDS).

Method: Students were required to individually choose an NDDS to research. Their research was to include IP, drug pharmacology, design and clinical features, marketing, regulatory and commercial issues related to the NDDS. The students presented their findings in a written report as well as a class seminar. Assignment assessment was based on student ability to research the NDDS, synthesise key points and present their findings. The impact of the assignment on student learning was evaluated from student feedback include questionnaires, focus groups and online Student Evaluation of Teaching (SET) surveys.

Results: Academically the students generally performed very well in the assessment, demonstrating an ability to locate relevant information, synthesise a synopsis of the details and present the information to their peers. Analysis of the student feedback using a one-way ANOVA (p<0.05), indicated the assignment was well received by the students. allowing them greater freedom while requiring them to take responsibility for their own learning.

Discussion: The development and implementation of a project-based assignment for pharmacy students proved to be highly successful, enhancing student understanding of cutting-edge technologies in a manner that was well received by the students. The outcomes demonstrated the value of project-based learning in a Pharmacy program.
Trends in High Stakes Examinations for Overseas trained pharmacists seeking registration in Australia

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Introduction: Under the National Registration and Accreditation Scheme, the Australian Pharmacy Council Ltd (APC) is responsible for the assessment process for provisional registration of pharmacists in Australia. As part of this process APC delivers high-stakes computer-delivered pharmacy examinations in Australia and overseas. Historically the largest proportion of overseas trained candidates were those who had already migrated to Australia. Recently, however, there has been significant growth in demand for candidates from international pharmacy programs residing overseas.

Aims: The purpose of the study was to compare examination results of candidates residing in various geographic regions. The research questions were:
- What are demographic trends in participation in registration examinations in the past five years?
- Are there patterns of success related to residential geographic region?

Methods: This study employs a secondary data analysis method described by Johnston (2014, 619) as “analysis of data that was collected by someone else for another primary purpose ... an empirical exercise that applies the same basic research principles as studies utilizing primary data and has steps to be followed just as any research method”. The data in this case consists of demographic and achievement data collected from graduates of overseas universities. As available data included the raw scores distributions and pass rates appropriate analysis included descriptive graphical and both parametric tests and non-parametric comparisons.

Results and Discussion: The results of the study have policy and practical implications for the registration of overseas based pharmacists.

Are entry year pharmacy students created equally? A comparison between New Zealand and Canada

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Introduction. Our previous research has shown that certain characteristics of pharmacy students are predictive of intent of providing patient care services. Little is known if these characteristics differ among incoming pharmacy students from different countries, with different admissions processes and pathways.

Aims. To compare the characteristics of entry level pharmacy students in Canada and New Zealand.

Methods. Students entering the pharmacy program at the Universities of Otago and Waterloo were invited to complete a survey which included the Big Five Inventory (BFI), New General Self-efficacy Scale; the Rational Experiential Inventory, the Achievement Goal Questionnaire-Revised, and 8 statements about providing information to patients scaled to 0 (no endorsement) to 100 (full endorsement).

Results. 97 Otago (74%) and 87 Waterloo (74%) students completed the survey in their first week of the program. The Waterloo students were older (21 vs. 19 years, p<0.001) and more likely to have selected pharmacy as their preferred course of study (90% vs. 68%, p<0.001). On the BFI, Waterloo students scored higher on conscientiousness (diff 4.2, p =0.04) but lower on openness (diff 5.3, p=0.03). Other differences between the student cohorts included a higher faith in intuition score for Waterloo students (diff 6.4, p=0.008), and much higher endorsement of the 8 statements that limit pharmacy roles for the Otago students (for example, Otago students more strongly endorsed “a doctor is better qualified than a pharmacist to advise patients about their medication”, diff 22.2, p<0.001).

Discussion. There were important differences between the entry cohorts at the Schools of Pharmacy at the Universities of Waterloo and Otago. Further research is needed to see how these differences translate into patient care activities.
142 Design and development of interdisciplinary learning in a new oncology unit of study in the new integrated pharmacy curriculum

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Introduction: A discipline-based approach to the learning and teaching of pharmaceutical sciences (including pharmacology) to pharmacy students has faced years of perceived lack of relevance to their chosen profession. This was despite improvements in case examples and contextualising lectures, labs and workshops.

Methods: A new integrated curriculum approaches the teaching of pharmacy from a more integrated perspective, rather than the previous discipline-based approach. It is structured by themes and underpinned by a detailed set of learning outcomes, which describe the knowledge, skills and attitudinal milestones to be achieved each year and by the time of graduation. The design and development of interdisciplinary learning (IDL) in a new integrated oncology unit of study was undertaken, covering the therapeutics of immunology & cancer including the pharmacology and pharmaceutical sciences that underpin such drug therapies. Via IDL in the use of case-based learning, students participated in the interpretation, application and dissemination of pharmaceutical and pharmacotherapeutic concepts and knowledge. On completion of this unit of study students were able to apply an understanding of the pharmaceutical sciences to optimising the drug and non-drug therapy of patients with cancer and immunological disorders. Students were able to apply also interdisciplinary communication and the application of specialist knowledge to implementing pharmacist cognitive services such as clinical oncology interventions and/or medication management review.

Results: This study aimed to examine the effectiveness of the new integrated Master of Pharmacy curriculum and the development of the new oncology unit of study. Unit of Study surveys (USS) collected feedback on the student experience at the unit of study level. The new integrated Master of Pharmacy curriculum demonstrated favourable results quantitatively and qualitatively compared to the previous discipline-based curriculum, with improved student perceived relevance and engagement.

Discussion: The new IDL integrated curriculum approach of the teaching of pharmacology and pharmaceutical sciences from a more integrated perspective demonstrated favourable student perceived relevance to their pharmacy profession and greater interdisciplinary engagement.

143 Antibiotics and Pharmacy students in Australia and Sri Lanka

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Introduction. Antimicrobial resistance (AMR) is a major global health challenge. The education and training of pharmacy students has the potential to impact on patterns of antibiotic use in community and hospital settings.

Aims. To investigate knowledge and antibiotic use in pharmacy students in Australian and Sri Lankan universities.

