UNSW PAEDIATRIC ILP AWARDS
2nd Annual UNSW Paediatric Research Week
Wednesday 12th November 2014
It is with great pleasure that I welcome you to the 2nd Independent Learning Project (ILP) Awards.

The ILP is a great opportunity for medical students to undertake a research project in paediatrics as part of their undergraduate course at UNSW and we are fortunate in that we have many great supervisors who regularly take students under their wing.

The ILP presentations last year stood out as one of the most successful events during research week and I am grateful to all the ILP students who submitted abstracts for consideration for presentation this year.

The standard was extremely high making it very difficult to choose the final four. I would like to congratulate the finalists who will be presenting their work today.

We have two prizes to be awarded – Overall Winner and People’s Choice. Therefore don’t forget to vote for your favourite presentation. The winners will be announced at this Friday’s UNSW Paediatric Research Showcase.

I would like to thank Dr Sean Kennedy, Discipline of Paediatrics Director of Education and Sam McFedries, Research Coordinator for organizing this event.

If you would like further information about potentially supervising an ILP student in the future, please contact Samantha McFedries, Research Coordinator s.mcfedries@unsw.edu.au

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**PROGRAMME OVERVIEW**

**WELCOME:**

12:55PM  Chair: Dr Sean Kennedy  
_Senior Lecturer;  Director of Education_  
_Discipline of Paediatrics, School of Women’s & Children’s Health, UNSW Medicine_

**FINALISTS PRESENTATIONS:**

1:00PM  David Chan  
_Supervisor/s:_ Dr Jordan Wood; Conjoint A/Prof David Champion  
_Project Title:_ Survey or patients and parents about the pain experience at and after discharge following appendicectomy at Sydney Children’s Hospital.  
_Abstract:_ Page 10

1:15PM  Bernadette Cameron  
_Supervisor/s:_ Dr Sean Kennedy; Dr Fiona Mackie  
_Project Title:_ The natural history of CMV, EBV and BKV viraemia in paediatric renal transplant recipients receiving valganciclovir prophylaxis.  
_Abstract:_ Page 8

1:30PM  Kenneth Chew  
_Supervisor/s:_ Dr Michelle Farrar; Dr John Widger  
_Project Title:_ The impact of nutrition on respiratory function in Duchenne Muscular Dystrophy.  
_Abstract:_ Page 13

1:45PM  Jasmine Chan  
_Supervisor/s:_ Conjoint A/Prof Avi Lemberg; Dr Steven Leach  
_Project Title:_ Tacrolimus Use in Inflammatory Bowel Disease.  
_Abstract:_ Page 11
In 2013, the Discipline of Paediatrics offered (for the first time) Independent Learning Project (ILP) students the opportunity to submit abstracts on the research they had been undertaking, competing to win one of two UNSW Paediatrics ILP Awards.

In 2014, all UNSW Medicine students who were completing their ILP that year in the field of paediatrics were invited to enter. The Discipline received 17 abstracts that were scored by a review panel. Four finalists were selected and will present their work at this special, Sydney Children’s Hospital Grand Rounds.

Judges will decide the Overall Winner based on today’s oral presentations.

The audience will cast their votes at the end of the presentations, which will determine the People’s Choice Award.

The winners of both awards will be announced at the 2nd Annual Paediatric Research Showcase held on Friday 14th November in the John Beveridge Lecture Theatre, Level 1, Sydney Children’s Hospital. The announcement will be made at approximately 2:05pm.

**WHAT ARE INDEPENDENT LEARNING PROJECTS (ILP)?**

The Independent Learning Project (ILP) is intended to provide UNSW medical students with a period of in-depth study that engenders an approach to medicine that is constantly questioning and self-critical.

The ILP is undertaken in Phase 2 of the undergraduate medicine program at UNSW.

The ILP aims to promote lifelong learning patterns and skills which will enable them to approach future medical challenges in their careers with a rigour and depth not possible without a detailed knowledge of the formal processes of research, literature appraisal, data collection, analysis and presentation.

