

CHARM

CANBERRA HEALTH
Annual Research Meeting

— PROGRAM —

31 July – 2 August 2018

Canberra Hospital Auditorium

Day 1: Heart Foundation Research Day

Day 2: Managing Chronic Conditions – the future is now

Day 3: ACT Research in Focus

Celebrating Health Research in the Canberra Region



**Professor
Sami Visken**



**Professor Sir
Harry Burns**



**Professor
Maree Teesson**





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WELCOME FROM PROFESSOR ROSS HANNAN ACT HEALTH EXECUTIVE DIRECTOR OF RESEARCH



It gives me great pleasure to welcome you to the 2018 Canberra Health Annual Research Meeting (CHARM).

In a time of population growth and increasing disease burden, the goal of a sustainable health care system is a key area for research, education and practice, which is critical to global health. CHARM 2018 will explore how interdisciplinary research can contribute to fulfilling this goal.

CHARM continues to be an excellent forum for showcasing health research in the Canberra region, providing opportunities for networking, collaboration and capacity building for researchers and clinicians in the ACT and beyond.

CHARM has been organised by the ACT Health Research Office, in collaboration with the Heart Foundation and representatives of ACT universities. I acknowledge the contribution of each of these institutions as well as the CHARM scientific review committee.

I would also like to acknowledge and thank the many sponsors for their generous support of this meeting.





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Deputy Chair: Diana Perriman	ACT Health
Treasurer: Kasia Bail	University of Canberra
Administrative Support: Cath Rollinson	ACT Health
Claire White	Heart Foundation ACT
Alison Lancaster	ACT Health
Ned Jelbart	ACT Health
Rachel Bacon	University of Canberra
Vivienne Moyle	University of New South Wales Canberra
Sean O'Byrne	University of New South Wales Canberra
Amanda Johnson	Australian Catholic University
Richard Keegan	University of Canberra
Farzaneh Kordbacheh	The Australian National University
Krisztina Valter-Kocsi	The Australian National University
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Divya Muthiah	The Australian National University
Karen Strickland	ACT Health and University of Canberra
Kirsty Douglas	The Australian National University





SCIENTIFIC REVIEW COMMITTEE

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Sean O’Byrne	UNSW Canberra
Mark Pickering	UNSW Canberra
Marian Currie	

KEYNOTE SPEAKERS

TUESDAY 31 JULY, 12-1PM

PROFESSOR SAMI VISKEN

**DIRECTOR CARDIAC HOSPITALISATION
UNIT, TEL-AVIV MEDICAL CENTRE,
ISRAEL AND ASSOCIATE PROFESSOR
CARDIOLOGY, TEL-AVIV
UNIVERSITY, ISRAEL**



Experience in Medical Journals at Senior Level.

Section Editor: Heart Rhythm.

Past Section Editor: Heart Rhythm.

Past Associate Editor: Europace.

Guest Editor: Journal of the American College of Cardiology.

Guest Editor: Heart Rhythm

Guest Editor: Journal of Cardiovascular Electrophysiology.

Experience in Medical Journals: Editorial Boards and Reviewer Positions.

Editorial Consultant: The Lancet.

Editorial Board: Circulation, Journal of the American College of Cardiology, Heart Rhythm, Journal of Cardiac Electrophysiology, Pacing and Clinical Electrophysiology, Heart (past), Annals of Noninvasive Electrocardiology.

Journal Reviewer: The New England Journal of Medicine, Nature-Clinical Practice, Lancet, Annals of Internal Medicine, Archives of Internal Medicine, Circulation, Circulation-Clinical Electrophysiology, Circulation-Cardiovascular Genetics, Journal of the American College of Cardiology, European Heart Journal, JACC-Clinical Electrophysiology, Europace and 20 other journals.

AWARDS:

- Michel Mirowsky Award in Cardiology in Israel. Israel Heart Society. 2008.
- Distinguished Teacher, Tel Aviv University, 2008
- Distinguished Physician, Tel Aviv Medical Center, 2009.
- Distinguished Reserve Officer, Israel Defence Forces, 2010.
- Elite Reviewer Award. Journal of the American College of Cardiology.
- Century Reviewer Award. Heart Rhythm.
- Simon Dack Award for Outstanding Scholarship from the Journal of the American College of Cardiology, 2013.
- Best Publication on the Clinical Studies category in Heart Rhythm, 2014.
- Distinguished Cardiologist. Asociación Nacional de Cardiólogos de México, 2014.
- Best Presentation, Clinical Category. Cardiac Electrophysiology Society, 2014.
- Distinguished Scientist Golden Lionel Award, Venice Arrhythmias, Italy 2015

TASK FORCE MEMBER:

1. American Heart Association, Position Paper. Analysis of the 12-lead ECG as a Screening Test for Detection of Cardiovascular Disease in General Populations of Young Healthy People (ages 12-22 years). 2014.
2. European Society of Cardiology, Position Paper. Management of patients with palpitations: Position paper from the European Heart Rhythm Association. 2014.
3. American Heart Association Committee on Electrocardiographic Early Repolarization. Member of the writing committee, 2014.
4. American Heart Association, American College of Cardiology and European Society of Cardiology GUIDELINES on Ventricular Arrhythmias and Sudden Cardiac Death. Reviewer.

PUBLICATIONS:

206 publications in peer reviewed journals, first or last author in >95%.

PROFESSOR SIR HARRY BURNS

**PROFESSOR OF GLOBAL PUBLIC HEALTH,
UNIVERSITY OF STRATHCLYDE, INSTITUTE
OF GLOBAL PUBLIC HEALTH AND
INTERNATIONAL PREVENTION RESEARCH
INSTITUTE GLASGOW, SCOTLAND**



Sir Harry Burns graduated in medicine from Glasgow University in 1974. He trained in surgery in Glasgow and was appointed as a Consultant Surgeon in the University Department of Surgery at the Royal Infirmary in Glasgow in 1984. Working with patients in the east end of Glasgow gave him an insight into the complex

inter-relationships between social and economic status and illness. He completed a Master's Degree in Public Health in 1990 and shortly afterwards was appointed Medical Director of The Royal Infirmary.

In 1994, he became Director of Public Health for Greater Glasgow Health Board, a position he occupied until 2005. During his time with Greater Glasgow Health Board, he continued research into the problems of social determinants of health and in 2005, he became Chief Medical Officer for Scotland. In this role, his responsibilities included aspects of public health policy, health protection and, for a time, sport.

He was knighted in 2011. In April 2014 he became Professor of Global Public Health at Strathclyde University where he continues his interest in understanding how societies create wellness. In addition to his University work, Sir Harry is Chair of the Wheatley Foundation, the charitable trust of the Wheatley Group which supports people in the Wheatley community who may be disadvantaged or vulnerable; he is a Board member of Diabetes UK and of Spirit of 2012, the London 2012 legacy charity, a Trustee of the STV Children's Appeal Board and a Governor of St Aloysius College.

In 2014, the First Minister, Nicola Sturgeon, presented him a lifetime achievement award from the Scottish Government and the Scottish Parliament for Public Service. In September 2016, the Scottish Government announced that he would chair an independent review of targets in Scotland's NHS. The Report was published in November 2017.

PROFESSOR MAREE TEESSON

**PROFESSOR, DIRECTOR NATIONAL
HEALTH AND MEDICAL RESEARCH
COUNCIL (NHMRC), CENTRE OF RESEARCH
EXCELLENCE IN MENTAL HEALTH AND
SUBSTANCE USE AND NHMRC PRINCIPAL**



**RESEARCH
FELLOW AT THE
NATIONAL DRUG
AND ALCOHOL
RESEARCH
CENTRE,
PROFESSORIAL
FELLOW AT THE
BLACK DOG
INSTITUTE, UNSW
SYDNEY**

Professor Maree Teesson AC, is the Director of the NHMRC

Centre of Research Excellence in Mental Health and Substance Use, an NHMRC Principal Research Fellow at the National Drug and Alcohol Research Centre and a Professorial Fellow at the Black Dog Institute, UNSW Sydney. She is also a Fellow of the Australian Academy of Health and Medical Sciences and Fellow Australian Academy of Social Sciences.

Maree's vision is to build the world's leading dedicated translational research program for the prevention and treatment of mental disorders and substance abuse. She seeks to increase our understanding of drug and alcohol and mental disorders, prevent these where possible and improve treatment responses. She is known internationally for her innovative use of technology to implement large scale prevention with adolescents.

Maree has made a substantial contribution to medical research with over 280 research articles, reviews, book chapters and books. The innovation of her research has been recognised through leadership of over 100 grants totalling over \$47M.

Maree's awards include the prestigious Australian Museum Eureka Prize for Mentoring Young Researchers; Senior Scientist Award by the Australian Professional Society on Alcohol and Drugs; SMHR Oration Award, SMHR Founders Medal, Westpac/Australian Financial Review 100 Women of Influence (Innovation).

INVITED SPEAKERS

PROFESSOR WALTER ABHAYARATNA

**CLINICAL TRIALS UNIT DIRECTOR,
CONSULTANT CARDIOLOGIST AND CLINICAL
DIRECTOR OF MEDICINE, CANBERRA
HOSPITAL AND HEALTH SERVICES,
PROFESSOR, ANU MEDICAL SCHOOL**



Prof Walter Abhayaratna is a senior staff specialist, consultant cardiologist and Clinical Director of Medicine, Canberra Hospital and Health Services. His PhD at the Australian National University was in the field of cardiovascular epidemiology and echocardiography, and he completed a three year fellowship in the Echocardiography

Laboratory at Mayo Clinic, Rochester, USA. He holds a number of NHMRC research grants for clinical research into the prevention of cardiovascular disease and is the Director of Clinical Trials at ACT Health. He is Professor of Cardiovascular Medicine at the Australian National University.

PROFESSOR PRASHANTHAN SANDERS

**DIRECTOR OF CARDIAC
ELECTROPHYSIOLOGY AND PACING, ROYAL
ADELAIDE HOSPITAL; DIRECTOR FOR HEART
RHYTHM DISORDERS, UNIVERSITY OF
ADELAIDE MEDICAL SCHOOL AND GROUP**



**LEADER FOR
HEART RHYTHM
DISORDERS,
SOUTH
AUSTRALIAN
HEALTH AND
MEDICAL
RESEARCH
INSTITUTE**

Professor Prash Sanders is a clinical and academic electrophysiologist. He undertook his

Cardiology training at the Royal Adelaide Hospital and electrophysiology and doctoral training at the Royal Melbourne Hospital before taking up a postdoctoral training in Bordeaux, France. Professor Sanders was appointed to the Knapman-National Heart Foundation Chair of Cardiology Research at the University of Adelaide and as Clinical Director of Cardiac Electrophysiology at the Royal Adelaide Hospital in 2005. He has since established an internationally recognised electrophysiology laboratory and research group which is at the forefront of strategies for the treatment and management of atrial fibrillation. Professor Sanders is an NHMRC Practitioner Fellow and has published more than 300 peer-reviewed publications. He has received a variety of accolades, including being named the 2010 Australian Medical Researcher of the year under the age of 40, receiving a NHMRC Achievement award for the highest ranked Practitioner Award in 2013 and most recently the R T Hall Prize from the Cardiac Society of Australia and New Zealand in 2015

ASSOCIATE PROFESSOR RAJEEV KUMAR PATHAK

CARDIOLOGIST AND CARDIAC ELECTROPHYSIOLOGIST, CANBERRA HOSPITAL AND HEALTH SERVICES AND NHMRC NEIL HAMILTON FAIRLEY FELLOW, THE AUSTRALIAN NATIONAL UNIVERSITY



Dr Pathak is a clinical academic who has recently been appointed as the Lead of Clinical Services for Cardiac Electrophysiology at the Canberra Hospital. He undertook Physician and Cardiology training at the Canberra Hospital. He

then completed his sub-specialist training in Cardiac Electrophysiology at the Royal Adelaide Hospital. During this time, he also completed his PhD under the mentorship of Professor Prash Sanders through the University of Adelaide. His PhD comprised of a series of studies entitled "Aggressive Risk Factor Reduction Study for Atrial Fibrillation (ARREST-AF)" that were awarded several accolades, including the Eric Prystowsky Clinical Research award at Heart Rhythm society (2014), the three late breaking trials in international Cardiology scientific meetings, Ralph Reader Award at the Cardiac Society of Australia and New Zealand and Samuel A. Levine Young Investigator Award at American Heart Association. He was also honoured with Young author achievement (William W. Parmley Award) at the American College of Cardiology.

Following this, Dr Pathak was awarded Neil Hamilton Fairley Fellowship by National Health and Medical Research Council (NHMRC) and Bushells Fellowship by Royal Australasian College of Physician to join highly prestigious Electrophysiology Fellowship program at the Hospital of University of Pennsylvania, USA, under the mentorship of Professor Francis Marchlinski. Dr Pathak developed a significant expertise in devices and complex catheter ablation techniques for a variety of atrial and ventricular arrhythmias. During his fellowship, he published avidly in this clinical area and has been recognized as an emerging leader by all major cardiovascular societies such as American College of

Cardiology, American Heart Association, Heart Rhythm Society and Cardiac Society of Australia and New Zealand.

Dr Pathak has returned to Canberra in 2017 to build the Electrophysiology services at the Canberra Hospital. He has brought the expert knowledge, skills and ongoing collaborations acquired during his fellowship that he is committed to use towards strengthening Australian cardiovascular research. His interests are in all aspects of clinical Cardiology with a particular focus on complex atrial and ventricular arrhythmias along with other comorbidities such as structural, functional and congenital heart diseases. He undertakes pacemaker, cardiac defibrillator implantation, cardiac resynchronization, electrophysiology studies and ablation of complex atrial and ventricular arrhythmias.

PROFESSOR MARK DANIEL

PROFESSOR OF EPIDEMIOLOGY, HEALTH RESEARCH INSTITUTE, UNIVERSITY OF CANBERRA; PROFESSORIAL FELLOW, DEPARTMENT OF MEDICINE, ST VINCENT'S HOSPITAL, THE UNIVERSITY OF MELBOURNE; AND SENIOR PRINCIPAL



RESEARCH FELLOW AT THE SOUTH AUSTRALIAN HEALTH AND MEDICAL RESEARCH INSTITUTE

Mark Daniel is Professor of Epidemiology in the Health Research Institute, University of Canberra where he leads the Spatial

Epidemiology Group. He is concurrently appointed Professorial Fellow in the Department of Medicine, St. Vincent's Hospital, the University of Melbourne and Senior Principal Research Fellow at the South Australian Health and Medical Research Institute.