Methods. A cross-sectional survey was conducted in Australian and Sri Lankan universities that offer a pharmacy degree. Pharmacy students from 17 Australian and 6 Sri Lankan pharmacy institutes were invited to participate in this study. A paper-based survey was utilised in Sri Lanka and an identical survey distributed online among pharmacy students in Australia. Descriptive data analysis and Chi square tests were performed (SPSS v24) to identify frequencies, percentages and associations.

Results. 476 pharmacy students from 14 universities in Australia and 466 students from 6 universities in Sri Lanka completed the survey. The majority of students [Australia (83%) and Sri Lanka (76%)] were aged between 20-25 years and were predominately female [Australia (73%) and Sri Lanka (67%)]. Participants commonly reported previous antibiotic use [Australia (88%) and Sri Lanka (86%)]. The majority of students [Australia (89%) and Sri Lanka (77%)] reported they obtained antibiotics with a doctor’s prescription. A significantly greater number of Australian pharmacy students (92%) correctly reported that the antibiotic use was appropriate for the management of bladder infection compared to Sri Lankan students (76%), p<0.05. A significantly higher percentage of Sri Lankan pharmacy students incorrectly indicated that antibiotic use was appropriate for cold and flu (51%), body aches (11%), and headaches (6%) disease conditions compared to Australian students (15%, 2%, 1% respectively), p<0.05.

Discussion. This study provides a snapshot of antibiotic use and knowledge among pharmacy students in a developed country, Australia and a developing country, Sri Lanka. Antibiotic use was highly prevalent among undergraduate pharmacy students in both countries. These findings identify some misconceptions about antibiotics among Sri Lankan undergraduate pharmacy students with a potential to increase the inappropriate use of antibiotics.
144 Professional identity and empathy in undergraduate pharmacy students

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Introduction. The formation of a strong professional identity early in a student’s career, can enable the successful transition to the workplace, motivate the beginning practitioner, and assist in establishing confidence in their role. Previous research suggests that the development of professional identity occurs following graduation with genuine work experiences due to a focus on traditional learning experiences during academic education. Empathy strengthens the relationship between patients and health professionals, improving satisfaction for both parties and promoting optimal clinical outcomes.

Aims. To measure students’ professional identity and empathy and compare this across year levels in the Bachelor of Pharmacy (with Honours) at UNE.

Methods. A cross-sectional study of students, enrolled in a UNE Pharmacy Practice unit offered during Trimester 2 2018, completed a hard-copy questionnaire containing validated Kiersma-Chen Empathy and Macleod Clark Professional Identity Scales.

Results. Of the 141 currently enrolled students in pharmacy practice units at UNE, 112 (79%) completed the survey. The mean age was 31 (range 18-61) and 73% were female. The professional identity score mean was 43.1 (SD=6.8) out of 54. There was a significant difference in the professional identity score in those students with experience working in pharmacy (M=44.3, SD=6.8 n=70) and those without (M=41.0, SD=6.5 n=39) \(t(109)=2.51, p=0.014\). The mean empathy score was 87.5 (SD=6.1) out of 105. There was no difference across year cohorts for either professional identity or empathy (see box plots).

Discussion. The results align with evidence that professional identity development occurs as a result of participation in authentic work practices. The UNE cohort of students is generally older with previous degrees and work experience would be expected to influence the results.

145 Self immolative linkers in the design of lymph directing, triglyceride mimetic prodrugs of buprenorphine

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Introduction. The oral bioavailability of buprenorphine (BUP) is limited by hepatic first-pass metabolism. Exploiting drug transport through the lymphatic system provides a means to circumvent first-pass metabolism, since the intestinal lymph drains into the systemic circulation via the thoracic duct, bypassing the liver. Previous studies have shown the utility of triglyceride (TG) mimetics to promote lymphatic drug transport and enhance bioavailability. The nature of the linker employed for drug-TG conjugation is critical to utility, but is incompletely understood.

Aims. To evaluate the utility of two different self-immolative (SI) linkers (a trimethyl lock system and a cyclising five carbon ester) in TG mimetic prodrugs to enable oral bioavailability of BUP.

Methods. Lymphatic transport and bioavailability studies were conducted in mesenteric lymph duct or carotid artery cannulated rats, respectively. The rats received the two TG mimetic prodrugs or BUP alone via intraduodenal infusion (lymph study) or oral gavage (bioavailability study).

Results. Both TG prodrug derivatives were transported efficiently into the lymphatics (up to 25% of the dose, vs 0.01% for BUP). Incorporation of the SI linkers facilitated BUP release from the prodrugs and led to marked enhancement in oral bioavailability (up to 14 fold) compared to Parent BUP (see figure for PK profiles).

Discussion. TG mimetic prodrugs incorporating both SI linkers successfully increased the lymphatic transport and systemic exposure of BUP following oral administration. Both constructs were equally efficient. The prodrug strategy may provide opportunities for the development of better oral products of opioids pain killers.

The prodrug technology described in this abstract has been licensed to PureTech/Ariya Therapeutics, Inc.
146 The role of cultural background in the engagement and learning of academically successful, late-stage CALD (culturally and linguistically diverse) and non-CALD pharmacy students at a research-intensive Australian university

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Introduction. During the last twenty years, Australian pharmacy schools have seen increased enrolments of culturally and/or linguistically diverse (CALD) students. This abstract presents one aspect of an educational study whose overall aim was to better understand how academically successful students in CALD cohorts engage and learn.

Aims. To explore the role of cultural background in the engagement and learning of academically successful, late-stage CALD and non-CALD students in an undergraduate pharmacy program at a research-intensive Australian university.

Methods. The qualitative methodology was a multiple-case study design. Participants (n=9) were third and fourth year domestic and international pharmacy students at the University of Queensland between 2013-2015. The novel data collection methods, which richly captured the participants’ backgrounds and ‘voices’, included demographic questionnaires, learning metaphors, student-generated artefacts (week-long diaries, ‘Prescriptions for Success’), and three semi-structured interviews. The data were analysed thematically using an interpretivist, social constructivist research paradigm and informed by a theoretical framework drawing on Kahu’s (2013) model of student engagement.