By the end of the ILP the students will be expected to achieve the following specific goals:

- An ability and inclination to question the basis of current scientific thinking in relation to medical and public health practice.
- To retrieve literature on a topic and demonstrate a familiarity with the use of medical databases.
- To evaluate current knowledge in a field and to provide a critical appraisal of that body of knowledge.
To identify a problem in their chosen field and to understand and participate in the process of designing a scientific investigation of the problem.

To be aware of the ethical issues involved in medical research as applied to their area of study.

To critically evaluate data including the appropriate use and application of analytical procedures.

JUDGING CRITERIA
ILP abstracts submitted as entries for the awards were scored based on the following criteria:

Please provide a score out of 7 for each abstract.

Try and use a range of scores to help us differentiate the better abstracts. A score of 7 would be outstanding and appropriate for an abstract that could be selected for an oral presentation at an international meeting.

They have been de-identified, but if you feel you have a conflict of interest regarding an abstract, please score 0 and leave a comment.

Questions to consider when scoring each abstract include:

- Is it well written with a clear and logical structure?
- Are the methods appropriate and adequately described?
- Are the results meaningful?
- Are the conclusions justified?
- Does there appear to be a significant amount of work in the study?
- Would it make an interesting oral presentation?

ACKNOWLEDGEMENTS
Thanks to Dr Sean Kennedy, Senior Lecturer and Director of Education for the Discipline of Paediatrics who developed the concept of the ILP Awards.

Thanks also goes to our review panel who kindly scored all 17 written abstracts; and to those that will be judging the oral presentations today.

Thanks also to the students supported by their supervisors, who submitted abstracts for the awards.

Objective:
The objective of this study is to determine the incidence of transfusion associated necrotising enterocolitis (TANEC) in premature infants born <32 weeks before and after the implementation of an enteral feeding regime to withhold feeds during transfusions.

Methods:
A retrospective cohort study was conducted on all neonates admitted to the Royal Hospital for Women’s Neonatal Intensive Care unit between January 2010 and December 2013 who received a packed red blood cell transfusion. TANEC was defined as NEC occurring within 48 hours after a blood transfusion.

Results:
A total of 17 out of 225 infants developed NEC (7.6%) during the study period. Of these, 5 were cases of TANEC and all 5 cases occurred in the pre-implementation period. This equated to a reduction in the incidence of TANEC from 4% to 0% (p= 0.065). There was also a non-significant reduction in the incidence of NEC from 9% to 6% after the introduction of the feeding regime. Baseline characteristics between the pre- and post-regime epochs were not different. TANEC cases were found to have developed NEC at a significantly younger postnatal age than non-transfusion associated NEC cases.

Conclusion:
The incidence of NEC decreased after the implementation of a new feeding regime. There were no cases of TANEC after the introduction of the new restricted feeding regime during transfusions. With no differences in baseline characteristics seen between the 2 cohorts, withholding feeds during transfusions may have benefits towards reducing the incidence of TANEC. Further larger studies are needed to confirm these findings.
The natural history of CMV, EBV and BKV viraemia in paediatric renal transplant recipients receiving valganciclovir prophylaxis.

Student: Bernadette Cameron

Supervisor/s: Dr Sean Kennedy; Dr Fiona Mackie

Background: Cytomegalovirus (CMV), Epstein Barr Virus (EBV) and Polyomavirus (BKV) are important causes of morbidity in paediatric renal transplant recipients (PRTRs) 1,2. This study aimed to describe epidemiology of these viraemia in children who received antiviral prophylaxis after transplant.

Methods: This study retrospectively assessed data on 35 PRTRs at Sydney Children’s Hospital from 2008-2014. Viraemia incidence, risk factors and outcomes and valganciclovir prophylaxis efficacy were examined. Serial viral monitoring was performed using plasma polymerase chain reaction. The primary endpoint was viraemia occurrence and/or timing.