Mark earned a doctorate in Health Care & Epidemiology at the University of British Columbia and was exposed to Australia as an MRC Canada Postdoctoral Fellow in Epidemiology and Preventive Medicine at Monash University. He has since held faculty appointments at the University of North Carolina at Chapel Hill and Université de Montréal (Canada Research Chair in Population Health). He returned to Australia in 2008, joining the University of South Australia as Research Chair: Social Epidemiology, and then the University of Canberra in 2017. He has authored 180 refereed articles and 21 book chapters. He has been a chief investigator on 91 grants in excess of \$67.5 M from the Centers for Disease Control, National Institutes of Health, Canadian Institutes of Health Research, Canada Foundation for Innovation, National Health and Medical Research Council of Australia and Australian Research Council. He has led 30 grant-funded projects.

Mark's research aims to identify the drivers and multi-sectoral levers for policy and practice-level intervention to reduce risk factors and slow rising rates of chronic diseases. For 18 years, he has utilised geographic information systems in spatial analyses of social and built

environmental conditions, lifestyle risks, biochemical markers and cardiometabolic diseases, mental health disorders, adverse birth outcomes, HIV/AIDS, hepatitis C and mortality. Most of this work aims at knowledge translation for improved disease prevention via partnerships with stakeholders including community leaders, health professionals, and policy makers.

PROFESSOR MATTHEW COOK

DIRECTOR OF IMMUNOLOGY, ACT HEALTH; PROFESSOR OF MEDICINE, THE AUSTRALIAN NATIONAL UNIVERSITY MEDICAL SCHOOL; AND DIRECTOR OF THE CENTRE FOR PERSONALISED IMMUNOLOGY, THE JOHN CURTIN SCHOOL



OF MEDICAL RESEARCH, THE AUSTRALIAN NATIONAL UNIVERSITY

Matthew Cook is Professor of Medicine at The Australian National University (ANU), Director of Immunology at Canberra Hospital and Director of the Centre for Personalised

Immunology, an NHMRC Centre of Research Excellence. He is also founder of the Canberra Clinical Genomics, a joint venture between ACT Health and ANU. He is a clinician-scientist with more than 20 years' experience investigating the pathogenesis of human immunological disease and more recently, has investigated genome variation as a discovery platform for understanding human immune disease.

PROFESSOR ROSS HANNAN

EXECUTIVE DIRECTOR OF RESEARCH, ACT HEALTH, CENTENARY CHAIR IN CANCER RESEARCH, JCSMR, THE AUSTRALIAN NATIONAL UNIVERSITY

Professor Hannan is a NHMRC Senior Principal Research Fellow, ANU Foundation Centenary Chair in Cancer



Research, Head of the Department of Cancer Biology and Therapeutics at John Curtin School of Medical Research, ANU, Canberra, a group leader at the Peter MacCallum Cancer Centre, Melbourne and Executive Director - Research, ACT Health. Professor Hannan's research career spans over 20 years of internationally competitive research

in Australia and the USA working on the genetic and epigenetic regulation of cancer. Most recently he brought together multi-disciplinary teams of laboratory and clinician researchers and forged industry collaborations to devise 'first in class' cancer therapies that are now in clinical trials for a range of human cancers.

Professor Hannan's achievements have been recognised by his election to the Fellowship of the Australian Academy of Health and Medical Sciences (2017).

In 2017 he was appointed as a Director of the National Breast Cancer Foundation (NBCF) and Chair of the NBCF Scientific Advisory Board.

As Executive Director of Research, ACT Health, Professor Hannan is focused on effective translation of research from fundamental science to the clinical practice; improving patient outcomes by strengthening health services, clinical research, and clinical trials; growing and unlocking health opportunities with data science; and improving investment opportunities for ACT Health Innovations.

SCIENTIA PROF NIGEL LOVELL

GRADUATE SCHOOL ON BIOMEDICAL ENGINEERING, UNIVERSITY OF NEW SOUTH WALES (UNSW), SYDNEY

Nigel Lovell received the B.E. (Hons) and Ph.D. degrees from the University of New South Wales (UNSW), Sydney. He is currently Head of the Graduate School of Biomedical



Engineering UNSW Sydney, where he holds a position of Scientia Professor and Head of School. He has authored more than 250 journal papers and been awarded over \$80 million in research and development and infrastructure funding. He is a Fellow of seven learned academies throughout the world.

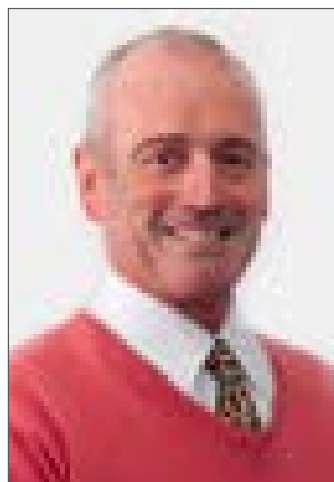
His research work has covered areas of expertise ranging from cardiac and retinal modelling, telehealth technologies, biological signal processing, and visual prosthesis design. Through a spin-out company from UNSW, TeleMedCare Pty. Ltd., he has commercialised a range of telehealth technologies for managing chronic disease and falls in the older population. He is also one of the key researchers leading a research and development program to advance in Australia a retinal neuroprosthesis or 'bionic eye'.

He has been conference or scientific chair of half a dozen international conferences including the triennial World Congress of Medical Physics and Biomedical Engineering in Sydney in 2003. For 2017 and 2018, he is the President of the world's largest biomedical engineering society – the Institute of Electrical and Electronics Engineers, Engineering in Medicine and Biology Society.

PROFESSOR GORDON WADDINGTON

PROFESSOR OF PHYSIOTHERAPY, UNIVERSITY OF CANBERRA AND RESEARCH PROFESSOR OF SPORTS MEDICINE, AUSTRALIAN INSTITUTE OF SPORT

Gordon Waddington holds the conjoint appointments of Research Professor of Sports Medicine at the Australian



Institute of Sport and Professor of Physiotherapy at the University of Canberra. Professor Waddington has established a reputation as an international expert in the field of human somatosensory performance incorporating proprioceptive and tactile function. This work has led to more than a dozen invited

lectures and keynote presentations in this area in the last five years. His group has published more than 60 publications during this time in the top ranked journals in the field, such as the British Journal of Sports Medicine, the Scandinavian Journal of Science and Medicine in Sport and the Journal of Science and Medicine in Sport. The multidisciplinary research team Professor Waddington currently leads comprises researchers from human performance sciences, a biostatistician and an epidemiologist and supports 11 PhDs and two Masters' students and is currently undertaking ongoing research collaborations with a number of international and national partners. Within Australia, the team partners with The Australian National University, the Australian Institute of Sport, the Queensland Academy of Sport and the NSW Institute of Sport examining the development of proprioceptive ability during growth and development and its contribution to injury risk in athletic populations. Internationally, our centre has projects with the European Space Agency, the Wingate Institute in Israel, the University of Nottingham and NASA to determine mechanisms to reduce the loss of somatosensory function with exposure to microgravity.

PROFESSOR JOSEPHINE FORBES

PROFESSOR OF MEDICINE, UNIVERSITY OF QUEENSLAND AND PRINCIPAL RESEARCH FELLOW, DEPARTMENT OF MEDICINE, UNIVERSITY OF MELBOURNE

Professor Forbes completed her PhD in Paediatric Nephrology in 2000 at the University of Melbourne



and Royal Children's Hospital in Melbourne. She then continued her training as a post-doctoral fellow in diabetes and kidney disease at both Austin Health and Baker IDI Heart and Diabetes Institute in Melbourne. Currently, she is a Professorial Research Fellow at Mater Research Institute, University of Queensland in Brisbane,

where she also leads the Chronic Disease Biology and Care Program. She holds and has received research grants from the NHMRC, Kidney Health Australia, National Institute of Health and the National Institute of Diabetes and Digestive and Kidney Diseases and the Juvenile Diabetes Research Foundation. She is a board member of the Australian Diabetes Society, the outgoing co-chair of the Diabetes Australia Research Program and an elected fellow of the Queensland Academy of Arts and Science.

Her work to date has resulted in more than 150 publications in highly ranked journals which have been cited more than 9000 times. Her primary research focuses on the pathological mechanisms that contribute to diabetes and its complications including advanced glycation and mitochondrial energy production. This is with a view to designing and translating therapies to combat these diseases. She has received numerous awards for her research, including the Commonwealth Health Minister's Award for Excellence in Medical Research in Australia and a Young Researcher Award from the International Diabetes Federation.

PROFESSOR JEFFREY BRAITHWAITE

PROFESSOR OF HEALTH SYSTEMS RESEARCH; FOUNDING DIRECTOR OF THE AUSTRALIAN INSTITUTE OF HEALTH INNOVATION; AND DIRECTOR OF THE CENTRE FOR HEALTHCARE RESILIENCE AND IMPLEMENTATION SCIENCE, MACQUARIE UNIVERSITY



Professor Jeffrey Braithwaite, BA, MIR (Hons), MBA, DipLR, PhD, FAIM, FCHSM, FFPHRCP (UK), FAcSS (UK), Hon FRACMA, FAHMS is Foundation Director of the Australian Institute of Health Innovation, Director of the Centre for Healthcare Resilience and Implementation Science and Professor

of Health Systems Research, Faculty of Medicine and Health Sciences, Macquarie University, Sydney. He has appointments at six other universities internationally and is a board member and President Elect of the International Society for Quality in Health Care and a consultant to the World Health Organisation.

His research examines the changing nature of health systems, which has attracted funding of more than AUD \$110 million. He is particularly interested in health care as a complex adaptive system and applying complexity science to health care problems.

Professor Braithwaite has contributed over 900 total publications and presented at international and national conferences on more than 900 occasions, including 90 keynote addresses. His research appears in journals such as The BMJ, The Lancet, Social Science & Medicine, BMJ Quality and Safety and the International Journal for Quality in Health Care. He has received 39 different national and international awards for his teaching and research.



ASSOCIATE PROFESSOR BRUCE SHADBOLT

**DIRECTOR OF RESEARCH, ACT HEALTH;
ASSOCIATE PROFESSOR, THE AUSTRALIAN
NATIONAL UNIVERSITY MEDICAL SCHOOL
AND SCHOOL OF FINANCE, ACTUARIAL
STUDIES AND STATISTICS**



Dr Shadbolt has combined a career in health care services with research to lead the epidemiological direction of ACT Health in the Australian Capital Territory. With university qualifications in science, psychology, mathematics and epidemiology, Dr Shadbolt has a broad understanding of research and its role in health care delivery.

His PhD in women's health and social roles using a life course design, paved the way for the Australian Women's Longitudinal Study and changes to family and work legislation to support better family-work balance. His research with the Australian National University and ACT Health has primarily focused on using evaluation, research and data science skills to improve clinical practice. As part of this, evidence-based medicine and translating new evidence into clinical care have been paramount to Dr Shadbolt's endeavours.

DAILY TIMETABLE

Tuesday 31 July

Day One – Heart Foundation Research Day

8.40	Introduction from Tony Stubbs – CEO, Heart Foundation ACT Welcome speaker – Meegan Fitzharris MLA ACT Minister for Health and Wellbeing	
9.00	Prof Walter Abhayaratna Clinical Trials Unit Director, Consultant Cardiologist and Clinical Director of Medicine, Canberra Hospital and Health Services, Professor ANU Medical School <i>The mystery of heart failure with preserved ejection fraction</i>	
9.45	Prof Prashanthan Sanders Director of Cardiac Electrophysiology and Pacing, Royal Adelaide Hospital; Director for Heart Rhythm Disorders, University of Adelaide Medical School and Group Leaders for Heart Rhythm Disorders, South Australian Health and Medical Research Institute <i>Risk factor modification to treat and manage atrial fibrillation</i>	
10.45	MORNING TEA	
11.15	A/Prof Rajeev Kumar Pathak Cardiologist and Cardiac Electrophysiologist, Canberra Hospital and Health Services and NHMRC Neil Hamilton Fairley Fellow, The Australian National University <i>Risk prediction for sudden cardiac death in non-ischaemic cardiomyopathy</i>	
12.00	Keynote Presentation: Prof Samuel Viskin Director Cardiac Hospitalisation Unit, Tel-Aviv Medical Centre, Israel and Associate Professor Cardiology, Tel-Aviv University, Israel <i>“History never looks like history when you are living through it.” A comparative history of long QT</i>	
1.00	NETWORKING LUNCH	
1.50	Prof Mark Daniel Professor of Epidemiology, Health Research Institute, University of Canberra; Professorial Fellow, Department of Medicine, St Vincent’s Hospital, The University of Melbourne; Senior Principal Research Fellow at the South Australian Health and Medical Research Institute <i>Geospatial analysis for cardiovascular disease prevention in a population context</i>	
Abstract Presentations		
2.30	Amandeep Kaur The Australian National University	<i>Evaluating platelet receptors and indices of inflammation in cardiac patients in receipt of mechanocirculatory support may help stratify patients for bleeding risk</i>
2.40	Brittany Harriden University of Canberra	<i>Effects of medium-chain triglycerides on cardiovascular disease risk markers: A systematic review</i>
2.50	HEALTH BREAK / NETWORKING OPPORTUNITY	
3.10	Rebecca Cesnik ACT Health	<i>The evaluation of the Six Minute Walk Test in the Canberra Hospital Heart Failure Rehabilitation Program</i>
3.20	Daniela Gagliardi Capital Health Network (ACT PHN)	<i>Heart Failure Care initiative – Co-designing a patient centred heart failure model of care</i>
3.30	Katie Speer University of Canberra	<i>Heart rate variability in children influenced by moderate to vigorous maternal exercise, nutrition and smoking during gestation</i>
3.40	Brett Scholz The Australian National University	<i>“Not in the room”: A story completion study about consumer representation</i>
3.50	Deborah Lupton University of Canberra	<i>The Australian Women and Digital Health project: Key findings</i>
4.00	Close of day	