Results. Firstly, cultural background was often difficult to disentangle from other factors, most notably family and educational backgrounds. Secondly, cultural diversity was only one of many factors influencing engagement and learning. Thirdly, most of the participants adapted their beliefs and learning practices over time, with the teaching and learning context and work experience playing roles in this transition. By the end of their studies, the cultural background of CALD students was not a prominent influence.

Discussion. The influence of cultural diversity on the engagement and learning of academically successful, late-stage pharmacy students was nuanced and subtle. This is not to say that cultural background was unimportant; however, to label students as CALD, to foreground their cultural and linguistic diversity, is to overstate the importance of this influence. Rather, this research is consistent with Kahu’s conceptual framework, which depicts culture as one of a number of sociocultural influences on student engagement and, ultimately, on academic performance (Kahu, 2013).

147 Australian community pharmacists’ experiences and comfort in caring for people at risk of suicide: a descriptive study

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Introduction. Suicide is a leading cause of death globally, with rates increasing in Australia since 2010. Pharmacists regularly interact with and care for people at risk of suicide (Murphy et al. 2017, Murphy et al. 2018), however little is known about these interactions to date.

Aims. To describe the experiences of community pharmacists involved in the care of people at risk of suicide.

Methods. Community pharmacists in Australia and Canada completed an online survey comprising four sections; of which one comprised questions exploring pharmacists’ experiences with people at risk of suicide, or who had died by suicide.

Results. Completed surveys were received from 161 Australian pharmacists. The majority were female (68%) with a mean age of 33.3 years. Most pharmacists had interacted with someone at risk of suicide at least once (85.1%), with 16.2% interacting more than 6 times. In relation to pharmacists’ most prominent experience with someone at risk of suicide, less than half carried out a suicide assessment, with only 13% of pharmacists directly inquiring about suicidal thoughts. More than half of pharmacists (60%) felt uncomfortable about their involvement and 1 in 4 were dissatisfied with how they handled the situation.

Discussion. Community pharmacists are frequently caring for people at risk of suicide, yet many feel uncomfortable with their involvement. Often people were seeking advice of the pharmacist directly, highlighting the important primary health care role pharmacists play in suicide prevention. Further research and education in suicide prevention training for pharmacists is required.


2018 APSA Annual Conference: Book of Oral Abstracts
Extending the role of pharmacists to beyond the traditional scope

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Introduction. The pharmacist role has evolved from traditional dispensing to having a key role in various clinical settings. Aims. The aim of this study is to report from recent pilot trials conducted in the ACT that examined pharmacist’s extended roles in general practice, smoking cessation and aged care.
Methods. Three pilot studies were conducted in the ACT in 2016 and 17, in which non-dispensing pharmacists were integrated into general practices or an aged care facility.
Results. The pharmacists integrated into the general practices recorded 944 and 1186 hours of data in 2016 and 2017 respectively. The pharmacists supported general practice by conducting a range of activities that included medication review, post hospital medicines reconciliation, communication with other health care professionals, clinical audits, patient education, staff education, asthma management, and smoking cessation. In both years the pharmacists conducted a range of clinical audits resulting in improved medication management such as improvement in anticoagulant use to prevent stroke. The proportion of practice pharmacist time spent on medication review and quality of practice increased in 2017 compared to 2016 (23%v19% and 46%v36%, respectively). There were similar times spent on patient education (9%v11%) and decreased time spent on administrative or evaluation tasks (22%v34%). Pharmacists-led smoking cessation activities resulted in an abstinence rate of 30% (20/66) and a sustained abstinence rate of 18% (12/66). Pharmacist-led activities in an aged care facility improved quality use of medicine indicators.
Discussion. Pharmacists can be employed for a range of activities outside their traditional scope of practice. These activities could include predominantly clinical tasks that are collaborative with other health professionals such as general practitioners and nurses.

Electronic nicotine delivery systems (e-cigarettes) as a smoking cessation aid: a survey among pharmacy staff in Queensland, Australia

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Introduction. With the growing popularity and use of e-cigarettes as a way to quit smoking, it is essential that pharmacists have adequate knowledge in order to guide their customers in making evidence-based decisions.
Aims. This study examined views of pharmacy staff regarding the safety of e-cigarettes compared to nicotine replacement therapies (NRTs) and conventional cigarettes, their knowledge toward current regulation of e-cigarettes and attitudes toward how they should be regulated.
Methods. We conducted a cross-sectional survey among pharmacy staff (64 pharmacists and 76 pharmacy assistants) from the greater Brisbane region, Queensland, Australia. The self-administered questionnaire included closed- and open-ended questions. Pearson’s chi-square test was employed for computing differences between variables. A content analysis of responses to open-ended questions was also performed.
Results. Over 90% of pharmacy staff regarded e-cigarettes without nicotine and NRTs as less harmful than regular tobacco cigarettes. This reduced to 72% for e-cigarettes containing nicotine, with 24% of respondents believing they are equally as harmful as conventional cigarettes. Moreover, few respondents were confident about the short and long term safety of e-cigarettes containing nicotine (36% and 15% respectively) whereas pharmacy staff were more comfortable with the safety of NRTs for short (88%) and long term (35%) use. The majority of respondents believed that e-cigarettes with nicotine should be regulated as a medicine, either requiring a prescription (24%) or sold only by pharmacies (22%), though many believed that they should be regulated in the same way as regular tobacco cigarettes (27%). Some pharmacy staff (39%) reported having been asked about e-cigarettes by customers and 75% believed that their customers would be interested in using e-cigarettes as a smoking cessation aid.
Discussion. Our results suggest that consumers expect pharmacy staff to be aware of these products as participants in our study reported receiving client inquiries about e-cigarettes. Thus, evidence-based and customised educational intervention (such as a practice guideline) for pharmacists about e-cigarettes would be useful.
The impact of mobile applications on medication adherence: A systematic review

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Introduction. Adherence to medication is suboptimal and could contribute to 69% of medication-related hospitalizations and cost 100 billion dollars, annually [1]. Interest in health-related mobile applications (apps) for improving medication adherence has been growing since 2008, when apps were introduced. Despite this growth, research on the efficacy of apps in improving medication adherence and clinical outcomes is scarce and the potential influence of apps on medication adherence is largely unexplored.

Aims. The aims of this research were to systematically review studies investigating the impact of apps on consumers’ medication adherence and determine whether improvement in adherence leads to better clinical outcome(s).