Results: 14, 8 and 12 children experienced CMV, EBV and BKV viraemia respectively. During prophylaxis, 2 episodes of EBV viraemia and no CMV occurred. Shorter prophylaxis duration was associated with increased CMV viraemia (p=0.044). There was an inverse correlation between valganciclovir dose adjusted for renal function and body surface area (BSA) and EBV incidence and timing (p=0.017, 0.013 respectively). 50% of CMV infections were symptomatic. There were no cases of EBV associated post-transplant lymphoproliferative disorder. BKV viraemia was associated with higher doses of mycophenolate (p=0.008). Acute rejection and/or BK associated nephropathy occurred in 50% of all BKV viraemia. BKV was not associated with CMV or EBV incidence.

Conclusion: Valganciclovir prophylaxis may effectively prevent CMV and EBV. Increasing prophylaxis duration to 12 months and adjusting dose monthly for BSA and creatinine clearance could further decrease CMV and EBV viraemia. This study calls for more research on valganciclovir in PRTRs to validate these findings and explore implications in terms of cost and adverse effects.

‘CAT NaP’ (Carers AT Night in Paediatric oncology): Trialling a ward-based sleep intervention for parents of children with cancer.

Student: Bridget Cavanagh

Supervisor/s: Dr Claire Wakefield; Dr Jordana McLoone

Background: Given the complex profile of late effects childhood cancer survivors (CCS) may experience it is crucial that current long-term follow-up (LTFU) services are regularly evaluated. This study explored the opinions of CCS (or their parents) with regards to their experience of LTFU care; in particular, LTFU clinics.

Procedure: A total of 16 CCS and 10 parents of CCS under 16 were interviewed over the telephone. The interviews were transcribed and analysed for emerging principal themes pertaining to their experience of LTFU care.

Results: Under half of the participants (n=12) had attended a LTFU clinic, and some (n=8) had not received any LTFU care. Lack of awareness of LTFU care services and perceived irrelevance of these services were barriers to accessing LTFU clinics. Many participants were satisfied with their current LTFU care and many appreciated LTFU clinics for the convenience of having a ‘one-stop-shop’, free of charge, appointment with a variety of specialists. However, participants described a need to transition from paediatric care into adult services, and a need for more information pertaining to late effects.

Conclusion: Overall, most participants were satisfied with their current level of LTFU care. Alterations to current LTFU care models such as; scheduling subsequent appointments immediately after the conclusion of each appointment, ensuring all CCS retain some level of contact with their treating hospital and the provision of more information pertaining to late effects, may optimize the benefits CCS receive from these services.
Background: Published literature suggests that pain following paediatric short-stay surgery may be problematic, particularly following from hospital. Potential child-related risk factors for increased pain include pain catastrophising, anxious depression, and negative attitudes towards medication.

Objectives: The objectives of this study were twofold. First; to investigate paediatric post-discharge pain outcomes. Second; to examine the child-related risk factors which may predict increased post-discharge pain.

Methods: This prospective observational study surveyed children aged 3-14 undergoing short-stay tonsillectomy or appendicectomy, and their primary caretakers. Parents and children completed a pre-discharge questionnaire assessing pain catastrophising, anxious depression, and negative attitudes to medication. Participants were then surveyed for ten-days post-discharge using electronic questionnaires loaded on iPod Touch™ devices, examining pain outcomes, functional limitation, and medication behaviours.

Results: This report presents an interim analysis of an ongoing study. Children (n = 26) experienced moderate peak pain intensities in hospital and at time of discharge. Post-discharge, it took a median of nine days until patients reported no pain. Tonsillectomy patients experienced higher post-discharge pain than appendicectomy patients (t(24) = 2.545, p < .05), and anxious depression was strongly correlated with a longer recovery period (r = .702, p < .05); other analyses did not reach statistical significance due to low power.