Wednesday 1 August**Day Two – Managing Chronic Conditions: The Future is now!**

8.45	Welcome and introduction
8.55	
9.30	Prof Matthew Cook Director of Immunology ACT Health, Professor of Medicine, The Australian National University Medical School, and Director of the Centre for Personalised Immunology, JCSMR, The Australian National University <i>The future of personalised medicine in chronic conditions management</i>
9.50	Prof Ross Hannan Executive Director of Research, ACT Health, Centenary Chair in Cancer Research, JCSMR, The Australian National University <i>Novel approaches to treat cancer and bone marrow failure syndromes based on the targeting the ribosome.</i>
10.10	Scientia Prof Nigel Lovell Graduate School on Biomedical Engineering, UNSW Sydney <i>The future of chronic disease management – the role of wearables, implantables and data analytics</i>
10.30	MORNING TEA
10.50	Prof Gordon Waddington Professor of Physiotherapy, University of Canberra <i>The effect of ‘bed rest’ on the human body. Collaborative project with NASA</i>
11.10	Prof Josephine Forbes Professor of Medicine, University of Queensland, Principal Research Fellow, Department of Medicine, University of Melbourne <i>How advances glycation of food by modern processing techniques and storage may be contributing to our diabetes epidemic</i>
12.00	Keynote Presentation: Prof Sir Harry Burns Professor of Global Public Health, University of Strathclyde, Institute of Global Public Health and International Prevention Research Institute Glasgow, Scotland <i>Population determinants of health and wellbeing</i>
1.00	NETWORKING LUNCH
1.50	Prof Jeffrey Braithwaite Professor of Health Systems research, Founding Director, Australian Institute of Health Innovation, Director, Centre for Healthcare resilience and Implementation Science, Macquarie University <i>Health services conceptualised as complex adaptive systems</i>
2.30	Prof Walter Abhayaratna Clinical Trials Unit Director, Consultant Cardiologist and Clinical Director of Medicine, Canberra Hospital and Health Services, Professor, ANU Medical School <i>Clinical trials – emerging methods</i>
15.10	Health break / Networking opportunity
3.30	A/Prof Bruce Shadbolt Director of research, ACT Health, Associate Professor, The Australian National University Medical School and School of Finance, Actuarial Studies and Statistics <i>Enabling research in Health Care: Adding value to diverse data sets</i>
4.10	Panel Discussion – Is there a future for chronic disease? Chair: Anne Kelso, CEO National Health and Medical Research Council Panellists: Sir Harry Burns, Jeffrey Braithwaite, Josephine Forbes, Alan Philp
5.00-6.30	Poster Viewing Event with drinks and canapes



Thursday 2 August Day three – ACT Research in Focus		
8.55	Welcome	
9.00	3 Minute Thesis Competition	
	Alice Wallett University of Canberra	Athletic training, gastrointestinal health and exercise performance in the heat
	Claire Kenneally-Dabrowski The Australian National University	Hamstring injuries in elite rugby union
	Hayley Teasdale University of Canberra	Feel, think, do
	Lachlan Campbell The Australian National University	Regimes of rustication for refugees. The rural dispersal of Australian humanitarian entrants
	Ella Kurtz University of Canberra	What could salutogenic maternity care mean for childbearing women?
	Paige Berry The Australian National University	Memory and culture: Can your cultural mindset make you more susceptible to false memories?
	Sean Dicks University of Canberra	The relationship between families of deceased organ donors and transplant recipients
	Rebecca Lawrence The Australian National University	Paying attention to healthy ageing
	Kathleen Miles University of Canberra	Sleep in female athletes: risk factors for disturbance and implications for recovery
	Naomi Elizabeth Clarke The Australian National University	A neglected disease: Waging war on worms
10.30	MORNING TEA	
All in the Mind – Neurological and Mental Health Research		
10.50	Conor Owens-Walton The Australian National University	Increased thalamo-cortical functional connectivity in Parkinson disease
11.00	Hayley Teasdale University of Canberra	Ankle proprioception and postural instability in Parkinson’s disease
11.10	Kasia Bail University of Canberra	Costs of hospital-acquired complications for older people and people with dementia
11.20	Helen Barnett University of Canberra	Effect of Folate Supplementation on Inflammatory Markers in Individuals Susceptible to Depression: A Systematic Review
11.30	Kathryn Bell The Australian National University	Risk and Protective Factors of Disordered Eating in Gay Men, Lesbian Women, and Transgender and Nonconforming Adults
11.40	Drew Richardson ACT Health	Incidence of Access Block in Mental Health Presentations in Australasia
12.00	Keynote Presentation: Prof Maree Teesson Professor, Director NHMRC Centre of Research Excellence in Mental Health and Substance Use (CREMS) and NHMRC Principal Research Fellow at the National Drug and Alcohol Research Centre (NDARC), Professorial Fellow at the Black Dog Institute, UNSW Sydney Pathways to prevention: The long-term effectiveness of prevention and early intervention for substance use and related harms	



13.00 LUNCH

Joint Session – Pain, Illness and Orthopaedics

14.00	Bernie Bissett University of Canberra	More than skin deep – The value of MASK-ED™ simulation in the physiotherapy classroom: A mixed cohort study
14.10	Faran Sabeti University of Canberra	Visual function of sports-related Mild Traumatic Brain Injury (mTBI)
14.20	Alice Churchill University of Canberra, ACT Health	Weighing in: Does size matter in knee kinematics?
14.30	Catherine Galvin University of Canberra, ACT Health	Do Kneeling Knee Kinematics change as we age from 20 to 90? What does healthy ageing of knees look like in deep flexion under load?
14.40	Joe Lynch The Australian National University, ACT Health	A comparison between osteoarthritic and asymptomatic knees using statistical shape modelling
14.50	Barbara Riegal Australian Catholic University, University of Pennsylvania	Development and Initial Testing of the Self-Care of Chronic Illness Inventory
15.00	Lucy Chipchase Western Sydney University, South-West Sydney Local Health District	Cultural adaption and chronic pain management: A pilot randomised controlled trial

15.10 10 minute break

Blood and Guts Discovery Research

15.20	Claire O'Brien The Australian National University, ACT Health	Gene expression differences over the course of Crohn's disease
15.30	James Byers ACT Health	Blood stream infection (BSI) following transrectal ultrasound-guided (TRUS) biopsy of the prostate: 20 year experience in the Australian Capital Territory
15.40	Dian Ningtyas The Australian National University	Investigation of platelet-erythrocyte interaction in circulation
15.50	Christine Lee The Australian National University	Tissue Inhibitors of Metalloproteinases – Rocks to the scissors on platelets
16.00	Farzaneh Kordbacheh The Australian National University	Extracellular histones induce erythrocyte fragility and anaemia and identification of compounds that prevent this process

CHARM

CANBERRA HEALTH
Annual Research Meeting



DAY ONE

HEART FOUNDATION
RESEARCH DAY

ABSTRACTS





KEYNOTE PRESENTATION

“History never looks like history when you are living through it.”

A comparative history of long QT

PROF SAMUEL VISKIN

Director Cardiac Hospitalisation Unit, Tel-Aviv Medical Centre, Israel and Associate Professor Cardiology, Tel-Aviv University, Israel

The Brugada syndrome (BrS) and long-QT syndrome (LQTS) present as congenital or acquired disorders with diagnostic electrocardiograms (ST-segment elevation and prolonged QT interval, respectively) and increased risk for malignant arrhythmias. Our understanding of the two disease forms (congenital vs. acquired) differs. A female patient on quinidine for atrial fibrillation who develops ventricular fibrillation is diagnosed with “acquired LQTS” and is discharged with no therapy other than instructions to avoid QT-prolonging medications. In contrast, an asymptomatic male patient who develops a Brugada electrocardiogram on flecainide is diagnosed with “asymptomatic BrS” and could be referred for an electrophysiological evaluation that could result in defibrillator implantation. The typical patient undergoing defibrillator implantation for BrS is asymptomatic but has a Brugada electrocardiogram provoked by a drug. The authors describe how the histories of LQTS and BrS went through the same stages, but in different sequences, leading to different conclusions.

INVITED SPEAKERS

The mystery of heart failure with preserved ejection fraction

PROF WALTER ABHAYARATNA

Clinical Trials Unit Director, Consultant Cardiologist and Clinical Director of Medicine, Canberra Hospital and Health Services, Professor ANU Medical School

Clinical trials have not been able to identify therapeutic options for the management of heart failure with preserved ejection fraction. During this presentation, the lessons learned from these trials will be reviewed and future therapeutic options for heart failure with preserved ejection fraction will be discussed.

Risk factor modification to treat and manage Atrial Fibrillation

PROF PRASHANTHAN SANDERS

Director of Cardiac Electrophysiology and Pacing, Royal Adelaide Hospital; Director for Heart Rhythm Disorders, University of Adelaide Medical School and Group Leaders for Heart Rhythm Disorders, South Australian Health and Medical Research Institute

Atrial fibrillation (AF) is reaching epidemic proportions, affecting over 33 million individuals worldwide. With the rise in obesity, recent data has demonstrated a strong correlation between obesity AF and the related risk factors. Several studies have shown that the significant impact of undertaking dedicated clinics that focus specifically on weight loss, improved exercise and management of associated risk factors. These clinics lead to a marked reduction not only in AF symptoms and recurrence but there is also an overall improvement in ablation outcomes.

Risk Prediction for Sudden Cardiac Death in Non-Ischaemic Cardiomyopathy

A/PROF RAJEEV KUMAR PATHAK

Cardiologist and Cardiac Electrophysiologist, Canberra Hospital and Health Services and NHMRC Neil Hamilton Fairley Fellow, The Australian National University

Sudden cardiac death (SCD) accounts for approximately one-third of all deaths among patients with non-ischaemic cardiomyopathy (NICM). Implantable cardioverter-defibrillator (ICD) therapy has been the primary intervention for managing individuals at high risk for SCD. However, individual ICD trials in the NICM population have failed to demonstrate a mortality benefit with prophylactic ICD implantation. Current guidelines recommend ICD implantation in NICM patients with symptomatic heart failure and a left ventricular $\leq 35\%$ and are based on meta-analyses of multiple trials that span almost three decades. A refined approach of risk stratification that selects patients at the highest risk for SCD may lead to a significant improvement in ICD efficacy. This talk highlights some key markers of arrhythmia risk that hold promise in personalizing risk stratification for SCD.

Geospatial analysis for cardiovascular disease prevention in a population context

PROF MARK DANIEL

Professor of Epidemiology, Health Research Institute, University of Canberra; Professorial Fellow, Department of Medicine, St Vincent's Hospital, the University of Melbourne; and Senior Principal Research Fellow at the South Australian Health and Medical Research Institute

Geographic information systems (GIS) can aid the identification of environmental factors that shape population risks, morbidity and mortality. Geospatial analysis is the sine qua non for seeing lifestyles as the intersection of environments and behaviour. GIS remains, however, underused in prevention science and policy decisions. This presentation will (i) cover the application of GIS to cardiovascular disease (CVD), (ii) distinguish environmental risk conditions for CVD from individual CVD risk factors, (iii) illustrate research on built and social environmental associations with CVD, and (iv) showcase new and novel aetiological research on ecological mechanisms of environmental effects. Current advances in the development of a national Australian GIS infrastructure will be covered, drawing a prototype originally developed and integrated into the public health service in Montreal, Canada.

ABSTRACT PRESENTATIONS

Evaluating platelet receptors and indices of inflammation in cardiac patients in receipt of mechanocirculatory support may help stratify patients for bleeding risk.

AMANDEEP KAUR¹, SAMANTHA J MONTAGUE¹, POHAN LUKITO², JOSHUA CASAN², ROBERT K ANDREWS³, AMANDA K DAVIS², ELIZABETH E GARDINER¹

1. *The John Curtin School of Medical Research, Department of Cancer Biology and Therapeutics, The Australian National University, Acton, ACT, 2601*
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3. *Monash University, Clayton, VIC, 3800*

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Despite advances in design and materials, as well as pharmacological prophylaxis, hemostatic complications continue to plague device recipients. Ventricular assist devices (VADs) and extracorporeal membrane oxygenation (ECMO) are associated with bleeding that is not fully explained by anticoagulant or antiplatelet use. Exposure of platelets to elevated shear in vitro leads to increased shedding. We examined blood samples from patients with heart failure or in receipt of high fluid shear mechanocirculatory support to assess whether loss of platelet receptors occurs in vivo and the relationship with acquired von Willebrand syndrome (AVWS) and changes in inflammatory cytokines. Platelet counts, levels of inflammatory cytokines IL-1 β , IL-6, TNF α , MCP-1, IL-17A and IFN γ , coagulation tests and von Willebrand factor (VWF) analyses were performed on samples from 13 continuous flow VAD (CF-VAD), 14 ECMO, and 24 heart failure patients. Levels of platelet receptors were measured by flow cytometry or ELISA. The loss of high molecular weight VWF multimers was observed in 12 of 13 CF-VAD and 7 of 14 ECMO patients, consistent with AVWS. Platelet receptor shedding was demonstrated by elevated soluble glycoprotein (GP) VI levels in plasma and significantly reduced surface GPIIb α and GPVI levels in CF-VAD and ECMO patients as compared with healthy donors. Platelet receptor levels were also significantly reduced in heart failure patients. Significant differences in levels of inflammatory cytokines monocyte-chemoattractant protein and tissue necrosis factor- α in a subset of patients with decompensated HF. These data link AVWS and increased platelet receptor shedding in patients with CFVADs or ECMO. Loss of the platelet surface receptors GPIIb α and GPVI in heart failure, CFVAD and ECMO patients may be linked with extent of inflammation and may contribute to ablated platelet adhesion/activation, and limit thrombus formation under high/pathologic shear conditions.

Effects of Medium-Chain Triglycerides on Cardiovascular Disease Risk Markers: A Systematic Review

BRITTANY L HARRIDEN, NATHAN D'CUNHA, ANDREW J MCKUNE, DUANE D MELLOR, DEMOSTHENES PANAGIOTAKOS, EKAVI GEORGIOUSOPOULOU, JANE KELLETT, NENAD NAUMOVSKI

Faculty of Health, University of Canberra, Canberra, ACT, 2601

Collaborative Research in Bioactive and Biomarkers Groups (CRIBB), University of Canberra, Canberra, ACT, 2601

Research Institute for Sport and Exercise (UC-RISE), University of Canberra, Canberra, ACT, 2601

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Department of Nutrition-Dietetics, School of Health Science and Education, Harokopio University, Athens, Greece

Department of Kinesiology and Health at The School of Arts and Sciences, Rutgers

The State University of New Jersey, New Jersey, United States

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Introduction: Medium-chain triglycerides (MCT) are commonly extracted from palm and coconut oil. A rapidly absorbed source of energy, MCT are purported to assist with weight management and appetite control. However, potential risk of MCT supplementation relative to cardiovascular disease (CVD) risk markers is still under evaluation.

Aim: A systematic review was conducted following PRISMA guidelines (2009) using four electronic databases (Scopus, PubMed, CINAHL, Cochrane) to identify randomised clinical trials on effects of MCT on CVD risk markers.

Methods: Primary outcome was blood lipid levels (cholesterol, triglycerides), while body composition, blood glucose and insulin were secondary outcomes.

Results: Nine trials fulfilled inclusion criteria, lasting 4-16 weeks using doses between 9.9-40.0g. The only double-blind, placebo-controlled trial reported lower total cholesterol ($5.72 \pm 0.35 \text{ mmol/L}$ to $3.89 \pm 0.29 \text{ mmol/L}$) and triglycerides ($1.35 \pm 0.28 \text{ mmol/L}$ to $1.02 \pm 0.31 \text{ mmol/L}$) (all, $p < 0.05$) with addition of 9.9g MCT to a very low-calorie diet for four weeks. Of the remaining parallel studies, three observed improvements in blood lipids with MCT, while two had no effect. Three parallel studies reported improved body composition with MCT, two measured reductions in glucose, and two in insulin levels. In crossover trials, high-oleic sunflower oil, and lauric acid, outperformed MCT over a range of lipid markers, while no differences were observed with corn oil.