Methods. A systematic literature search, guided by the PRISMA method, was conducted to identify English publications that reported on the use of an app and measured medication adherence among an intervention and comparator group, published between January 2008 – April 2018. Included studies were assessed for risk of bias using the ROBINS-I tool for non-randomized studies.

Results. Of the 1993 records examined, 21 studies met the inclusion criteria. Twelve studies showed significant improvements in at least one adherence measure while 10 studies showed improvements in at least one clinical outcome. However, only two studies showed significant improvements in all measures of adherence and clinical outcomes. The risk of bias was moderate or serious for all except one study. The risks of bias were mainly attributed to the lack of blinding of the health care providers, lack of triangulation of subjective with objective adherence measures and inadequacy of control group design.

Discussion. The majority of apps led to improvements in adherence; however, the effect on patient outcomes remains unclear. It is difficult to draw comprehensive, accurate conclusions regarding the impact of apps on medication adherence, due to the heterogeneity of apps explored in included studies, as well as, the limitations of study designs. For accurate comparisons within and among studies, it is recommended that researchers design high quality studies involving blinding and controls, using a variety of adherence measures, with appropriate sample sizes and duration.


Would you like to participate? Factors impacting on participant recruitment for quality use of medicines interventions in residential aged care

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Introduction. Recruitment for interventional studies in residential aged care facilities (RACFs) can be challenging. Poor recruitment could lead to resource wastage or insufficient sample sizes. Understanding factors influencing resident recruitment is important to inform future quality use of medicines research in RACFs.

Aims. To evaluate the process of resident recruitment for the Simplification of Medications Prescribed to Long-tErm care Residents (SIMPLER) study and understand barriers and enablers to recruitment.

Methods. A mixed methods process evaluation of the SIMPLER study, a cluster randomised controlled trial which is being conducted to identify opportunities to reduce medication complexity in eight South Australian RACFs, was undertaken. Qualitative data extracted from recruitment notes maintained by research nurses and from semi-structured interviews with 25 stakeholders were thematically analysed to identify factors impacting on resident recruitment.

Results. Research nurses sought informed consent for all 631 eligible residents. Third party contact was needed for 392 residents (62%). In total, 242 residents (38%) were recruited over six months. Participants were similar to all residents of the eight RACFs in terms of age, sex and dementia diagnosis. Recruitment was facilitated by highlighting the involvement of the resident and their usual healthcare providers in implementing suggested strategies for medication simplification. Barriers included resistance to change the current medication regimen, third party hesitation regarding undue distress to the resident, and perceived lack of benefit for the resident. The resident’s decision to participate was influenced by their relationship with their usual clinician and their aged care provider.

Discussion. We successfully recruited a representative sample of residents. Embedding strategies to address enablers and barriers into recruitment processes may facilitate increased participation in future interventions to optimise medicines use in RACFs.

152 Evaluating antibiotic dispensing practice in Sri Lanka: A mixed methods approach
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Introduction. Anecdotal evidence indicates that community pharmacy staffs are frequently providing antibiotics to consumers without a prescription. This is illegal under Sri Lankan law. Using different methods to measure the same outcome, increases the validity of the data collected.

Objectives. To determine 1) illegal provision of antibiotics without a prescription by Sri Lankan community pharmacy staff, and 2) factors that contribute to such behaviour.

Methods. Three cross-sectional methods were used among 242 community pharmacies in Sri Lanka from Dec 2016 to Sep 2017 to determine antibiotic supply: a self-reported survey and two mystery shopper (MS) visits. MSs visited consenting pharmacies twice within a six-month period. One MS visit involved directly requesting one of four antibiotics (DPR): erythromycin, metronidazole, ciprofloxacin tablets or amoxicillin syrup and the other MS visit involved presenting with one of four symptoms of minor infections (SBR): acute sore throat, common cold, acute diarrhoea or urinary tract infection. Demographics and antibiotic-related knowledge were evaluated using a self-reported survey. Data were analysed using descriptive and inferential statistic techniques.

Results. Provision of antibiotics without a prescription (illegally) by pharmacy staff for minor infections was 61% (147/242) for DPR, 41% (99/242) for SBR and 31% (75/238) in the survey. A significantly higher proportion of antibiotics were supplied on DPR than SBR ($\chi^2 (1, N = 242) = 25.51, P<0.001$) or self-reported ($\chi^2 (1, N = 237) = 8.40, P=0.004$). Self-reported knowledge about antibiotic use/misuse (Adj. OR=0.83, 95%CI: 0.71-0.96; P=.015) and observed availability of a pharmacist in the pharmacy (DPR visit) (Adj. OR=0.53, 95%CI: 0.30-0.95; P=0.033), significantly reduced the likelihood of illegal antibiotic dispensing.

Conclusion. The self-reported illegal antibiotic provision was considerably lower than that found in MS visits. However, all approaches demonstrated high rates. Strict enforcement of regulations related to antibiotic supply in community pharmacies and strategies to improve knowledge and understanding about antibiotic use and misuse among community pharmacists may help to minimize illegal antibiotic supply.

153 How do clinicians and pharmacists assess polypharmacy in a case-based setting?
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Introduction. It is unclear how clinicians and pharmacists assess polypharmacy in practice. A website called What Is Polypharmacy Exactly (WIPE) was developed, which allows users to rate the degree of polypharmacy and potential for harm from medicines, for de-identified cases from practice, which can be accessed via wipe.logicssquad.net/signup.

Aims. To analyse factors such as the presence of drug-drug and drug-disease interactions and their associations with case ratings on WIPE, to gain insight into polypharmacy assessment in a case-based setting.

Methods. A systematic review of existing polypharmacy tools and their validation against patient related outcomes was undertaken. Expert clinicians and pharmacists in this area were surveyed to identify i) their usage of existing validated tools and stated that whilst the number of medicines is important in polypharmacy assessment, drug-drug interactions, high risk medicines, drug-class duplication and drug-disease interactions are also important. 89 users rated cases on WIPE, comprising of 73.0% (n=65) pharmacists, 22.5% (n=20) clinicians and 4.5% (n=4) researchers in the quality use of medicines. Analysis of WIPE cases revealed a mean of 9.2 medicines. Prevalence of drug-drug interactions was 68.0% (n=34), high risk medicines was 60.0% (n=30), drug-disease interactions was 24.0% (n=12) and drug-class duplication was 12.0% (n=6). The total number of medicines, number of high risk medicines and number of drug-class duplication were significantly ($p < 0.05$) associated with higher ratings for polypharmacy and potential for harm from medicines, as assessed by multiple linear regression.