Conclusions: Post-discharge pain in children is problematic. Future research needs to further examine risk factors and use a specific model to frame hypotheses. Targeted interventions to reduce unhelpful pain catastrophising, anxious depression and negative attitudes towards medication utilization may be beneficial in the short-stay surgical context.

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Objectives: The management of inflammatory bowel disease (IBD) remains a challenge in patients with acute severe colitis or refractory disease. To avoid surgery, patients are generally willing to try the more potent second-line immunosuppressants, such as tacrolimus. The aim of this study is to evaluate the short- and long-term efficacy and safety of oral tacrolimus in paediatric IBD patients.

Methods: A retrospective chart review was conducted on all paediatric IBD patients who were prescribed tacrolimus. Data were collected for all included patients at baseline, then every subsequent clinic visit up to the cessation of tacrolimus or 12 months following initiation of tacrolimus therapy. Details of disease activity, clinical symptoms, inflammatory markers, growth, adverse events and colectomy rate were gathered and analysed.

Results: A total of 28 patients were included. Thirteen patients (46.4%) achieved remission with tacrolimus and all remissions were induced by approximately 6 months of treatment. Significant improvement was observed in daily stool frequency and across all inflammatory markers. Weight was significantly improved in patients who achieved disease remission with tacrolimus (p = 0.001). Colectomy rate at 5-year was at 28.6%. At the cessation of tacrolimus, patients in remission had a lower 5-year colectomy rate than patients with active disease (7.7% as compared to 46.7%) (p = 0.038).

Conclusions: This study demonstrated that oral tacrolimus is generally well-tolerated, reduces disease activity, improves clinical symptoms and inflammatory markers, increases growth and assist in delaying or avoiding colectomy in paediatrics patients with refractory and acute severe diseases.
Purpose: Childhood cancer survivors are a small-volume but high-risk population [1]. Effective management of complex physiological and psychological treatment-related effects requires life-long follow-up care [2], in which primary care physicians (PCPs) may be able to play a key role [3]. We sought to explore the perspective of survivors and their parents regarding this model of care.

Methods: Qualitative, in-depth, semi-structured telephone interviews were conducted by a clinical psychologist with 26 survivors (or their parents) recruited from four hospitals in Australia. Participants were asked about their use of primary health-care services, pattern of attendance, confidence in their PCP, and any barriers or suggested improvements to the care provided by their PCP. Interviews were recorded, transcribed and content-analysed using NVivo9 software.

Results: Fourteen survivors and twelve parents of survivors participated in the study. Only five participants considered their PCP to be the primary person responsible for their follow-up care. Despite this, participants described three major roles currently played by their PCPs: (1) management of general ailments; (2) initial investigation of a cancer-related symptoms; and (3) care coordination and referral. Most participants did not see their PCP for cancer-specific care, due to perceptions that (1) PCPs were disengaged; (2) PCPs were less knowledgeable or ill-equipped; and (3) PCPs did not have a role to play regarding childhood cancer survivorship care. They suggested the following improvements for PCPs: (1) undergoing additional training to become more informed; and (2) increased communication with each survivor’s treating oncologist or long-term follow-up clinic.

Conclusions: Although survivors and their parents expressed doubts regarding the potential role of PCPs in childhood cancer follow-up care, these concerns may be addressed with the proper interventions. More research is required to investigate the feasibility of these options.

Student: Joanne Cheng
Supervisor/s: Dr Jordana McLoone; Dr Claire Wakefield

Background: The multidisciplinary care of Duchenne Muscular Dystrophy (DMD) incorporates management of nutrition and the respiratory system, however the effect of nutritional status on respiratory function in DMD is poorly understood. The present study examined the impact of nutritional status on respiratory function in DMD to guide further treatment strategies.

Methods: Anthropometric and respiratory parameters (Body mass index (BMI) z-scores, forced vital capacity (FVC) and forced expiratory volume in one second (FEV1)) were retrospectively analyzed with a mixed linear model in 34 DMD patients to determine possible associations. Cross-sectional analysis of cough peak flow (CPF) in both upright and supine positions and body fat mass was examined in 11 DMD patients to determine a relationship if any.