Conclusion: Due to considerable variety of the results across studies, there's insufficient evidence to suggest that MCT has adverse or positive effect on CVD risk markers. While metabolic benefits may exist, well designed longer-term trials are required to determine effect of MCT on CVD risk markers.

The Evaluation of the Six Minute Walk Test in the Canberra Hospital Heart Failure Rehabilitation Program

REBECCA CESNIK, LOUISE GAINSFORD

Exercise Physiology Department, ACT Health, Garran, ACT, 2605

Acknowledgements: Heart Function Multidisciplinary Team, ACT Health

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Introduction: Heart Failure (HF) is a complex clinical syndrome characterised by objective evidence of underlying cardiac dysfunction, with symptoms (e.g. dyspnoea, fatigue) occurring at rest or exertion. Exercise improves functional and aerobic capacity in patients, increasing Quality of Life (QoL) and ability to complete daily tasks. The Six Minute Walk Test (6MWT) is a validated, evidence based tool to monitor walking distance, exercise tolerance and cardiac symptoms.

Methods: The HF Rehabilitation (HFR) program consists of multidisciplinary supervised exercise and education, twice per week for 12 weeks. 3, 6 and 12 months reviews are completed. 6MWT is completed at commencement, 12 week and all reviews. Patients included in the evaluation, commenced within 2014 and 2015.

Results: Of 53 patients, 8.64% completed supervised programs, 41.82% attended the 3 month review, and 34.55% attended 6 and 12 month reviews. Significant improvements between all 6MWT (12 week, and 3,6,12 month reviews) and baseline were seen ($p < 0.05$) and clinically significant difference was achieved by 100% of patients. Adherence to exercise guidelines ranged between 41.18-64.71%.

Conclusion: Results show that current HFR processes result in statistically and clinically significant changes in 6MWT distance. Adherence to exercise was moderate for those that attended review, however non-attendance rates were high.

Clinical Significance: Improvements in aerobic and functional capacity are associated with decreased all cause mortality, number of hospitalisations and length of stay in patients with HF. Results show that the current HFR program results in these improvements.

Heart Failure Care initiative – Co-designing a patient centred Heart Failure Model of Care

DANIELA GAGLIARDI

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Aims: Heart failure places a significant burden of disease on the Canberra population, despite advances in heart failure management, clinical outcomes remain poor. The objective of this innovation is to develop and implement a comprehensive and systematic approach to the management of Heart Failure in the ACT.

Methods: Led by a multi-disciplinary Clinical Leadership Forum, an intensive co-design process was adopted in the development of a patient centred, evidence based Heart Failure Model of Care (MoC) and Outcomes Framework. This included a review of current ACT Heart Failure services model, key stakeholder consultations and current model of care gap analysis. Ensuring the MoC addressed needs identified by consumers, facilitated focus groups were held with consumers during the design period.

Results: The developed MoC comprises twelve key components facilitating early diagnosis and interventions, self-management, inter-professional collaboration and care co-ordination. Endorsed by the Clinical Leadership Forum, Health Care Consumer's Association and Heart Foundation ACT, the next phase will involve conducting a pilot program to implement and assess key priority interventions identified in the MoC across July 2018 – March 2019.

Conclusion: Co-designed by local clinicians and informed by consumers, a comprehensive, patient centred, evidence based, multi-disciplinary Heart Failure Model of Care was developed, which provides a framework for best practice heart failure care tailored to both ACT population needs and our local health system (public and private).

Clinical Significance: The Heart Failure model of care aims to enhance patient health outcomes, improve the patient experience across the system of care and reduce avoidable demand on local health services.

Heart rate variability in children influenced by moderate to vigorous maternal exercise, nutrition and smoking during gestation

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Aims: Autonomic nervous system (ANS) imbalance contributes to increased risk of cardiovascular disease (CVD). Modifiable CVD risk factors, such as physical inactivity, poor diet, smoking, and abnormal blood lipids unfavourably alter ANS function, reflected by reduced heart rate variability (HRV). While this relationship has been examined in adults, limited research exists investigating modifiable CVD risk factors on autonomic control in paediatric populations. Therefore, a systematic review was conducted on studies examining the effect of modifiable risk factors on children's HRV as a physiological marker of CVD risk.

Methods: Following PRISMA guidelines (2009), five electronic databases were searched for peer-reviewed journal articles between 1996 – 2018. Included studies examined ANS function of children between 28 weeks gestational age (GA) – 6 years in relation to CVD modifiable risk factors.

Results: Ten studies fulfilled inclusion criteria. Eight studies demonstrated modifiable CVD risk factors significantly ($p < 0.05$) influenced HRV of children. The strongest associations between ANS imbalance and modifiable CVD risk factors were nutrition, smoking and exercise, particularly with respect to the mother. Specifically, higher maternal omega-3 fatty acid status, regular moderate/vigorous aerobic exercise and a non-smoking pregnancy contributed to increased offspring HRV at 36 weeks GA – 6 months. Neither maternal nor offspring metabolic profile was significantly associated with reduced HRV.

Conclusion: Despite promising results that the ANS of young children is influenced by modifiable CVD risk factors, there is insufficient evidence to support the strength of this association.

Clinical Significance: Findings highlight the importance of omega-3 fatty acid intake, maternal exercise and a non-smoking environment to reduce CVD risk in children.

"Not in the room": A story completion study about consumer representation

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Aims: Policy mandates consumer involvement in decisions at all levels of the health system. One way services interpret this requirement is to appoint 'consumer representatives'. The term 'representative' is critiqued as being poorly defined and as limiting contributions to representation, despite calls for consumer leadership to fully realise the value of consumer perspectives. This study aimed to compare perspectives of consumers' and other health professionals' ability to impact organisational processes.

Methods: Data were collected using a story-completion methodology. Participants completed stories about either a consumer or a doctor asking to add an item to a committee meeting agenda. 30 participants completed the story, including 20 consumers and 9 other (i.e. non-consumer) health professionals.

Results: Non-consumers were often narratively positioned as professional and influential. Consumers were often positioned as concerned with trivialities of health services. Stories often placed consumers outside – whether that be outside the sphere of influence (e.g. consumers being told "perhaps you should get the hang of this first" before speaking in a meeting) or outside the activity of the narrative altogether (e.g. "Alex was not in the room. The doctors were in the room").

Conclusion: The current study contributes evidence about dominant understandings of consumer representation as still being tokenistic and problematic. We discuss implications for policy makers and for health professionals about how to meaningfully partner with consumers.

Clinical Significance: The current study highlights ways consumer partnerships can be improved, so that services can 1) benefit from the value brought by consumers, and 2) meet policy requirements to meaningfully partner with consumers at the systemic level.

The Australian Women and Digital Health Project: Key Findings

DEBORAH LUPTON

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In this presentation I will discuss the key findings from the Australian Women and Digital Health Project. A total of 66 women participants (36 from Canberra, 30 from across Australia) were involved in either interviews or focus groups about their use of digital health technologies. Findings showed that the importance of Google Search as a tool to find health information was to the fore. Almost every participant said that they regularly googled to search for information. They also used websites regularly for health information, often directed to them by searching online. In-person interactions with doctors or other healthcare professionals as well as family and friends were still important sources of health information, but the opportunity to go online at any time was highly valued by these participants. Many searched for health information on behalf of their family members (partners, children – even adult children – or elderly parents) as part of their familial caring roles. Traditional media (books, television, radio) were hardly mentioned at all as a source of health information, although pamphlets were still consulted quite often when women were waiting to see the doctor. These women valued the access they had online to international sources of information, but still placed a lot of importance on being able to find Australian-based information and information that was specific to their local area. It was notable that none of these women used a fitness platform like Strava, although calorie-counting apps and Fitbits were quite popular.

CHARM

CANBERRA HEALTH
Annual Research Meeting



DAY TWO

MANAGING CHRONIC
CONDITIONS: THE FUTURE
IS NOW!



ABSTRACTS



KEYNOTE SPEAKER

Population determinants of health and wellbeing

PROF SIR HARRY BURNS

Professor of Global Public Health, University of Strathclyde, Institute of Global Public Health and International Prevention Research Institute Glasgow, Scotland

Sir Harry's principal interest is in using Improvement Science to transform the lives of people, particularly children and young people living socially difficult lives. Sir Harry uses evidence to support his argument that adversity in early years can have considerable, biological consequences in later life.

More widely, his focus is on how societies can create "wellness" – where health is a state of complete physical, mental and social wellbeing, not merely the absence of illness. By looking at the association of social patterns and health, it is possible to develop interventions which are aimed at narrowing health inequalities and enabling individuals to find meaning and have a sense of coherence in their lives.

To be effective, this requires collaboration across health, education, social services, academia and government. Sir Harry's work reflects this range and scope.

INVITED SPEAKERS

The future of personalised medicine in chronic conditions management

PROF MATTHEW COOK

Director of Immunology ACT Health, Professor of Medicine, The Australian National University Medical School, and Director of the Centre for Personalised Immunology, The John Curtin School of Medical Research, The Australian National University

Personalisation of medical diagnosis and treatment has been made feasible by tremendous progress in next generation sequencing, matched by advances in bioinformatics analysis of the substantial datasets of genome variants that result from whole exome and whole genome sequencing (WES and WGS). We now have numerous proof-of-principle cases where elucidation of a single novel variant reveals mechanism of disease, and in some cases, identifies a precision therapy. This represents substantial progress towards personalised medicine. The majority of human morbidity and mortality is not accounted for by single gene defects, however, and the transition to personalised medicine will not be universal. I will provide a theoretical framework for the nature of phenotypic variation and build on this with examples from disease of immunity to outline how we might start to apply the principles of personalised medicine to common disease.

Novel approaches to treat cancer and bone marrow failure syndromes based on the targeting the ribosome

PROF ROSS HANNAN

Executive Director of Research, ACT Health, Centenary Chair in Cancer Research, JCSMR, The Australian National University

Professor Hannan will discuss his latest research findings on how the nucleolus the site of ribosome biogenesis, is providing new therapeutic approaches to treat cancer and bone marrow failure syndromes.



The future of chronic disease management – the role of wearables, implantables and data analytics

SCIENTIA PROF NIGEL LOVELL

Graduate School on Biomedical Engineering, UNSW Sydney

As a response to the increasing burden of chronic disease and the ageing population on health care expenditure, considerable focus has been placed on appropriate technologies for promoting self-care and for supporting ageing-in-place.

A number of medical device technologies aimed at relieving the burden of disease and improving quality of life will be explored. These devices, developed at the Graduate School of Biomedical Engineering, UNSW over the past two decades include telehealth monitoring and decision support systems for chronic disease management; and wearable ambulatory technologies based around triaxial accelerometry for estimating risks of falling and for automatically detecting falls.

A vision of how an existing telehealth framework would support data monitoring from wearable devices as well as other telecare sensors is presented. Looking further to the future, we also propose a model of how this architecture would integrate control and measurements to and from fully implantable bionic devices in order to provide ubiquitous personalised care.

Lower Limb Somatosensory Assessment: Measuring tactile and proprioceptive ability using an active movement extent discrimination approach. What is the link to walking on Mars?

PROF GORDON WADDINGTON

Professor of Physiotherapy, University of Canberra; Research Professor of Sports Medicine, Australian Institute of Sport

This presentation will examine human Somatosensation from the basis of our groups research and why the AMEDA (Active Movement Extent Discrimination Assessment) approach is potentially the most valid mechanism of assessing dynamic proprioception? Aspects of talent identification, performance enhancement/injury prevention will be examined and the current application for human undertaking long periods of microgravity exposure such as on a Mars space flight will be discussed.

How advances glycation of food by modern processing techniques and storage may be contributing to our diabetes epidemic

PROF JOSEPHINE FORBES

Professor of Medicine, University of Queensland, Principal Research Fellow, Department of Medicine, University of Melbourne

Advanced glycation end products (AGEs) are sugar modifications to proteins formed in the body. AGEs can also be absorbed from dietary sources, in particular from westernised diets as a result of modern food processing, storage and choice of cooking method. AGEs are arguably best studied in diabetes complications where increased burden of AGEs in the body, measured at sites such as the skin and in the blood, can predict the later onset of diabetic complications. Recently, however, there has been a paradigm shift which suggests that AGEs, including those from dietary sources may be direct modulators of insulin secretion and peripheral insulin sensitivity and as such, may play a crucial role in the development of both major forms of diabetes *per se*.

Health services conceptualised as complex adaptive systems

PROF JEFFREY BRAITHWAITE

Professor of Health Systems research, Founding Director, Australian Institute of Health Innovation, Director, Centre for Healthcare resilience and Implementation Science, Macquarie University

People have tried to improve the care given to patients suffering from chronic conditions by many methods, including promoting health and healthy behaviours; improving the availability of community and GP services; making assistive devices available; and providing community resources. Implementation of these and other strategies has often taken a linear approach—issue more policy, institute a new service, trial and then prescribe another drug, for example. But linear approaches do not work well on complex problems, for people with complex conditions, or in complex contexts. This means we have to understand how health services are not amenable to linear, step-wise solutions but are better conceptualised as complex adaptive systems. This talk uses recent ideas about complexity science to appreciate this point and argues for a better approach to managing chronic conditions and illness.

References

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Braithwaite J. Changing how we think about healthcare improvement. *The BMJ*. 2018; 361.



Clinical Trials – emerging methods

PROF WALTER ABHAYARATNA

Clinical Trials Unit Director, Consultant Cardiologist and Clinical Director of Medicine, Canberra Hospital and Health Services, Professor, ANU Medical School

Randomised clinical trials, designed to enhance the internal validity of clinical experimentation, have been the mainstay of evidence based medicine over the past seven decades. Innovations in clinical trials methodology and contemporary challenges to clinical trials investigators are reviewed.

Enabling research in Health Care: Adding value to diverse data sets

A/PROF BRUCE SHADBOLT

Director of research, ACT Health, Associate Professor, The Australian National University Medical School and School of Finance, Actuarial Studies and Statistics

One of our most immediate challenges in healthcare is to develop new approaches to research that better use data to support clinical practice. The complexity of care and an increasing societal problem of an aging population provides an ideal platform upon which to advance unique multidisciplinary research approaches. Current patient and research data limits most of the human-machine solutions to activity and behaviours. We need to go further by introducing concepts of wellbeing, personal values and judgements into algorithmic research translations that span philosophy, linguistics, psychology, demography, epidemiology, sociology, economics, and data science.

We are developing a model that incorporates qualitative, quantitative, experimentation and data science methods with technology to create “real-world” learning algorithms that address societal concepts and practical issues to provide views of probable scenarios, choices and outcomes in health care systems – the ultimate in research translation. These futuristic human-research-machine principles and taxonomy structures will achieve real-time research translation. A new technological process for predictive modelling of tacit and explicit knowledge classifications will significantly change the landscape of how research and personal data are used in person-centred care.