Discussion. Analysis of WIPE data indicates the importance of the number of medicines as well as high risk medicines and drug-class duplication in polypharmacy assessment. Testing the factors that experts indicated as important in other datasets can provide further insight into important considerations for polypharmacy rationalisation in practice.
154  An ethical framework of the responsibilities of pharmacists when selling complementary medicines

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Introduction. The widespread sale of complementary medicines in pharmacies and the lack of evidence for effectiveness available for many complementary medicines raise ethical concerns regarding the responsibilities of pharmacists when selling these medicines. An ethical conflict between evidence-based practice and respecting consumer demand in relation to the sale of complementary medicines in pharmacy is frequently identified in the literature. There is, however, a lack of guidance regarding how this ethical conflict should be resolved.

Aims. To provide practical guidance to pharmacies by developing an ethical framework for the responsibilities of pharmacists when selling complementary medicines.

Methods. Principlism consists in the application of the four bioethical principles to make decisions in healthcare. The bioethical principles include: autonomy, beneficence, non-maleficence and justice. The theoretical resources provided by principlism including reflective equilibrium and specification are used to articulate the responsibilities of pharmacists when selling complementary medicines.

Results & Discussion. Arguments for and against pharmacists selling complementary medicines are examined. The following two aspects of the debate are given particular attention: the need for pharmacists to practice according to evidence and respecting consumer demand for complementary medicines. Harms may be associated with the use of complementary medicines and the imprimatur of pharmacists consists in selling complementary medicines are the arguments provided against the sale of complementary medicines. Following arguments support the sale of complementary medicines in pharmacies: (i) many consumers will still choose to buy complementary medicines whether or not they are sold in pharmacies and (ii) pharmacists can help support the safe use of complementary medicines if they are involved in the sale of complementary medicines. Recognizing this argument helps to identify the responsibilities that pharmacists must fulfill when selling complementary medicines. The key responsibilities include: ensure that all staff in a pharmacy provide evidence-based advice regarding complementary medicines, ensure that consumers are offered advice of a pharmacist and ensure that the pharmacist is available to provide advice regarding complementary medicines. Further specific responsibilities of pharmacists are derived when these key responsibilities are specified in the context of specific cases.

155  Quantifying the relative increase in falls risk due to pregabalin use

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Introduction. Falls are the most common cause of injury resulting in hospitalisation in Australia. Several classes of medications are known to be high risk factors for falls, including anti-epileptic drugs. However, the association between falls risk and the anti-epileptic drug, pregabalin, is currently unknown due to a lack of definitive outcomes resulting from a handful of small studies. This is a significant issue in terms of patient safety, especially when considering the increasing use of pregabalin in Australian patients to manage neuropathic pain; in 2016-2017 pregabalin was ranked 13th highest in total prescription volume (1).

Aims. The aim of this project was to quantify the relative increase in falls risk associated with the use of pregabalin.

Methods. A retrospective cross-sectional study examined hospital records between April 2017 to June 2018 for patients who were admitted to hospital due to falls or who had a recorded fall in hospital; the AHRQ Tool 3I was used to assign a medication fall risk score (MFRS) to each patient.

Results. Hospital records were retrieved from 307 patients; there were 33 patients who were on pregabalin at the time of the fall. The age of patients taking pregabalin ranged from 39-91 with a similar number (14:19) of male and female patients. The average (±SD) MFRS for patients taking pregabalin was 8±3.8 compared with patients who were not taking pregabalin (5±4.3); this was highly significant (t=3.83, p=0.0002). The most common dose of pregabalin was 75mg twice daily (for 14 cases); this likely reflects prescribing trends for pregabalin rather than a dose-related effect. Interestingly the most common cause of fall reported by patients taking pregabalin was that they ‘lost control of their legs’ or that ‘their legs gave out’ (7 cases). Approximately 700 patients received pregabalin over this time period.

Discussion. The falls risk in patients taking pregabalin was higher than patients who were not taking pregabalin. No significant difference was observed between patient sex or the dose of pregabalin that they were receiving. This initial data suggests an increased falls risk in patients taking pregabalin, potentially linked to the pharmacological effect of inhibitory signalling. The impact of polypharmacy needs to be further investigated.

156 Effectiveness of interventions on the appropriate use of opioids for non-cancer pain among hospital inpatients: a systematic review

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Introduction. Opioid-related harms in both primary care and hospital inpatient settings are well documented. Numerous interventions have been trialled to improve the appropriate use of opioids, however, they have yielded mixed findings. No review has been conducted to summarise the effect of interventions addressing opioid use in the hospital inpatient setting.

Aim. To investigate the effectiveness of interventions on appropriate opioid use among hospital inpatients.

Methods. Systematic search of Medline, Scopus, Embase, Cochrane Central Register of Controlled Trials, International Pharmaceutical Abstracts and PsycINFO from database inception to 21 March 2018 by two independent reviewers and discrepancies were discussed with a senior author. Original research articles reporting prescribing and clinical outcomes of interventions on appropriate opioid use among adult hospital inpatients were eligible. Appropriateness was defined as the safe and effective use of opioids guided by evidence-based recommendations. Quality assessment was performed for all included studies.

Results. A total of 41 articles met the inclusion criteria. Of these, 35 studies primarily addressed appropriate opioid use and six articles reported on appropriate opioid use as a secondary outcome. Most primary interventions (37.1%) used a multifaceted approach and pain management was the main outcome measured (42.9%). Multifaceted interventions involving academic detailing and education for health providers and patients, reinforced by hard-copy material and performance feedback showed a trend towards improved appropriate opioid prescribing by 13.0% to 29.5% and reduced pain intensity ranging from 7.0% to 34.5%. The most common intervention types involved a multifaceted strategy, patient monitoring and clinical pharmacist review. The overall risk of bias was high.