Results: Respiratory function in DMD patients was significantly related to nutrition (P < 0.001), age (P < 0.05) and mobility (P < 0.001). DMD patients with greater weight had increased respiratory function, even when adjusting for age, mobility status and weight category, with a 1 unit increase in BMI z-score associated with a 5.69% increase in FVC% predicted (P < 0.001). CPF values were significantly lower in the supine compared to the upright position (P = 0.005), however the small sample size in this part of the study prevented any further statistical analysis.

Conclusion: The present study reinforces the importance of weight management in DMD children, showing that children who maintain a higher weight profile will have better respiratory outcomes. In addition, attention to body position when performing airway clearance techniques, especially in unwell patients, will maximize the effectiveness of these important treatments.

Student: Kenneth Chew
Supervisor/s: Dr Michelle Farrar; Dr John Widger
Purpose: To investigate the incidence of infundibular stenosis and other abnormalities in the contralateral kidney of children with unilateral multicystic dysplastic kidneys and to determine the rate of involution of the multicystic dysplastic kidneys.

Materials and Methods: A retrospective review of medical records of all patients under the age of 18 who presented to Sydney Children’s Hospital between the years 1997 – 2014 and were diagnosed with a multicystic dysplastic kidney.

Results: Records were retrieved on 65 children. Complete involution of the multicystic dysplastic kidney was seen in 29% with an overall rate of involution of 0.37 mm/month. Compensatory hypertrophy of the contralateral kidney has occurred in 54%. Ultrasound abnormalities affecting the contralateral kidney were seen in 44% at or soon after birth. Four patients (6%) were identified to have infundibular stenosis. Vesicoureteral reflux was found in 22%, 66% of those had abnormalities on ultrasounds. Obstruction either at the pelviureteric or the vesicoureteric junction of the contralateral kidney was found in 19%.

Conclusion: The prevalence of infundibular stenosis is relatively high however this could be due to an ascertainment bias. The high prevalence of other abnormalities in the contralateral kidney largely affirms what is known in the current literature, and supports the recommendation for ongoing surveillance of these children.

Student: Cher Wei Chuah
Supervisor/s: Dr Sean Kennedy; Dr Elizabeth Dally

Acute Kidney Injury in Sydney Children’s Hospital Intensive Care Unit

Aim: To report the epidemiology of acute kidney injury in Sydney Children’s Hospital intensive care unit (ICU).

Background: Acute kidney injury (AKI) is associated with high mortality and poor outcomes in critically ill children. Currently there is limited evidence describing AKI incidence and prognosis in this population. Here we present our findings for Sydney Children’s Hospital as part of the international Assessment of Worldwide AKI in Pediatrics, Renal Angina and Epidemiology (AWARE) study.

Methods: Recruitment of consecutive patients aged older than 90 days admitted ICU for at least 48hrs was undertaken from 18/02/14 until 18/05/14. Clinical data including ventilation, vital signs, fluid balance, blood chemistry and medications were collected daily to determine the risk, incidence, and severity of AKI.

Results: Out of 304 children admitted to SCH ICU over the study period, 80 were eligible for inclusion (mean age 3.9±4.6 years). 17 of the 80 patients (21%) developed AKI (defined by >1.5 times increase in serum creatinine). 9 had evidence of AKI at admission. The other 8 all developed AKI within 7 days of admission. The greatest risk factor for the development of AKI was an admission diagnosis of major trauma (RR 5.8 [3.3 to 10.3], P<0.0001). Other significant risk factors included receiving inotropic, nephrotoxic or diuretic medication, and needing resuscitative fluids and ventilation. Patients who had AKI at admission. The other 8 all developed AKI within 7 days of admission. The greatest risk factor for the development of AKI was an admission diagnosis of major trauma (RR 5.8 [3.3 to 10.3], P<0.0001). Other significant risk factors included receiving inotropic, nephrotoxic or diuretic medication, and needing resuscitative fluids and ventilation. Patients who had AKI had a longer ICU length of stay (11.6±7.4 days compared to 6.4±5.2 days in non-AKI patients). Of patients who received invasive ventilation, those with AKI were ventilated for longer (6.3±6.8 days compared to 5.0±4.9 days). No patients required dialysis or died as a result of AKI.