PANEL DISCUSSION

Is there a future for Chronic Disease?

CHAIR: PROF ANNE KELSO

Panellists: Sir Harry Burns, Prof Jeffrey Braithwaite, Prof Josephine Forbes, Prof Alan Philp



CHARM

CANBERRA HEALTH
Annual Research Meeting



DAY THREE

ACT RESEARCH
IN FOCUS

ABSTRACTS



3 MINUTE THESIS COMPETITION



Athletic training, gastrointestinal health and exercise performance in the heat

ALICE WALLET

University of Canberra

Given the abundance of competitions scheduled to take place in hot and humid conditions, there is high importance to understand the physiological mechanisms affected under heat strain. Exercise-induced endotoxemia is a risk of exercise in the heat, primarily attributed to translocation of lipopolysaccharides (LPS) from the gut into circulation. The stress of heat and oxidative damage during physical activity can disrupt intestinal epithelial cell tight-junction proteins resulting in increased permeability to luminal endotoxins. This compromise's intestinal integrity, alters physiological gut function, and can negatively affect athletic performance. This PhD aims to quantify changes in gut permeability biomarkers during exercise in different environmental conditions.

Hamstring injuries in elite rugby union

CLAIRE KENNEALLY-DABROWSKI

The Australian National University

Hamstring injuries are highly prevalent in running-based sports such as rugby union. It is well recognised that the majority of hamstring injuries occur during running, however, the exact mechanism of injury is not well understood. This PhD will describe the nature of hamstring injuries, and examine the running mechanics of elite rugby athletes, in order to better understand the possible mechanisms of injury. Further, MRI data will assist in understanding how the unique muscle morphology of elite rugby players may influence their running mechanisms and injury susceptibility.

Feel, think, do

HAYLEY TEASDALE

University of Canberra

A result of the compilation of a multitude of sensory afferents, proprioception is the sensation of body position and movement and is key for the way humans move. It is a sense that is rarely appreciated until it begins to fail, and the study of proprioception in diseased states, such as Parkinson's disease, continues to further the understanding of the complex mechanisms of motor control in humans.

Regimes of rustication for refugees. The rural dispersal of Australian humanitarian entrants

LACHLAN CAMPBELL

The Australian National University

Rural dispersal of humanitarian entrants in Australia is being pushed by the Safe Haven Enterprise Visa scheme, which links long-term asylum to working in regional Australia. This study uses in-depth ethnographic fieldwork in two country towns to critically evaluate the social and health impact of this policy.

What could salutogenic maternity care mean for childbearing women?

ELLA KURZ

University of Canberra

The potential for psychosocial pathology to occur after a bad birth experience, for example birth trauma and postnatal depression, is widely recognised. The phenomena of psychosocial wellbeing following a positive birth experience on the other hand, is poorly articulated and represented – at this stage one of the few terms available to describe it is the largely inadequate 'empowering birth'. By coming to recognise the cultural values embedded within contemporary maternity care practice we can begin to imagine how and why the psychosocial wellness of childbearing women should become a defining feature of future maternity care provision.

Memory and culture: Can your cultural mindset make you more susceptible to false memories?

PAIGE BERRY

The Australian National University

Human memory does not work like a video recorder – it is much more like a Wikipedia page, constantly changing and being updated by ourselves or others (Loftus, 2013). Therefore, memory is rarely perfect and people regularly make mistakes in what they remember. False memory is one type of memory error and my honours project will investigate the underlying cognitive mechanisms of this error. I will prime people into certain mindsets that map on to key cultural differences in the way we process information (Collectivism and Individualism).

My research results will help us to understand cross-cultural vulnerability to false memories, and whether memory errors can be avoided.

The relationship between families of deceased organ donors and transplant recipients

SEAN DICKS

University of Canberra

The relationship between families of deceased organ donors and transplant recipients is unique and has procedural, ethical and legal implications for Family Support Coordinators. I prefer to see this relationship through the lenses of care, compassion, support and ongoing adjustment. The reasons for this choice will be highlighted.

By drawing together what is known about the psychosocial experiences of donor families and recipients' in the context of organ donation and transplantation respectively, I will demonstrate how this relationship assists both parties to take on the challenges they face and re-build their identity following their crises.

Paying attention to healthy ageing

REBECCA LAWRENCE

The Australian National University

Attention is critically important for effective daily functioning. Our research explored how one aspect of attention, changing the visual area over which attention is spread, is altered with healthy ageing. To do this, we used a highly sensitive method which removed distracting visual information from the experimental display to measure older and younger adults' attention spread. By doing so, we found a reliable age difference in attention, where older adults were more likely to narrow their attention compared to younger adults. We believe that this difference may be due to broader changes in cognition with across the lifespan.

Sleep in female athletes: risk factors for disturbance and implications for recovery

KATHLEEN MILES

University of Canberra

The growth in Australian women's sport has brought increased demands on athletes to perform at a high level and recover between training and competition. These demands are accompanied by difficult working conditions and wages far below their male counterparts. This may create distinct stressors for female athletes, potentially affecting health and performance.

Sleep is an integral factor for health and performance. However, females remain largely unrepresented within sports sleep research, influencing the development of applied practice and support. This thesis will explore the sleep characteristics of female athletes, identify risk factors for disturbance, and develop an intervention to improve sleep.

Stress urinary incontinence in elite athletes

LIZZY SMILES

University of Canberra

Stress Urinary Incontinence (SUI) has been shown to be prevalent in athletes who compete in high impact sports. There is however very little information in adolescent athletes, and the impact on their physical and emotional health. This is likely due to the absence of sensitive diagnostic tools available for use in prevalence studies. Therefore, we aim to develop a validated questionnaire to gain information of how age, sporting level and amount of training affects the likelihood of developing SUI. This will hopefully increase awareness and direct timely intervention can be implemented to prevent it from occurring in the future.

A neglected disease: waging war on worms

NAOMI ELIZABETH CLARKE

The Australian National University

Soil-transmitted helminths are intestinal worms that infect over a billion people worldwide. While they have historically received little attention from a global health perspective, this is changing and there is now a concerted push for their control. This presentation describes the problem of intestinal worms, and the findings of research aiming to improve worm control worldwide.

The Three Minute Thesis (3MT®) competition celebrates the exciting research conducted by Doctor of Philosophy (PhD) students. Originally developed by The University of Queensland (UQ), 3MT cultivates students' academic, presentation, and research communication skills.

The competition supports their capacity to effectively explain their research in three minutes, in a language appropriate to a non-specialist audience.

CHARM 3MT competitors are also encouraged to compete in their respective university competitions.

Keynote Speaker: Prof Maree Teesson

PROFESSOR, DIRECTOR NHMRC CENTRE OF RESEARCH EXCELLENCE IN MENTAL HEALTH AND SUBSTANCE USE AND NHMRC PRINCIPAL RESEARCH FELLOW AT THE NATIONAL DRUG AND ALCOHOL RESEARCH CENTRE, PROFESSORIAL FELLOW AT THE BLACK DOG INSTITUTE, UNSW SYDNEY

Pathways to prevention: The long-term effectiveness of prevention and early intervention for substance use and related harms

Young Australian adulthood is characterised by increased use of alcohol and cannabis, and heightened risk of harms associated with this use including injury, self-harm or violent behaviour, and onset of alcohol or drug use disorders. This high prevalence of use is of particular concern given earlier initiation of use is a risk factor for poorer health outcomes, all of which negatively impact on current functioning, health and future life options. Ideally, preventive interventions should delay onset of alcohol and other drug use in low-risk adolescents who may be influenced by peer factors or social conformity, and high-risk adolescents whose underlying vulnerability may lead to alcohol and drug misuse. We have been developing two programs of prevention research and an online portal for delivery www.positivechoices.org.au

Increased thalamo-cortical functional connectivity in Parkinson disease

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Introduction: Parkinson disease (PD) affects 2-3% of the population over the age of 65. Cell loss in the substantia nigra causes dopamine deficiency to the nuclei of the striatum which impacts functioning of cortico-basal-ganglia-thalamo-cortical circuitry. The role of the thalamus within this circuitry warrants further explication due to the key role the structure plays in a range of motor, behavioural and sensory functions.

Methods: We investigated the size and shape of the thalamus in PD (n = 74), and how these aspects of morphology related to clinical functioning of patients compared to controls (n = 27). We then investigated the functional connectivity of motor and frontotemporal functional subterritories of the thalamus to investigate how neuronal circuitry might be influenced in PD.

Results: Relative to controls, PD patients showed no change in volumes or surface morphology of the left or right thalamus. We identified significant increases in functional connectivity in PD patients between the motor thalamus and the pre- and postcentral gyrus. We also identified significant and widespread increases in functional connectivity of the frontotemporal thalamus with cortical areas across the frontal lobe, and also with subcortical structures of the basal ganglia.

Conclusion: Our results indicate that PD is associated with increases in thalamo-cortical functional connectivity with important motor and cognitive areas of the brain, independent of any morphological alterations to the structure. Increases in thalamo-cortical functional connectivity may be indicative of a compensatory mechanism in PD due to pathological alterations to cortico-basal ganglia-thalamo-cortical circuitry.

Ankle proprioception and postural instability in Parkinson's disease

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Aims: Parkinson's disease (PD) is characterised by a variety of sensory and motor impairments. Motor impairments in PD are in part due to sensory or perceptual deficits, such as proprioception. This study had the following aims:

- compare ankle proprioception between PD participants and controls
- investigate postural instability in PD with and without vision
- determine how proprioception or postural stability relate to rate or fear of falling
- investigate the relationship between central and peripheral proprioception.

Methods: This was a cross sectional study of proprioception in Parkinson's disease and healthy aged matched controls. Measures included the Active Movement Extent Discrimination Apparatus to measure proprioception, a force platform to measure postural instability (CoP movement), Von Frey hairs for neuropathy and the PDQ-39 and Falls Efficacy Scale questionnaires.

Results: Twenty six participants were observed, 11 with PD and 15 healthy age-matched controls. A significant difference was observed in ankle proprioception between control and PD groups (MD = -0.048, 95% CI from -0.096 to -0.001, $p = 0.047$). The mean difference in 95% ellipse of CoP movement between with vision and without vision for the PD group was significantly larger when compared with controls (MD = 222.092, 95% CI from 66.078 to -378.105, $p = 0.007$).

Conclusion: The results of this study confirmed impaired proprioception of the ankle in people with mild to moderate PD. This proprioceptive loss did not correlate significantly with CoP measurements.

Clinical Significance: A greater understanding of these movement control mechanisms can inform general understanding of brain function and inform more effective rehabilitation for PD.

Costs of hospital-acquired complications for older people and people with dementia

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Aim: Increased length of stay (LOS) and high rates of hospital acquired complications for people with dementia are stimulating interest and debate about what costs may be associated, and potentially avoided, with this population. This project aimed to identify and compare costs of hospital-acquired complications and dementia.

Methods: A retrospective cohort study with a census sample of 426,276 discharged overnight public hospital episodes for patients aged 50+ in the 2006-07 financial year from NSW was collected. Four common hospital-acquired complications (urinary tract infections, pressure areas, pneumonia, and delirium) were risk-adjusted at the episode level. Extra costs were attributed to patient LOS above the average for each patient's Diagnosis Related Group (fixed and variable costs calculated separately).

Results: The complications were associated with 24.7% of extra costs of above-average LOS for older patients, costing A\$226 million in a single year. Dementia patients were more likely to have complications (RR2.5, $p < 0.001$) and comprised 22.0% of the extra costs (A\$49 million), despite only accounting for 10.4% of the hospital episodes. Complications were associated with increased LOS of 3.6 days and mean episode cost of A\$16,403. Complications and dementia cost more than other kinds of inpatient complexity such as comorbidity or age.

Conclusion: This research reveals urinary tract infections, pressure areas, pneumonia and delirium represent a burdensome financial cost, and that they are key in understanding increased LOS and costs in older and complex patients.

Clinical Significance: These complications are potentially preventable. Models of care, nurse skill-mix and healthy work environments should be considered to reduce the financial and social costs of these complications.

Effect of Folate Supplementation on Inflammatory Markers in Individuals Susceptible to Depression: A Systematic Review

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Folate has been proposed to be an efficacious treatment strategy for depression. The mandatory fortification of flour with synthetic folic acid (FA) in over 80 countries has yielded improvements in folate intake; however, depression is still a considerable public health concern. While there are established benefits of FA fortification in reducing risk of neural tube defects, the implications regarding depression are unclear, especially in individuals with certain genetic polymorphisms. Therefore, a systematic review was conducted to examine the effects of folate to treat depression. Following PRISMA guidelines, a systematic review was conducted of electronic databases (PUBMED, Scopus, CINAHL, and Cochrane Library) to identify human clinical trials examining the effects of folate (including FA) supplementation in the management or prevention of depression, the impact on inflammatory markers and if genetic polymorphisms were considered. Ten trials met the inclusion criteria. Seven trials examined effects of either adjunctive FA or L-methylfolate (L-MTHF) supplementation with antidepressants in the management of depression and three examined effects of FA supplementation alone for prevention of depression. No benefit of FA was found compared to placebo (all, $p > 0.05$). The single L-MTHF trial that explored the interplay of genetic polymorphisms and methylation status found benefit in the Hamilton depression rating scale from adjunctive treatment with 15 mg/day of L-MTHF compared with placebo (-6.8 ± 7.2 vs. -3.7 ± 6.5 ; $p = 0.017$) and improvement with L-MTHF for most genetic markers. Currently, there is no evidence to support FA supplementation for the management or prevention of depression. More research is required to determine the efficacy of L-MTHF.

Risk and Protective Factors of Disordered Eating in Gay Men, Lesbian Women, and Transgender and Nonconforming Adults

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Aim: This study aimed to compare the prevalence of eating disorder (ED) attitudes and behaviours between gay men, lesbian women, and transgender and nonconforming (TGNC) adults. The study further sought to identify and compare the risk and protective factors, and examined a mediational model based on the interpersonal theory of eating disorders, whereby the association between interpersonal factors and disordered eating would be mediated by psychological constructs pertaining to the self and negative affect.

Method: Data was obtained from a larger national study of health risk and protective factors among sexual minority populations. Participants (97 gay men, 82 lesbian women, and 138 TGNC) completed an ED screen, and measures of depression, anxiety, self-compassion, negative social exchange, thwarted belongingness, and perceived stigma.

Results: There were significant differences between groups in possible ED caseness, weight-based self worth and satisfaction with eating patterns. The groups differed regarding which factors predicted ED caseness. Thwarted belongingness and perceived stigma had an indirect relationship with possible ED caseness that was mediated by self-compassion and/or depression.