Discussion. Interventions involving academic detailing, patient monitoring and education, particularly when reinforced by hard-copy material and audit and feedback, showed promising effects on improving the appropriate use of opioids.

157 Persistence with opioids post discharge from hospitalisation for surgery in an Australian adult cohort

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Introduction. There is potential for inadvertent transition of initial opioid use for acute pain to chronic use, such as in cases of injury or surgery where opioids are initiated for short-term pain relief only. Studies examining opioid use post-discharge from surgical hospital admissions have found between 3% and 10% of people who were opioid naïve prior to surgery were still taking opioids at one year follow-up. The extent to which this pattern is observed in Australia is less clear.

Aims. The aim of this study was to determine the time to opioid cessation post-discharge from hospital in persons who had been admitted to hospital for a surgical procedure who were previously naïve to opioids.

Methods. This is a retrospective cohort study using administrative health claims database from the Australian Government Department of Veterans’ Affairs (DVA). DVA gold card holders aged between 18 and 100 years who were admitted to hospital for a surgical admission between 1st January 2014 and 30th December 2015 and naïve to opioid therapy prior to admission were included in the study. The outcome of interest was time to cessation of opioids, with follow-up occurring over twelve months. The proportion who became chronic opioid users was defined as those who continued taking opioids for greater than 90 days post discharge. Cumulative incidence function with death as a competing event was used to determine time to cessation of opioids post discharge.

Results. In 2014-2015, 24,854 persons were admitted for a surgical admission. The majority were private hospital admissions (93%). In total 3907 (15.7%) were discharged on opioids. The median time to cessation was 8 days. In total 3.9% of those discharged on opioids became chronic users of opioids, receiving more than 90 days of continuous therapy. The opioid that patients were most frequently discharged with was oxycodone; oxycodone alone accounted for 43%, while oxycodone with naloxone accounted for 8%.

Discussion. Opioid initiation post-surgical hospital admission leads to chronic use of opioids in a small percentage of the population. However, given the frequency at which surgical procedures occur, this means that a large number of people in the population may be affected. Post-discharge assessment and follow-up of at-risk patients is important, particularly where psychosocial elements such as anxiety and catastrophising are identified.
Introduction. Fever and pain are two of the most commonly presenting conditions in the Australian healthcare setting. Clinical guidelines provide important and key therapeutic recommendations in the management of these conditions. A community pharmacy is considered as one of the most frequently accessed primarily healthcare services. It is therefore important to understand the views and practices of Australian community pharmacists in pain and fever.

Aims. To investigate and compare the views and practices of Australian community pharmacists in pain and fever management to the relevant clinical guidelines; and to also investigate the views of pharmacists on the recent codeine up-scheduling.

Methods. Community pharmacists were invited to complete an anonymous online survey that was designed to assess: pharmacists’ views and practices on various aspects of pain and fever management; pharmacists’ views and knowledge of clinical guidelines and training; and pharmacists’ views regarding the codeine up-scheduling.

Results. Results showed that: ‘paracetamol’ was preferred over ‘ibuprofen’ for most mild to moderate pain and fever scenarios; majority of pharmacists reported good knowledge of pain and fever management; and most pharmacists believed that clinical experience is just as important as following clinical guidelines. In the context of the codeine up-scheduling, perceived advantages included increased pharmacist/patient engagement, whereas perceived disadvantages included pharmacists losing the ability to recommend codeine in appropriate situations.

Discussion. These findings suggest that pharmacists are in an ideal position to provide education and interventions to assist with the management of pain and fever symptoms. Results indicated that pharmacists appear to value and follow clinical guidelines, however, it was identified that many pharmacists are still undecided on the perceived benefits of the recent codeine up-scheduling.

Prevalence and comorbidities associated with analgesic prescribing for poly-medicated elderly patients

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Introduction. Pain is common in older patients and management guidelines rarely consider the effect of polypharmacy or multiple comorbidities.

Aims. To identify patterns, prevalence and factors associated with analgesic prescribing in older patients.

Methods. Elderly patients (aged ≥ 75 years) admitted to the Royal Adelaide Hospital between September 2015 and August 2016 and on polypharmacy were included, and their comorbidities and medications prescribed at discharge were recorded. Drug burden index (DBI) and Charlson comorbidities index (CCI) were calculated. Number of prescribed medications (NPP) and number of medications increasing the risk of orthostatic hypotension (OD) were recorded. Logistic regression was used to compute the association between analgesic use and participant characteristics, and results were presented as an odds ratio (OR) and 95% confidence interval (95% CI).

Results. 69% (n = 814) of cohort used at least one analgesic agent. Paracetamol (used by 61.2% of cohort), opioids (23.7%) and adjuvants (11.4%) were used more frequently than non-steroidal anti-inflammatory drugs (NSAIDs) (5.5%). Analgesic users had a higher median DBI (OR = 3.03, 95% CI 2.36-3.88), were prescribed more medications (OR = 1.2, 95% CI 1.15-1.26) and were less likely to be male (OR = 0.62, 95% CI 0.48-0.79) compared to non-users. Musculoskeletal diseases (OR = 2.08, 95% CI 1.59-2.73), hypertension (OR = 1.46, 95% CI 1.09-1.95) and falls (OR = 1.87, 95% CI 1.3-2.68) were more prevalent with analgesic users. Opioid use was associated with DBI (OR = 6.97, 95% CI 5.39-9), while adjuvant use was associated with OD (OR = 1.36, 95% CI 1.17-1.57) and CCI (OR = 1.11, 95% CI 1.01-1.22). Adjuvant use was associated with gastro oesophageal reflux diseases (OR = 1.5, 95% CI 1.02-2.23) while NSAID use was associated with pulmonary diseases (OR = 1.94, 95% CI 1.12-3.34).

Discussion: Poly-medicated older patients are presented with multi comorbidities and concurrent medications that can increase risk of analgesic adverse effect.
160 Post-operative prescribing of opioids at discharge from hospital

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Introduction. Opioids play a critical role in the adequate management of acute post-operative pain, however multimodal analgesia forms the mainstay of evidence-based post-operative pain treatment. In August 2017 Post-Operative Adult Discharge Analgesia Guidelines were implemented at Shoalhaven District Memorial Hospital (SDMH) in an attempt to optimise patient analgesia, improve patient safety and minimise variations in practice.