Student: Madeleine Didsbury
Supervisor/s: Dr Sean Kennedy; Dr Fiona Mackie
**NEONATOLOGY**


**Student:** Morgan Haines  
**Supervisor/s:** Conjoint A/Prof Julee Oei; A/Prof Mohamed Abdel-Latif (ANU)

**Background:** Extremely low gestation age infants (ELGANS, born 22-27 weeks gestation) may not survive without active resuscitation and admission into a neonatal intensive care unit (NICU). It is unclear whether changes underlying these practices over the last decade have occurred.

**Aim:** To determine rates of resuscitation, neonatal intensive care unit (NICU) admissions and mortality for all infants born between 22 to 27 weeks gestation and/or birthweight <1500g in New South Wales (NSW), Australia, between 1998-2011.

**Methods:** Linked population de-identified perinatal and mortality data for 6474 ELGANS were examined. The infants were divided into two birth cohorts: 1998-2004 (n= 2072), 2005-2011 (n=2207) and stratified by resuscitation, nursery admission and survival.

**Results:** Resuscitation occurred significantly less in epoch 2 though infants were significantly heavier at birth (823.9(197.9) vs 849.2(202.0), p<0.001). NICU admission occurred less in cohort 2 (80.6% vs 74.7% OR 0.709(0.61-0.82) and significantly more infants had Apgar score < 5 at 5 minutes(33.4% vs 40.6% OR 1.37(1.25-1.55). Survival without NICU admission rarely occurred. Survival to discharge was significantly lower in epoch 2 which had increased neonatal death after admission (24.8% vs 42.2% 2.21(1.91-2.56)).

**Conclusion:** Resuscitation rates and NICU admissions for 22-27 week gestation infants have significantly decreased after 2005. Mortality rates of either all live born or admitted infants have also not changed. The impact of consensus guidelines1 therefore have not markedly altered practice for the management of ELGAN infants within the last decade.

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**GASTROENTEROLOGY**

Climatic factors and distal intestinal obstruction syndrome in cystic fibrosis

**Student:** Jasmine Lau  
**Supervisor/s:** Dr Keith Ooi; Dr Usha Krishnan

**Objective:** Distal intestinal obstruction syndrome (DIOS) is a gastrointestinal complication of cystic fibrosis (CF). Dehydration has been raised as a suspect environmental risk factor of DIOS. The aim of this study was to continue investigating the potential influence of climate, namely measures of ambient temperature and rainfall, in the development and onset of DIOS symptoms.

**Design:** Hospitalisations of DIOS episodes were retrospectively identified over a twelve-year period (1st January 2000 to 31st December 2012) at Sydney Children’s Hospital, Randwick. Data was collected regarding maximum and mean temperatures for the day of admission, week prior to admission and season of admission. Data was also collected regarding the total rainfall for the day of admission, week prior to admission, season of admission and year of admission.

**Results:** There were 27 episodes of DIOS episodes identified among 17 patients. The maximum temperature of the week prior to DIOS admission was significantly higher than the maximum temperature of the season. There was no statistically significant difference between rainfall in the week prior to admission compared with rainfall in the season and year of admission. After logistic regression analyses, ambient temperature and rainfall levels were not predictors of the onset of DIOS symptoms.