Conclusions and Clinical Significance: The interpersonal theory of eating disorders partially extends to sexual minority populations, however, the results suggest that theoretical models and treatment programs need to be extended to include the role of stigma and self-compassion.

Incidence of Access Block in Mental Health Presentations in Australasia

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Background: Mental Health access block is a patient care issue but there are no incidence data for Australia, which no longer enforces national limits on time in ED, nor New Zealand, which does enforce a national “six-hour rule”. This study aimed to identify the incidence of such boarding.

Methods: Binational voluntary survey of all 135 EDs accredited for training by the Australasian College for Emergency Medicine. Participating EDs reported data for the seven days from 27 Nov 2017. Mental Health presentations were defined as those with a clinical need for review by a mental health clinician during their ED stay. Admissions were defined as those to inpatient wards rather than ED short stay units. Access Block was defined as a total ED time of greater than eight hours for an admitted patient.

Results: 53 EDs (39.3%) provided full data comprising 57890 presentations and 14673 admissions (25.3%, 95%CI 25.0-25.7). 2532 mental health presentations were identified (4.4%, 95%CI 4.2-4.5), of which 636 (25.1%, 95%CI 23.5-26.9) required admission. Access Block was 22.2% (95%CI 21.5-22.9) in patients without mental health presentations and 37.4% (95%CI 33.7-41.3) in patients with mental health presentations ($P<0.0001$ Chi-square). In the prespecified subgroup of tertiary paediatric hospitals the figures were 11.2% (95%CI 8.9-14.0) and 5.6% (95%CI 0.3-29.4) respectively, in the remaining New Zealand hospitals 4.9% (95%CI 4.0-6.0) and 4.5% (95%CI 0.2-24.9) and in the other 43 Australian hospitals 25.8% (95%CI 25.0-26.7) and 39.6% (95%CI 35.7-43.7) (difference between countries $P<0.0001$ and $P<0.001$ respectively, Chi-square). There were smaller differences between different Australian jurisdictions.

Conclusions: Mental Health presentations disproportionately experience Access Block.

More than skin deep – The value of MASK-ED™ simulation in the physiotherapy classroom: A mixed methods cohort study

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Aim: MASK-ED™ simulation is a novel classroom-based technique where expert clinicians don a high-fidelity silicone mask to play the role of ‘patient’. The aim of this study was to determine physiotherapy students’ perceptions of the value of MASK-ED™, particularly in preparation for clinical placement.

Methods: A mixed methods study, collecting quantitative and qualitative data about students’ perceptions of MASK-ED™ simulation. MASK-ED™ simulation was implemented during classroom learning in the two semesters immediately prior to the students’ first clinical placement. During five tutorials, students practiced assessments and interventions with a uniquely created MASK-ED™ character, played by a researcher. The character was designed to align with the learning objectives of a cardiorespiratory physiotherapy unit. Third-year physiotherapy students completed a questionnaire, rating eight statements from strongly disagree (0) to strongly agree (4) prior to and after completing their first hospital-based clinical placement. Students were then invited to participate in focus groups.

Results: 43 students (100%) completed both questionnaires and 32 participated in four focus groups. Analysis revealed four themes: MASK-ED™ enriches the learning environment; MASK-ED™ enhances clinical performance; MASK-ED™ has more potential; MASK-ED™ has limitations. 100% of students agreed that MASK-ED™ improved their readiness to undertake clinical placement. However, students’ perception of the effectiveness of MASK-ED™ reduced after clinical placement (MD -0.20 out of 4, 95% CI -0.54 to -0.04).

Conclusion: Physiotherapy students perceive MASK-ED™ simulation as helpful for learning and preparing for clinical placement.

Clinical Significance: MASK-ED™ is a valuable addition to Physiotherapy educators’ simulation toolbox. Patients may benefit from interaction with Physiotherapy students who are more confident and prepared for clinical interactions.

Visual function of sports-related Mild Traumatic Brain Injury (mTBI)

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Aims: To investigate the effect and correlation of mild traumatic brain injury (mTBI) on retinal thickness and visual function with multifocal pupillary objective perimetry (mfPOP).

Methods: Thirty seven male patients diagnosed with acute concussion occurring less than 30 days (21.6 ± 2.11 years, mean \pm SD), eleven athletes with a history of head trauma between 30 to 365 days (20.9 ± 2.0 years) and twelve athletes with no history of head trauma were recruited (22.50 ± 2.71 years) including eighteen healthy aged-matched controls (22.13 ± 1.89).

Results: On average, subjects who suffered acute mTBI also showed most delay in responses (7.2 ± 1.1 ms, $P < 0.0005$). Local correlations between retinal thickness and mfPOP delays showed significant negative correlations across all central retinal regions in subjects with mTBI ($P < 0.05$).

Conclusion: Retinal thickness change mTBI and the significant association with MfPOP response delays may be a biomarker of mild head trauma.

Clinical significance: Visual field loss in mild traumatic brain injury (mTBI) is often undiagnosed or underdiagnosed. Structural changes in the retina and its correlation with functional change may identify mTBI and assist in monitoring post injury.

Weighing in: Does size matter in knee kinematics?

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Introduction: Knee osteoarthritis (OA) is strongly associated with obesity. Weight loss can help reduce symptoms and self-reported disability in knee OA. The mechanism behind this is not fully understood. Changes in load may influence knee joint kinematics, but kinematic responses to changes in body mass index (BMI) and other morphometric factors are not well understood.

Method: A cross-sectional observational study using 2D-3D image registration with single-plane fluoroscopy and computed tomography (CT) in 29 healthy participants aged < 56 years. The effect of four morphometric factors (BMI, weight, height and knee size) on in vivo tibiofemoral kinematics during a deep knee-bend (DKB) and step-up activity was investigated. The cohort was dichotomised according to size in each morphological category. Tibiofemoral kinematics were analysed at the mid-point of flexion during each activity. Polynomial regression models were used to compare morphometric categories.

Results: Maximum flexion during DKB was significantly influenced by BMI ($p=0.03$ respectively) and the timing of internal rotation was influenced by both BMI and weight ($p<0.01$ and $p=0.02$). Those in the larger BMI and weight categories were more internally rotated at the flexion mid-point and internally rotated earlier during the deep knee bend activity. The taller height group was more medially translated at the mid-point of step-up ($p<0.05$).

Conclusion: Morphology was found to influence in vivo tibiofemoral kinematics. People with higher BMI and weight demonstrated earlier internal rotation during DKB which has not previously been reported.

Clinical Significance: Earlier internal rotation during knee flexion may increase forces in the knee. Specific strengthening strategies may protect the knee in people with high BMIs.

Do Kneeling Knee Kinematics change as we age from 20 to 90? What does healthy ageing of knees look like in deep flexion under load?

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Introduction: Kneeling is an activity which becomes more difficult as we age. Altered knee kinematics can lead to movement restriction. However, there have been no previous studies examining knee kinematics through life.

Methods: 67 healthy knee participants aged 20 to 90 years were recruited and divided into four 20-year age-groups. Each participant's knee CT scan was registered onto 'kneeling knee' single-plane fluoroscopy, using Orthovis© 3D/2D registration; producing knee motion in 3D. A one-way MANCOVA, with covariates University of California, Los Angeles activity scale and AQoL (Assessment of Quality of Life) Physical Dimension, compared kinematic variables of position, displacement and rate-of-change in six-degrees-of-freedom between age-groups. Significant results were examined with univariate one-way ANCOVAs with Bonferroni correction producing pairwise-comparisons.

Results: Both groups were similar except that the older groups were less physically active ($p < 0.0005$). There were significant differences in the multivariate-linear-composite only at 120° flexion, achieved while moving into flexion. At 120°, 80+ years were more anterior than the 20-39y group, -5.5(2.0)mm, and more abducted than the 20-39y, 40-59y and 60-79y groups, -4.4(1.3)mm, -4.1(1.3)mm, and -3.0(1.1)mm respectively.

Conclusion: This is the first study to compare the knee kinematics of healthy ageing using 3D/2D registration techniques with a high level of accuracy. It has demonstrated that ageing changes knee kinematics but only into flexion, and only at 120°. At this flexion angle, the 80+ year knee is more anterior and abducted than younger age-groups.

Clinical Significance: Healthy knees are kinematically normal until after 80 years but 120 degrees may be an important target angle for manual therapy when kneeling becomes difficult.

A comparison between osteoarthritic and asymptomatic knees using statistical shape modelling

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Aims: Knee osteoarthritis (OA) results in changes such as joint-space narrowing and osteophyte formation. Current OA classification systems group patients by the presence or absence of these gross anatomical features but are poorly correlated to function. Statistical-shape modelling (SSM) enables the detection of subtle 3D differences in bone geometry, providing an opportunity for accurate predictive models. The aim of this study was to describe and compare the variations between OA and asymptomatic knee shape.

Methods: 74 patients with OA and 72 asymptomatic controls received a CT of their knee. Three-dimensional models of the joint were created by manual segmentation. A template mesh was fit to all meshes and rigidly aligned resulting in a training set of correspondent features. Principal Component Analysis (PCA) was performed to create the SSM. Statistical classification was performed on the PCA weights to create a classifier that distinguished morphologic features of the two groups. Modes of variation describing 95% of the variation within the data were analysed.

Results: The first 12 modes of the SSM captured >95% shape variation with modes 1-5, 7 and 9 being significantly different. Visually, OA knees were larger, and displayed sub-chondral bone expansion in the lateral condyle and posterior lateral tibial plateau. The model classified the two groups with an accuracy, area-under-the-curve and precision of 91%, 96% and 92%, respectively.

Conclusions: Osteoarthritic shape changes were accurately captured and classified using a SSM with 12 modes.

Clinical Significance: Shape alone is an important factor in diagnosing knee OA. Further research should investigate the influence of these shape changes on clinical and functional outcomes.

Development and Initial Testing of the Self-Care of Chronic Illness Inventory

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Aim: To develop and psychometrically test the Self-Care of Chronic Illness Inventory, a generic measure of self-care. Existing measures of self-care are disease-specific or behaviour-specific; no generic measure of self-care exists.

Methods: We developed a 20-item self-report instrument based on the Middle Range Theory of Self-Care of Chronic Illness, with three separate scales measuring Self-Care Maintenance, Self-Care Monitoring and Self-Care Management. Each of the three scales is scored separately and standardized 0 to 100 with higher scores indicating better self-care. After demonstrating content validity, psychometric testing was conducted in a convenience sample of 407 adults (63 ± 15 years, 54% male, 2.7 ± 1.3 chronic conditions) enrolled from in-patient and out-patient settings at five sites in the United States and ResearchMatch.org. Cross-sectional data were obtained and used for dimensionality testing with confirmatory factor analysis, which preceded reliability testing.

Results: The Self-Care Maintenance scale (eight items, two dimensions: illness related and health promoting behaviour) fit well when tested with a two-factor confirmatory model. Internal coherence reliability was estimated at .67. The Self-Care Monitoring scale (five items, single factor) fit well and reliability was .81. The Self-Care Management scale (seven items, two factors: autonomous and consulting behaviour), when tested with a two-factor confirmatory model, fit adequately. Internal coherence reliability was .71. A simultaneous confirmatory factor analysis on the combined set of items supported the more general model.

Conclusion: The Self-Care of Chronic Illness Inventory is adequate in reliability and validity.

Clinical Significance: Although further testing in diverse populations is needed, the instrument can be useful to assess self-care in persons with chronic illness.

Cultural adaptation and chronic pain management: A pilot randomised controlled trial

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Aims: To pilot a culturally adapted pain management approach and investigate its effect on patient engagement compared to usual care.

Methods: This study was a participant- and assessor-blinded pilot randomised controlled trial. Forty-eight participants with chronic pain, identifying as Assyrian, Mandaean or Vietnamese, were randomised to a culturally adapted pain management approach or usual care. All participants attended a maximum of 10 sessions over three months. Primary outcomes (attendance, adherence and satisfaction) were evaluated at three months. Secondary outcomes (pain, physical and psychosocial function) were collected at baseline and three months to inform feasibility. Independent samples t-tests and analysis of variance were calculated for between group differences at treatment completion (3-months).

Results: The programs were successfully implemented for each community. Ninety-six percent of patients in the culturally adapted group completed treatment compared to 58% in the usual care group. Significant between group differences were observed for treatment attendance (87% v's 68%) and treatment adherence (88% Vs 55%) in favour of the culturally-adapted approach ($p < 0.05$). A significant difference in pain-related suffering was observed for the culturally adapted approach compared to usual care (3.56 95% CI 0.11 to 7.0; $p = 0.043$). No significant difference in secondary outcomes of satisfaction, pain intensity, pain interference, physical function or psychological symptoms were observed between groups at 3-months.

Conclusion: Pain management approaches can be successfully adapted to reflect the beliefs, values and social identities of culturally and linguistically diverse (CALD) communities.

Clinical Significance: Adopting strategies to enhance the cultural relevance of pain management approaches enhances patient engagement and is an important first step towards reducing pain disparities for CALD communities.

Gene expression differences over the course of Crohn's disease

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Introduction: The earliest macroscopic lesion in Crohn's disease (CD) is the aphthous ulcer, which overlies Peyer's patches and lymphoid follicles ('early-stage disease'). Our aim was to compare whole genome expression profiles of 'early-stage' CD and control tissues with 'mid-' and 'late-stage' tissues.

Methods: We obtained 238 mucosal samples representing 'early-stage' disease (N=42 CD and N=24 control samples), 'mid-stage' disease (N=44 CD and N=37 control samples) and 'late-stage' disease (N=27 CD samples and N=27 control samples). RNA was extracted and 24 samples from early- and late-stage disease were sequenced using a NextSeq 500 platform (150 bp paired end). Whole genome transcripts were assessed for quality, trimmed and aligned to the human reference genome. Fragment counts were obtained, expression values normalized, and differential gene expression analyses performed. A panel of 13 genes, all of which were upregulated in aphthous ulcers, were screened using qRT-PCR for all samples.

Results: We obtained 36 million tags per sample, 93% of the quality reads mapped to the human genome. Over 685 genes were significantly unregulated in aphthous ulcers compared to adjacent mucosa and Peyer's patches. We confirmed that the 13 genes in the qRT-PCR panel were upregulated in involved tissues from all stages of disease, for the full set of samples. The level of expression of the 13 genes correlates with stage of disease.

Conclusions/Clinical Significance: Genes that are over-expressed in aphthous ulcers, and almost exclusively by blood monocytes, may serve as markers for early disease. They may also be targets for new therapeutics, which could be used to halt disease progression.

Blood stream infection (BSI) following transrectal ultrasound-guided (TRUS) biopsy of the prostate: 20 year experience in the Australian Capital Territory.

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Aims: To investigate trends in the risk of blood stream infections (BSI) following trans-rectal ultrasound guided prostate biopsies (TRUSPB) in the Australian Capital Territory (ACT) over the past 20 years.