Aims. To evaluate the impact the Post-Operative Adult Discharge Analgesia Guidelines on discharge analgesia prescribing practices on the surgical ward at SDMH.

Methods. A retrospective cohort study of inpatients discharged with an opioid from the surgical ward at SDMH during the periods January to June 2017 (n=119) and 2018 (n=127) was performed. Eight individual components of the guideline were assessed and an overall guideline compliance score calculated.

Results. No statistically significant difference in overall prescribing compliance was observed between pre- and post- implementation groups. Mean total guideline compliance was 63.8% (SD=1.2) in 2017 and 63.5% (SD=1.2) in 2018. A statistically significant difference in patient education (45% in 2017, 17% in 2018) and communication to GP (56% in 2017, 75% in 2018) pre- and post-guideline implementation was observed. NSAID prescribing compliance was the overall lowest performing component (24% compliant in 2017 and 33.3% compliant in 2018). There was a slight but not statistically significant improvement in immediate release and controlled release opioid prescribing compliance post-implementation.

Discussion. There was no change in overall prescribing compliance upon implementation of the guideline. The identified reduction in communication with patients may have been a change in recording of the discussion or perceived reduced need because GPs were being contacted. Passive and active education programs for pharmacists and prescribers are required to address areas of non-compliance particularly education of patients and NSAID use.

161 Formulating an enzyme and antibiotic therapy for untreatable biofilm infections

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Introduction. Biofilms are the cause of 80% of all infectious diseases and play a significant role in the global development of antimicrobial resistance. Importantly, biofilms cannot be eradicated by currently available treatments. To improve the treatment of infectious diseases, a novel combination therapy has been identified that involves the enzymatic break down of the biofilm to potentiate the effect of co-administered antibiotics. To implement this therapy, a formulation strategy is required. Previously, liquid crystal gels formed by glycerol monooleate containing alginate lyase (enzyme) and gentamicin (antibiotic) were shown to be responsive to Pseudomonas lipase.

Aims. To build on from the liquid crystals, a particle based formulation is explored to co-deliver alginate lyase and gentamicin while ensuring enzyme stability in a format amenable for topical delivery with better activity.

Methods. The particle based formulation was investigated for the ability to release alginate lyase and gentamicin with and without the presence of Pseudomonas lipase, using pressure ultrafiltration. Subsequently, the in vitro anti-biofilm effect of the particle based formulation compared to solutions was determined against clinic isolate P. aeruginosa. suicide. The cubosomes harnessed the responsive nature of the liquid crystals to release alginate lyase and gentamicin. However, in comparison to the gel, the cubosomes enhanced the anti-biofilm activity of alginate lyase and gentamicin.

Discussion. While the cubosomes show some anti-biofilm activity alone, the small size of the cubosomes (200 nm), also suggests a possible interaction between the cubosomes and biofilm. Accordingly, the cubosomes formulation will be further investigated to translate this effective enzyme and antibiotic combination as a topical therapy to eradicate untreatable biofilms infections.


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162 Polymeric Lipid Hybrids (PLH) for Intracellular Pulmonary Delivery of Antibacterial Drugs

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Introduction. Delivery of antibiotics directly to the lung as a nanoparticle-based dry powder formulation offers the potential to target tissues and cells infected by intracellular pathogens (e.g. tuberculosis, melioidosis). However, deposition of dry powder to the lung is limited due to particle size, i.e. particles >5um tend to deposit in the upper airways; conversely the dispersion of particles < 1um is not feasible in a dry form while such small particles would be readily exhaled.

Aims. To design and optimize a novel polymeric nanoparticle-lipid hybrid (PLH) drug carrier for dry particle lung delivery of nanoparticles and to specifically target alveolar macrophages infected by intracellular bacteria.

Methods. PLH microparticles were prepared by a two step process of homogenization and spray drying of PLGA nanoparticles-stabilized emulsions. Physicochemical characterization of PLH particles were carried out by SEM, DLS, HPLC, etc. Macrophage uptake studies were accomplished by growing RAW264.7 cell line in Dulbecco’s Modified Eagle’s Medium (DMEM) medium. Particles were labeled with Nile Red and the fluorescence was estimated quantitatively using FACS and qualitatively using confocal microscopy.

Results. Dry PLH microparticles were of an ideal size (5.01±1µm) for dry powder delivery while exhibiting the ability to generate nanoparticles (350 ±50 nm) within 20 minutes when in contact with the aqueous biological environment. The unique combination of PLGA nanoparticles and submicron lipid droplets resulted superior macrophage uptake (> 2 fold increment, Figure 1) compared to conventional PLGA micro- and nanoparticles.

Discussion. Particle size and surface chemistry are two important factors that control macrophage uptake. Higher uptake of PLH microparticles attributed to the re-dispersion to nanoparticle and preferential uptake of the more hydrophobic lipid nano droplet.

163 Pharmacokinetics/Pharmacodynamics (PK/PD) of polymyxin B against isogenic mcr-1 positive and negative Klebsiella pneumoniae

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Introduction. Polymyxins are used as last resort therapeutics against multidrug-resistant Gram-negative ‘superbugs’ including Klebsiella pneumoniae. Polymyxin resistance is primarily mediated by the chromosomal genes, arnBCADTEF and eptA. The plasmid-mediated mcr-1 raises a concern for rapid dissemination of polymyxin resistance. Furthermore, the current recommended dosage regimens of polymyxins are suboptimal and may lead to development of resistance.

Aims. This study aimed to investigate the PK/PD of polymyxin B against an isogenic pair of K. pneumoniae strains with and without the mcr-1 gene.

Methods. K. pneumoniae II-503Δmcr-1 was constructed from a clinical mcr-1-harbouring strain, K. pneumoniae II-503 by allelic replacement. An in vitro dynamic model was employed to investigate the PK/PD of polymyxin B (C90,avg of 1 and 3 mg/L to mimic its PK in patients) against both isolates over 48 h. Emergence of polymyxin resistance was examined using population analysis profiles (PAPs) and the expression of mcr-1, eptA and arnT was accessed using RT-qPCR. In vivo efficacy of polymyxin B was assessed in a neutropenic mouse thigh infection model.