**Conclusions:** The underlying pathophysiology of DIOS in CF may be influenced by high ambient temperatures, but not rainfall. Ambient temperature and rainfall had low predictive power over the onset of DIOS symptoms. Additional climatic factors, particularly ambient moisture (i.e. humidity), may have a potential influence on the development of DIOS in CF.
The influence of plastic wrapping on admission temperature and hospital outcomes in preterm infants 28-30 weeks gestation

Student: Raina Loh

Supervisor/s: Dr Srinivas Bolisetty; Dr John Smyth

Background: Hypothermia carries significant mortality and morbidity in preterm neonates. While plastic wrapping at birth is a standard recommendation for infants born at <28 weeks gestation, the Neonatal Intensive Care Unit (NICU) at the Royal Hospital for Women (RHW) extended this, in 2008, to include infants of 28-30 weeks gestation.

Objective: The study aims to assess the safety and efficacy of extending plastic wrapping in this older gestational age group.

Methods: This a retrospective cohort study of preterm infants <31 weeks gestation born at RHW between 2003 and 2013. The period is divided into Epoch 1 (2003-2007) and Epoch 2 (2008-2013), encompassing infants born pre- and post-extension of plastic wrapping, respectively. Hypothermia is defined as an admission skin temperature of <36.0°C, normothermia as 36.0-37.5°C, and hyperthermia >37.5°C.

Results: Of the 773 infants, 195 (25.2%) were hypothermic, 545 (70.5%) normothermic, and 33 (4.3%) hyperthermic. Admission temperature showed an upward trend (R² =0.71 for 23-30 weeks; R²=0.80 for 23-27 weeks; and R²=0.63 for 28-30 weeks). Mean post-extension admission temperature was significantly higher (36.6°C vs. 35.9°C for 23-30 weeks; 36.4°C vs. 35.6°C for 23-27 weeks; and 36.7°C vs. 36.0°C for 28-30 weeks). Post-extension hyperthermia incidence among infants 28-30 weeks gestational age was significantly higher (8.1% vs. 1.4%; p=0.001). The outcomes of hyperthermic and normothermic infants were similar.

Conclusion: The results suggest that plastic wrapping could improve infants’ admission temperatures in both 23-27 weeks and 28-30 weeks gestational age groups. However, hyperthermia in the 28-30 weeks group would require further study.

A 10-year Retrospective Audit on Respiratory Support in Premature Infants with Respiratory Distress in a Regional Centre

Student: Elaine Ng

Supervisor/s: A/Prof John Preddy; A/Prof Rakesh Seth

Wagga Wagga Rural Clinical School

Aim: To review the modes of treatment and outcomes for preterm infants with respiratory distress (RD) managed in a regional hospital over a 10-year period.

Methods: Infants born in Wagga Wagga Base Hospital between 2003 and 2013 were included if they were between 32 and 37 weeks gestation, had a supplemental oxygen requirement and RD for more than 4 hours. Information collected from medical records included patient characteristics, mode and duration of respiratory support, patient outcomes, including adverse effects and up-transfer.

Results: 74 infants met the inclusion criteria. 9 (12%) of babies did not receive any antibiotic treatment, and of these 7 had significant risk factors for neonatal sepsis. There was a clear trend of increasing CPAP use from 2007 onwards, with a concomitant decrease in head box oxygen use. A total of 21 babies were transferred to a neonatal unit, of these 10 babies continued to be managed with CPAP and thus may not have required up-transfer of care.

Conclusions: This study has demonstrated that there has been a clear change in the management of RD in the last 10 years. Our study highlights the need for uniform guidelines in order to optimize the management of RD in NSW SCNs, including protocols on non-respiratory supportive measures such as antibiotics as well as appropriate transfer thresholds. Such a protocol may assist in reducing transfers of infants being successfully managed with CPAP and thus may not have required up-transfer of care.
Pancrætic transdifferentiation in Type 1 Diabetes Mellitus.

**Student:** Anita Puvanendran

**Supervisor/s:** Dr Daniel Hesselson
*The Garvan Medical Research Institute*

Type 1 Diabetes Mellitus (T1DM) is an increasingly diagnosed disease in Australian children and there is a growing need for new therapeutic strategies to overcome the high rates of complications as a result of T1D.