Methods: Clinical information related to all patients with BSI at the Canberra Hospital has been prospectively collected since 1998. We analysed the demographic and microbiological features of BSIs related to TRUSPBs for four time periods between 1998 and 2017. The Medical Benefit Schedules database was used to estimate the number of TRUS biopsies performed in the ACT for each time period. Simple descriptive statistics and 95% confidence intervals were calculated using Excel.

Results: A total of 58 BSIs related to TRUSPB occurred between 1998 and 2017. Eight cases (14%) required ICU admission but there were no attributable deaths. E. coli accounted for 90%. The overall estimated risk of bacteraemia following TRUSPB was 0.86% (95% CI: 0.8095 - 0.915). The highest risk occurred in 2003-2007: 1.33% (95% CI: 1.323 - 1.346) and the lowest in 2013-2017: 0.51% (95% CI: 0.4667 - 0.5672). The total number of TRUSPBs peaked at 2274 in 2008-2012 and fell to 1354 in 2013-2017.

Conclusion: Fewer TRUSPBs are being performed in the ACT and the risk of procedure-associated BSI is lower than the international average. The results may be related to better pre-procedure antibiotic prophylaxis.

Clinical Significance: Despite the falling incidence, TRUSPB-related BSI still results in significant morbidity and mortality in the ACT. Less invasive and more accurate diagnostic procedures are needed to avoid the infective complications of TRUSPB.

Investigation of platelet-erythrocyte interaction in circulation

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During malarial infection, platelets bind to both Plasmodium-infected erythrocytes which leads to the direct intraerythrocytic killing of the parasite through the release of platelet antimicrobial proteins. Interestingly, platelet binding to uninfected erythrocytes is also observed, both in the circulation of malaria patients and Plasmodium-infected mice and in healthy uninfected people mice. However, how these complexes form and their potential functions in the circulation are not known. In this project, we hypothesized that platelet-erythrocyte complexes form specifically with senescent and diseased erythrocytes and that the complexes undergo accelerated clearance from the circulation, thus serving as a mechanism to remove ageing and diseased erythrocytes, and during malaria infection, contribute to the development of thrombocytopenia.

To investigate this hypothesis, we aimed to (i) observe of platelet binding to age-tracked biotin-labelled erythrocytes in murine circulation; (ii) measure of the platelet-erythrocyte complex lifespan by injecting CFSE-labelled platelet-Atto-labelled erythrocyte complexes into murine circulation; and (iii) observe role for splenic retention in complex clearance using in vitro splenic filtration bead column. The main results from these experiments were that (i) platelets bound preferentially to erythrocytes greater than 40 days of age; (ii) that the CFSE-labelled platelet-Atto-labelled erythrocyte complexes were cleared from the circulation four times faster compared to the free CFSE-labelled platelet and about 10-14 times faster compared to the free Atto-labelled erythrocyte; (iii) there was a 30% increase in the retention of the erythrocytes bound to platelet in the splenic bead column. From those findings, we suggest that the platelets might be involved in the removal of ageing erythrocytes from the circulation by binding preferentially to those cells, and one of the possible mechanisms for that removal is by splenic retention.

Tissue Inhibitors of Metalloproteinases – Rocks to the scissors on platelets

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Introduction: Tissue-inhibitor-of-metalloproteinases (TIMPs) regulate vascular metalloproteinases and control metalloproteolytic activity in the vasculature. Glycoprotein (GP)VI is the platelet collagen receptor involved in thrombus initiation and growth. Human GPVI is stable on circulating platelets but metalloproteolytically shed from activated platelets by A-Disintegrin-And-Metalloproteinase (ADAM) 10, to release soluble GPVI (sGPVI). sGPVI levels are significantly elevated in stroke, sepsis and trauma patients but how ADAM10-mediated GPVI shedding is controlled remains unclear. We assessed TIMP/platelet interactions and evaluated how these interactions regulate ADAM10 activity, GPVI levels and thrombus formation.

Methods: TIMPs and platelet receptors were assessed in platelet-rich plasma by flow cytometry and ELISA. Effect of TIMPs on platelet ADAM10 activity was explored using a fluorescence resonance energy transfer assay with an ADAM10 substrate. Thrombus formation under shear stress was measured in microfluidic chambers and evaluated using digital holographic microscopy.

Results: TIMP1 and TIMP2 were detectable on resting platelets and increased upon platelet activation ($p < 0.001$, $n=6$), suggesting an intracellular TIMP store. Surface TIMP3 and TIMP4 were detected at lower levels. Recombinant human TIMP1 and TIMP3 reduced platelet ADAM10 activity by 25-50% ($n=3$). Combining TIMPs (1-4) reduced thrombus volume when platelets were perfused over collagen-coated surfaces ($n=1$), suggesting a role of TIMPs in thrombus formation.

Conclusions: TIMPs are present on circulating platelets and are upregulated upon activation. TIMP1 and TIMP3 reduced platelet ADAM10 activity. Further investigations are needed to elucidate how ADAM10 is regulated by TIMPs and potentially provide a therapeutic avenue to modulate thrombus formation in pathological settings.

Extracellular histones induce erythrocyte fragility and anaemia and identification of compounds that prevent this process

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Background: Extracellular histones are released from activated immune cells including neutrophils (NETs) following pathogens and tissue injury and exhibit very effective anti-microbial activity. Uncontrolled formation of NETs can, however, become pathogenic particularly via their associated histones that can be cytotoxic in the vasculature causing endothelial cell death, systemic vascular obstruction and multiple organ failure. They can also initiate coagulation by both activating platelets and damaging erythrocytes such that they become pro-thrombotic. Recently we discovered an additional effect of histones on erythrocyte, which is to enhance their fragility when they are subjected to shear stress associated with blood flow through the vascular system and spleen in particular. In parallel studies our laboratory has synthesised a family of small polyanions (SPAs) which have been screened for their ability to neutralise the pathogenic effects of histones and NETs.

Methods: We have used a novel mechanically-induced shear stress method as well as an in vitro spleen filtration model to investigate the effects of mammalian histones \pm SPAs, on RBC fragility. The in vitro findings were mirrored in vivo with the injection of histones and SPAs in mice.

Results: Our results revealed that free histones bind to erythrocytes with high affinity and render erythrocytes susceptible to lysis by shear stress in a dose-dependent manner and some SPAs could totally inhibit or reverse this phenomenon.

Conclusion: Based on these data we propose that erythrocytes can capture histones in the circulation and transport them to the spleen for disposal. Overload of this disposal system could cause the unexplained anaemia associated with sepsis, cancer and other pathological conditions.

CHARM

CANBERRA HEALTH
Annual Research Meeting

POSTER PRESENTATIONS



1. Determination of clinical applicability and demonstration of concordance of NGS to investigate Myeloid Malignancies

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Aim: The revised World Health Organisation (2017) classification refers to sequence variants in myeloid malignancies for diagnosis, prognosis, therapy decisions and monitoring. We assessed the clinical applicability of next generation sequencing (NGS) in our centre and tested concordance of sequence variants with previous results from other centres.

Method: DNA was extracted and library preparation of DNA was performed as per the Illumina TruSight Myeloid method (54 gene panel) from cell pellets of 24 patients with AML whose samples were archived in the ACT Haematology research Tissue Bank after consent. Pooled library preparations were run on the MiSeq Next Generation Sequencer and data was analysed using Illumina's BaseSpace software. Data was compared with previous results obtained from other laboratories.

Results: Full concordance between NGS and previous results was observed for FLT3 TK2, NPM1, CEBPA and CALR. As expected, the FLT3 ITD was not able to be detected by NGS. While this was a trial of methodology, the time from sample receipt to report is achievable within one week.

Conclusion: NGS results were concordant for all variants (excluding FLT3 ITD mutations) that had previously been detected.

Clinical Significance: Moreover, this panel approach to testing demonstrates clinical utility in the timely provision of variant information for diagnosis and improved sub-classification of AML.

2. Elucidation of Glioblastoma by FISH on a Suboptimal Brain Tissue Biopsy

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Aims: Glioblastoma (GBM) is the most common and most aggressive primary brain tumour in adults. The histopathology of GBM is defined by the presence or absence of nuclear atypia, mitotic activity, and necrosis and/or microvascular proliferation. The EGFR gene is overexpressed and amplified in a subset of primary GBMs. We present a case of an 80 year old male with imaging suggestive of a high grade glioma but where repeated biopsies demonstrated only a minor increase in cellularity. Routine histology suggested a low grade glioma. Fluorescence in situ hybridisation (FISH) studies for EGFR gene amplification were used to clarify the diagnosis of GBM in this difficult case.

Methods: Immunohistochemistry for ATRX, IDH, and EGFR was performed on a Ventana staining platform. Dual colour FISH analysis was performed using the XT EGFR amp probe from Metasystems on 4um paraffin sections of brain tissue.

Results: The inconclusive histopathology showed only mildly increased cellularity with apparent staining of scattered cells for EGFR (but negative for IDH1 and positive for unmutated ATRX). The FISH studies showed high copy number amplification for EGFR in a subset of cells confirming the diagnosis of EGFR amplified high grade glioma.

Conclusion: Routine histology provided a misleading impression of tumour type and stage. FISH detection of EGFR amplification confirmed a diagnosis of GBM in this patient.

Clinical Significance: Due to the aggressive nature of GBM and poor outcome for these patients a definitive diagnosis is important for appropriate prognosis and treatment planning.

3. Targeting nucleolar dynamism as a strategy to inhibit tumour cell division

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The nucleolus is the most prominent membraneless structure in the nucleus. Nucleoli have a three-part substructure and facilitate processes such as ribosome biogenesis, the response to cellular stress and malignant transformation of cells. Given the necessity of the nucleolar substructure to the key nucleolar function of ribosome biogenesis, and the observation that nucleoli in many cells coalesce to form a single nucleolus before mitosis, we hypothesise that disrupting nucleolar coalescence and/or sub-compartmentalisation (hereby referred to as nucleolar dynamism) could inhibit the cell from entering mitosis and induce cell cycle arrest or apoptosis. Moreover, we hypothesise that ribosomal DNA (rDNA) loci, which are located on several chromosomes, may need to condense to the same locus to allow for appropriate chromosomal segregation and therefore, that disrupting nucleolar dynamism could lead to quiescence, senescence, chromosomal missegregation and ultimately cell death. Since malignant tumour cells rely heavily on upregulated rDNA transcription and ribosome biogenesis, any disruption of the nucleolus, including nucleolar dynamism, may have fatal consequences compared to normal cells.

Our over-arching hypothesis is that disrupting nucleolar dynamism through targeting proteins responsible for the formation, segregation and liquid-like properties of the nucleolus will inhibit tumour cell division, mitosis or appropriate chromosomal segregation and therefore be a potential therapeutic target for cancer. To test our hypothesis, fluorescent live-cell microscopy screening will be used to observe the effect of therapeutic inhibitors of rDNA transcription or small interfering RNA (siRNA) knockdown of key nucleolar proteins on nucleolar dynamism and tumour cell division.

4. Novel cancer immunotherapy, intratumoural Complete Freund's Adjuvant (cfa) – dependency on neutrophil infiltrates.

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Our novel cancer immunotherapy involves an intratumoural injection of Complete Freund's Adjuvant (CFA), effectively turning the tumour into its own vaccine. Since beginning a Phase I Clinical Trial at the Canberra Hospital assessing our treatment in multiple solid tumours, the current focus of our research is improving the potency of our novel anticancer immunotherapy and elucidating its precise mechanism of action using murine cancer models.

We have studied CFA immunotherapy in four mouse models of cancer, with improved survival in mammary adenocarcinoma (4T1) and mastocytoma (P815). Complete regressions were seen in the P815 model after a single injection of 0.05mL of CFA. To elucidate the mechanism of action in this model we used our novel technique of 'fine-needle aspiration' (Carroll, et al. J Immunol Methods, 2015), to allow for sequential tumour analyses of infiltrating cells and retrospective correlation with survival. Our findings showed that mice with the longest survival had the highest leukocyte infiltrates. In particular, high neutrophil infiltrates at days 1-3 post treatment, and sustained neutrophil infiltrates were predictive of increased survival.

We have investigated whether the efficacy of our cancer treatment can potentially be improved through manipulation of neutrophil infiltration and maturation. We have also endeavoured to identify the mechanism by which these neutrophils are eliciting their anti-tumour effects. From these findings, we can better understand how to improve our cancer treatments in patients and identify the cancer types that will derive the most benefit from our treatment.

5. Orthogeriatric patients with type 2 diabetes mellitus (DM): prevalence, demographic characteristics, trends and forecast up to 2050

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Aims: To examine the prevalence, trends, characteristics and short-term outcomes in orthogeriatric patients with and without DM (1) and predict their number up to 2050 (2).

Methods: In 1515 consecutive patients aged ≥ 60 years admitted to the Department of Orthopaedic Surgery (2012 – 2015) clinical characteristics and in-hospital outcomes (mortality, high postoperative inflammatory response [HPIR], length of stay [LOS], need for a permanent residential care facility [RCF]) were analysed. Patients with DM ($n=324$) and without DM ($n=1191$) were compared in three groups: (1) hip fracture ($n=601$), (2) other non-vertebral fracture ($n=480$) and (3) without fracture ($n=434$).

Results: The mean annual prevalence of diabetic orthogeriatric patients was 21.4% (20.9% among females, 22.4% among males) ranging 18.7% – 22.7% over four years and similar in the three groups. Patients with and without DM were similar in regard to the mean age (77.4 vs. 78.3 years), gender (M:F ratio 1:1.97 vs. 2.15), in-hospital mortality (2.5% vs. 2.6%), developing HPIR (44.15 vs. 47.7%), LOS (19.2 vs. 17.4 days) and new RCF discharge (3.2% vs. 3.8%). Compared to groups 2 and 3, hip fracture patients were significantly older (+6.2 to +8.8 years). The annual number of diabetic orthogeriatric patients is projected to increase in 2030 by 595.1% ($n=482$) and in 2050 by 824.7% ($n=668$), including hip fracture patients by 343.3% and 470.0%, respectively.

Conclusion: Prevalence of DM among hospitalised orthogeriatric patients is about 20%; given the rapidly growing elderly population an 8-fold rise may be expected by 2050.

Clinical significance: Urgent need of implementation effective preventive strategies and useful data for future planning.

6. Role of islet heparan sulfate (HS) and heparan sulfate proteoglycans (HSPGs) in Type 2 diabetes (T2D)

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Background: This study examined whether (i) ER stress contributes to the loss of intra-islet HS and HSPG core proteins during T2D development and (ii) relieving ER stress preserves T2D beta cell HS/HSPGs and function.