Results. Polymyxin B at C90,avg of 1 and 3 mg/L led to a 1.07±1.24 and 2.74±0.65 Log10 CFU/mL reduction respectively, of K. pneumoniae II-503 at 4 h. The expression of mcr-1 was not affected by polymyxin. An immediate bactericidal effect was observed with polymyxin for mcr-1 negative strain, with 3.72±1.09 and 4.89±1.42 Log10 CFU/mL reduction at 1 h; however, it was followed by the emergence of polymyxin resistance where an increased expression of eptA and arnT was observed. A protective effect against polymyxin B killing by mcr-1 was observed in the infected mice.

Discussion. The mcr-1 was constitutively expressed even in the absence of polymyxin B treatment. Current dosage regimens of polymyxin B is not very effective against mcr-1-harbouring K. pneumoniae and it can lead to the emergence of resistance via chromosomal-mediated resistance mechanisms in mcr-1 negative K. pneumoniae. This study highlights the urgent need for optimising polymyxin combination therapy to minimise the resistance.
164  Cocrystal approach to decrease the dissolution of drugs intended for treating tuberculosis

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Introduction. The aim is to reduce the dissolution of a water-soluble anti-TB drug to increase the treatment success of tuberculosis through pulmonary delivery.

Method. Cocrystal of moxifloxacin, a water-soluble drug, was prepared using trans-cinnamic acid as a by the solution cocrystallization method. The co-crystal was characterized using different physicochemical characterization techniques and dissolution. The powder was also characterized for aerosolization capacity.

Results. Moxifloxacin produced cocrystal with a coformer, cinnamic acid, at 1:1 molar ratio (MCA1:1). The formation of the new crystalline phase with hydrogen bonding was identified by X-ray powder diffraction, infrared and solid-state NMR spectroscopy. Equilibrium solubility and intrinsic dissolution rate measurements for the cocrystal MCA1:1 in phosphate buffered saline (PBS, pH 7.4) revealed a significant decrease in the solubility of moxifloxacin (from 17.68 ± 0.85 mg mL−1 to 6.10 ± 0.05 mg mL−1) and intrinsic dissolution rate (from 0.469 ± 0.04 mg cm−2 min−1 to 0.139 ± 0.03 mg cm−2 min−1) compared to the supplied moxifloxacin. The aerosolization behaviour of the cocrystal powder from an inhaler device, Aerolizer®, using a Next Generation Impactor (NGI™) showed a fine particle fraction of 30.4 ± 1.2% with mass median aerodynamic diameter 4.5 ± 0.2 µm. Further, the dissolution behaviour of a fine particle dose of respirable particles collected using a modified Twin Stage Impinger (mTSI) was assessed in a small volume of stationary mucus fluid using a custom-made dissolution apparatus. The respirable particles of cocrystal also showed lower dissolution (microscopic observation) and permeation rate (0.045 ± 0.004 µg cm−2 min−1) compared to the supplied moxifloxacin (0.091 ± 0.009 µg cm−2 min−1).

Discussion. This study concluded that MCA1:1 had a lower solubility and dissolution rate than moxifloxacin and could improve the local residence time and therapeutic action in the lungs.

165  Liposome encapsulation of a novel antimicrobial compound improves solubility and reduces toxicity in vitro.

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Introduction. Despite broad-spectrum antibacterial activity, the use of novel compound USA987 is limited due to its low aqueous solubility and narrow therapeutic index.

Aims. To develop USA987 incorporated liposomes to improve the solubility and reducing the toxicity.

Methods. Six different USA987 loaded liposome formulations have been developed using a solvent evaporation method. Characterization of the developed formulations has been conducted and included measurement of size and zeta potential via dynamic light scattering (DLS). Drug loading and encapsulation efficiency were analyzed by using HPLC. Assay of in-vitro cytotoxicity was conducted to assess the safety of the developed formulations compared to pure drug via MTT Assay with two different cell lines; HEK-293 and MDCK along with fluorescent imaging to determine any morphological change.

Results. Developed liposome formulations showed improvement in solubility >500 fold. Moreover, DLS indicated the size to range from 100-200nm. The encapsulation efficiency of the liposomes was 99% with more than 11% drug loading. In-vitro cytotoxicity assays showed a significant decrease in toxicity (>50%) in comparison to the pure compound.

Discussion. Our results indicate that USA987 loaded liposomes hold promise as a safe and effective therapeutic agent.
Isolation, characterisation and formulation of novel *K. oxytoca* phages for in-vivo delivery

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**Introduction.** Antibiotic resistance has become a significant issue worldwide. *Klebsiella oxytoca* (*K. oxytoca*) is part of the normal flora in the human gut. It is a causative agent in up to 50% of cases of antibiotic-associated haemorrhagic colitis with bloody diarrhoea. Bacteriophages (phages) capable of killing bacteria offer a potential alternative to antibiotics. **Aims.** Isolation, characterisation and formulation of novel phages lytic for *K. oxytoca*. **Methods.** These phages were isolated and characterized morphologically using electron microscopy and phenotypically by deducing their host range. Their genomes were analysed by Next Generation Illumina sequencing. ORFs were identified by glimmer 3 and putative functionality ascribed to predicted protein sequences based on proteins in the NCBI database. To prepare for the formulation of these phages into various dosage forms, they were lyophilised with phosphate-buffered saline (PBS) alone as well as in PBS with 1M sucrose as stabiliser. **Results.** *K. oxytoca* phages had dsDNA genomes ranging in size from 37 kb to 44 kb. These phages contained no identified lysogenic or toxin genes and potentially could be useful in phage therapies. When phages were lyophilized with PBS or PBS with 1M sucrose, there was no decrease in phage lytic capacity upon re-solubilisation. **Discussion.** The results show that lyophilisation will not decrease phage lytic capacity, and so can be used to allow storage of phages and formulation with other medication. Subsequent experiments will involve assessment of stability of *K. oxytoca* phages following lyophilisation and formulation with a proton pump inhibitor drug (omeprazole) and trial in animal models. The proton pump inhibitor drug will allow lowering of stomach acidity, which may be important for survival of phages when delivered orally.