This project focuses on a beta cell regeneration method known as pancreatic transdifferentiation, which involves repressing a transcription factor in the pancreas, Ptf1a, to cause the transdifferentiation of acinar cells to beta cells.

We developed a novel functionalised CRISPR/Cas9 system to specifically repress gene transcription and demonstrate that we are able to purify soluble recombinant protein in bacteria and that this protein is non-toxic in an in vivo zebrafish bioassay.

Future studies will focus on conjugation of the repressor protein with a cell penetrating peptide to test whether Ptf1a repression stimulates beta cell regeneration in pre-clinical T1DM models.

Comparing cognitive aids in the management of paediatric cardiac arrest using simulation: A prospective pilot feasibility study

**Student:** Rebecca Singer

**Supervisor/s:** Prof Adam Jaffe; Dr Arjun Rao

**Introduction:** The infrequent nature of paediatric cardiac arrest can result in errors in management due to lack of practice. Visual cognitive aids provide easily accessible information, improving adherence to best practice guidelines. However, there are practical difficulties in assessing cognitive aid use and design. We aimed to prospectively study if algorithm choice and design impacted management of paediatric cardiac arrest and appraise the use of the simulation environment to study this impact.

**Methods:** 41 participants were recruited. Simulations took place in groups of 3-7 individuals. Each group was supplied with either an APLS or ARC published algorithm suitable to the scenario. An observer collected data during the scenario and participants were asked to fill out a survey following the simulation. Outcome measures included appropriate identification of steps in management, delays in aspects of care, correct dosing and ease of use of the algorithm.

**Results:** Nine scenarios (APLS, n=5; ARC, n=4) were run and 41 participants (APLS, n=24; ARC, n=17) were recruited. The majority of participants were medical students. There was a significantly shorter time from the second shock to adrenaline administration in the ARC groups (p<0.05). There were no other significant differences in management or participant rating. There were several clinically interesting differences, particularly concerning delays in key management steps. We showed the feasibility of the simulation environment for studying the functional utility and design of cognitive aids. Sample size calculations were performed and a minimum sample size of 30 scenarios per group would be needed for significance across most parameters.

**Conclusions:** We have demonstrated the feasibility of the simulation environment to compare cognitive aids in paediatric cardiac arrest. Several clinically interesting differences were noted; consequently, a higher power study should be performed using similar study design to assess if these are true proportions.
There is increasing interest in the role of buprenorphine, a mu opioid receptor (MOR) partial agonist and kappa opioid receptor (KOR) antagonist, for the pharmacological treatment of maternal heroin dependence during pregnancy and neonatal abstinence syndrome (NAS), as an alternative to methadone. However, the endogenous opioid system plays a critical role in modulating neurodevelopment and perinatal buprenorphine exposure may significantly affect this process. In order to predict these possible effects of perinatal buprenorphine exposure on neurodevelopment, we utilised double-labelling immunohistochemistry to define MOR and KOR protein expression in normal developing rat brain from embryonic day 16 (E16) to postnatal day 23 (P23).

KOR was expressed on neural stem and progenitor cells (NSPCs) of the ventricular zone (VZ) and subventricular zone (SVZ); choroid plexus (CP) epithelium; a subpopulation of neurons and oligodendrocytes in postnatal cortex; and in NSPCs and a subpopulation of neurons in postnatal hippocampus. MOR expression was low and primarily associated with a subpopulation of immature and mature neurons in embryonic SVZ and postnatal cortex.

KOR expression on NSPCs, neurons and oligodendrocytes in critical regions of developing rat brain in distinct temporal and regional patterns indicates the potential for opioid drugs such as buprenorphine to alter normal neurodevelopment. KOR expression on CP epithelium also suggests that buprenorphine could possibly influence the secretion of trophic factors, synthesis of cerebrospinal fluid (CSF) and fluid interchange across this critical blood-CSF barrier.

Exogenous opioids should therefore be used with caution during the perinatal period until their precise mechanisms are better understood.