Methods: HS and HSPG core proteins in pancreases of wildtype (wt) and T2D-prone db/db mice at 3-20 weeks were examined by immunohistochemistry. The expression of ER stress-associated genes was analysed by real-time RT-PCR. Beta cell viability was assessed on day 0 and day 2 \pm culture with heparin (HS mimetic; 50 μ g/ml). Db/db mice at 4 weeks were treated with TUDCA (chemical chaperone; 150 mg/kg/day i.p) or saline for 28 days; blood glucose was monitored and islet HSPGs/HS levels were assessed.

Results: HS and HSPG core proteins in db/db islets were reduced to 44% and 22-46% of controls, respectively, by 6 weeks of age. Isolated db/db islets showed a 13-125 fold increase in ER-stress associated gene transcripts, compared to wt controls. Wt and db/db beta cells cultured with heparin showed a 3.5-fold and 1.8-2.8 fold increase in viable beta cells and H₂O₂-induced death was reduced to 15% and 32-60% of corresponding controls. TUDCA treatment significantly increased islet HSPG in db/db mice and improved glycaemic control.

Conclusion: Diminished levels of HS and HSPG core proteins in db/db islets during the progression of T2D are consistent with ER stress effects on HSPG and HS synthesis. Treatment with HS mimetics rescued db/db beta cell viability and protected against acute oxidative damage in vitro. TUDCA treatment improved islet HSPG/HS and glycaemia in db/db mice.

7. Mendelian inheritance of a diabetes-prone trait in a sub-strain of NODk mice

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Introduction: NODk compared to NOD (non-obese diabetic) mice carry a low risk H2k-MHC haplotype for autoimmunity, making it type-1-diabetes (T1D) resistant. Two NODk sub-strains differ in their type-2-diabetes (T2D) susceptibility with high fat (HF) feeding: O-NODk mice are T2D-prone; whereas RF-NODk mice (a refreshed sub-strain derived from backcrossing onto NOD/Lt mice) are T2D-resistant.

Aim: To determine the genetic basis for the diabetes susceptibility of O-NODk mice compared to T2D-resistant RF-NODk mice.

Methods: Selective breeding was performed by crossing O-NODk with RF-NODk mice to generate F1 mice (genetically 50% O-NODk and 50% RF-NODk mice). Female F1 mice were inter-crossed with male F1 mice producing F2 mice; or back-crossed to male O-NODk and RF-NODk mice to create O-N1F1 and RF-N1F1 mice. Male mice were fed HF or chow diets from weaning until 24 weeks of age. Serial measurements of body weight, glucose and intraperitoneal glucose tolerance were performed.

Results: By 24 weeks, 0/8 HF-fed male F1 mice developed T2D; long-term phenotyping of HF-fed mice showed that 1/7 F2, 1/7 RF-N1F1 and 8/15 O-N1F1 mice developed glucose intolerance and T2D ($p < 0.001$). Diabetic mice had higher body weight than diabetes-resistant, however no early glucose or insulin phenotypic differences were evident.

Conclusion: This study suggests that segregation in these mice to diabetes susceptibility traits follows Mendelian rules. There is either a dominant T2D-resistant allele in RF-NODk mice or a recessive T2D-causative allele in O-NODk mice. Whole genome sequencing of these mice can determine the causative gene(s).

Clinical Significance: Identification of novel diabetes gene(s) and mechanism for islet μ -cell susceptibility to failure in both T1D and T2D.

8. Gestational diabetes is the predominant and an increasing indication for early-term induction of labour at The Canberra Hospital

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Aims: To determine trends and primary indications for early term induction of labour (IOL) at the Canberra Hospital for the five-year period 2012-2016.

Methods: De-identified information on deliveries was extracted from the Birth Outcomes System. Data were stratified by gestational age. Maternal BMI and birthweight as well as labour complications and neonatal conditions related to macrosomia and gestational diabetes mellitus (GDM), respectively, were assessed by Chi-square and ANOVA.

Results: Total deliveries and the proportion of early-term IOL rose markedly over the time period. GDM was the most frequent and an increasing main indication for early-term IOL. Women with GDM who underwent early-term IOL had higher BMI, an increased proportion of obesity and a greater incidence of labour complications related to macrosomia. Birthweight of neonates of diabetic mothers was significantly higher and this was associated with decreased rates of admission to the special care nursery/neonatal intensive care unit compared to non-GDM babies. The relative risk of early-term IOL was increased in obese women who developed GDM by 1.8 times.

Conclusions: The burden of GDM and early-term IOL have increased at TCH, likely due to a reduced diagnostic threshold. Although GDM is associated with more labour complications, adverse short-term neonatal outcomes have not increased, possibly suggesting appropriate management.

Clinical Significance: Early-term delivery is an important cause of neonatal morbidity associated with increased healthcare costs and possible long-term developmental ramifications. As a form of 'iatrogenic' delivery, IOL is a potentially modifiable contributor to this burden. Improved understanding of indications for early-term IOL may help identify patients who could safely continue pregnancy to full-term.

9. Fasting rapidly reverses severe hyperinsulinaemia in the high-fat diet fed NOD.B10 foz/foz mice

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Introduction: Female NOD.B10 and Balb/c mice when challenged by genetic obesity (foz) and high-fat diet (HFD) develop obesity by 12-weeks of age, but only the NOD.B10 mice develop type 2 diabetes (T2D) and profound hyperinsulinaemia.

Aims: To investigate the effects of fasting (short-term islet b-cell rest) followed by refeeding on insulinaemia in 12-weeks old NOD.B10 and Balb/c foz/foz mice.

Methods: NOD.B10 and Balb/c (WT and foz/foz) mice were fed chow or HFD from weaning. At 12-weeks of age, mice were submitted to fasting/refeeding protocols (17h overnight/5h (both strains) or 12h daytime/12h (NOD.B10 only)). Body weight, blood glucose and plasma chemistry were assessed.

Results: In the 17h/5h fast/refeeding experiment, non-fasted NOD.B10 HFD-fed foz/foz mice compared to Balb/c counterparts were hyperglycaemic (13.0 ± 1.7 vs 6.9 ± 0.2 mmol/l; $p < 0.01$) and markedly hyperinsulinaemic (35.4 ± 8.5 vs 3.3 ± 0.9 ng/ml; $p < 0.01$). After 17h-fasting, despite mild hyperglycaemia (7.8 ± 0.8 vs 5.4 ± 0.4 mmol/l; $p < 0.05$) NOD.B10 HFD-fed foz/foz mice showed a dramatic fall in insulinaemia to levels similar to the Balb/c mice (2.2 ± 0.3 vs 1.4 ± 0.5 ng/ml). After 5h-refeeding, glycaemia was mildly elevated in NOD.B10 mice (9.1 ± 0.5 vs 7.6 ± 0.4 mmol/l; $p < 0.05$) with only partial return of relative hyperinsulinaemia (6.2 ± 1.2 vs 2.7 ± 0.8 ng/ml; $p < 0.05$). The 12h/12h experiment resulted in similar trends, but with less effective diminution of hyperinsulinaemia. Insulin:C-peptide ratios were two-fold-higher in NOD.B10 compared to Balb/c HFD-fed foz/foz mice in the fed state suggesting possible differences in insulin clearance.

Conclusion: Islet b-cell rest with prolonged overnight fasting dramatically reverses profound hyperinsulinaemia in NOD.B10 HFD-fed foz/foz.

Clinical Relevance: These findings may have relevance to dietary management of obesity-related hyperinsulinaemic states and T2D.

10. The healthy eating disorder: A scoping review on what dietitians need to know

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Orthorexia Nervosa (ON) is a condition where people present with a pathological fixation on consuming only healthy food. Despite causing distinct clinical symptoms and nutrient deficiencies, this pattern of disordered eating, whilst receiving intense popular-media interest, is relatively unknown.

Aims: This study aims to provide a scoping review to define the clinical symptoms of orthorexia, how it differentiates from other formally recognised eating disorders, and to determine appropriate treatment modalities.

Methods: Using the PRISMA 2009 guidelines, four databases were searched (Pubmed, Scopus, CINAHL, and PsycINFO). Studies were included if they were published in peer-reviewed journals in English from January 2010 to September 2017 and focused exclusively on orthorexia. From 61 articles initially identified, after two levels of screening, 11 articles met the inclusion criteria.

Results: Results show that ON is a distinct eating disorder with significant clinical symptoms and micronutrient deficiencies. Psychoeducation, nutrition counselling and the drug oral olanzapine were proposed as effective treatment modalities.

Conclusion: Our analysis indicated there is sufficient evidence to suggest ON is an emerging and distinct eating disorder worthy of dietetic attention.

Clinical Significance: Due to the paucity of research on this topic, it is advised that future research focus specifically on the clinical symptoms, treatment and management of ON from a nutrition perspective.

11. Exploration of Clinician Perspectives of Feeding Challenges in the Southern Sector of the WNSW Local Health District

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Aims: Failure to address feeding challenges in paediatric clients including food refusal and limited self-feeding skill could result in complications including malnutrition, aspiration, respiratory infections and development of eating disorders. Furthermore, unbalanced diets can lead chronic diseases in adulthood. The demand for specialist paediatric feeding services outside of the Orange Local Government Area has inexplicably grown. We aimed to examine potential barriers and enablers faced by clinicians who did not have regular access to a multidisciplinary team at Orange Health Service (OHS) in providing care to paediatric clients with feeding challenges.

Methods: Mixed methods were used, utilising focus groups and a survey developed using previously validated tools. Two focus groups were conducted with nineteen allied health clinicians treating feeding challenges. Focus groups were recorded, transcribed and analysed for common themes. The data from the survey (N= 16) was descriptively analysed and graphed using excel.

Results: Three barriers emerged from the focus groups: (1) Low level of feeding challenge referrals to local clinicians resulted in a lack of experience to practice skills; (2) Low confidence in treating and managing feeding challenges; (3) Lack of specialist teams to support practice. Enabler: Suggestion of a centralised service in Orange that incorporated Telehealth. Survey data showed an inverse correlation between frequency of feeding challenge presentations and confidence. Education and training opportunities did not translate to increased confidence without the opportunity to practice skills.

Conclusion: A better understanding of the perspectives of the clinicians working in regional communities may help to inform policies so that paediatric clients have equal access to appropriately skilled multidisciplinary teams.

12. The rheological and antioxidant properties of the potential functional food product (mango sorbet) containing the green tea amino acid L-theanine

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L-theanine (L-THE) consumption has been associated with numerous health benefits including improvements in relaxation and immune function. Commercially available pure L-THE has generated interest towards the development of various potential functional food products. The aims of the study were to examine the physicochemical and organoleptic properties of the functional food product (mango sorbet; ms) containing L-THE (0.2% w/w) in comparison to the same product without L-THE (ms-L-THE).

Physicochemical and antioxidant characteristics; DPPH, ABTS and FRAP (Trolox Equivalents (TE)); Phenolics (Gallic acid equivalents); and Flavonoid (Catechin equivalents) were determined spectrophotometrically. Product likeability was tested in healthy participants (n=50) (Hedonic scale and Triangle test). Antioxidant assays levels are presented as mean±standard deviation (or median (1st, 3rd quartile for not normally distributed variables) and were compared using the Student's two tailed t-test for normally distributed data and the Mann-Whitney U-test for data not normally distributed, while triangle test analysis was performed using Chi Square. Level of significance was set at $\mu=0.05$. Sensory analysis showed no significant differences between organoleptic properties of the two products ($p>0.05$) and the ms-LTHE is 'liked moderately' by consumers for all taste categories. The ms-L-THE had significantly higher DPPH compared with the ms (879±41.8 vs. 817±21.5 μ MTE, respectively, $p=0.01$). No significant differences were detected between samples for FRAP, ABTS, Phenolics or Flavanoids (all $p>0.05$). The differences in free radical scavenging activity sets the stepping stone for further investigation of the effectiveness and proposed functionality of the functional food product.

13. Development and implementation of the Texture Modification Diet Evaluation Tool (TeMDET) at the Canberra Hospital

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Aim: (1) To develop an evidence-based audit tool that assesses food items and recipes against current best practice specifications for texture modified diets (TMDs). (2) To embed routine, interprofessional quality auditing of therapeutic TMDs to monitor improvement actions.

Methods: An action research approach was used in the development of the TeMDET. The five phases were: (1) scoping literature review for evidenced-based practice auditing tools and TMD specifications, kitchen observations, and staff interviews with key food service personnel, (2) modification of an existing audit tool to incorporate Australian TMD standards, (3) piloting and advanced the tool, adding standardised evidence-based "mouthfeel" descriptors, (4) development of the TeMDET training module, and (5) establishment of the interprofessional texture modified working party and implementation of scheduled auditing.

Results: The resulting audit tool identifies four key TMD monitoring areas: (a) Appearance (7-pt Likert scale from poor to excellent), (b) Texture compliance against standards (% compliance score), (c) Flavour and mouthfeel (7-pt Likert scale from poor to excellent), and (d) Identified issues and reported actions (improvement areas clearly documented alongside recommendations for actions).

Conclusion: The authors believe this to be the first evidence-based audit tool developed to specifically address compliance with TMD standards in a food service environment. Strengths include the interprofessional nature of the development team and inclusion of a training module.

Clinical Significance: TMDs are a primary therapy for a variety of inpatient populations. The routine implementation of the TeMDET will ensure the ongoing quality of prepared texture modified food items and recipes, and the development of clear and transparent processes for reporting improvement actions.

14. Consuming honey at least twice a week reduces Type 2 Diabetes Mellitus risk: 10-year follow-up of the ATTICA study

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Introduction: Perceived wisdom is to exclude honey from the diet of people with diabetes due to its sugar content. Recently this has been reconsidered due to its low glycaemic index and high levels of bioactives. However, the long-term effect of honey consumption on risk of developing Type 2 Diabetes Mellitus (T2DM) remains unknown. The present study investigated relationships between frequent honey intake and 10-year T2DM risk. The ATTICA study is a 10-year prospective study of individuals aged 18-89 years living in the Athens metropolitan area, Greece.

Methods: A random sample of 1514 men (mean age: 44.9±14.3years) and 1528 women (45.6±13.5years), recruited in 2001-2002, followed-up for 10-years (2011-2012). After excluding diabetic participants at baseline, the working sample consisted of 1,485 participants. Among other characteristics, honey consumption was collected via a validated Food Frequency Questionnaire. Diabetes was defined according to American Diabetes Association criteria.

Results: The T2DM 10-year incidence was 12.9% with no difference between genders ($p=0.574$). Regarding honey intake, 23.2% of participants had at least one teaspoon of honey more than twice a week, regardless of gender ($p=0.342$). Frequent honey intake was more than threefold higher among T2DM-free participants compared to those who developed T2DM (24.4% vs. 7.7% respectively, $p=0.017$). Moreover, frequent honey intake was associated with 70% decrease in T2DM (Odds Ratio=0.229, 95% Confidence Interval: 0.061, 0.866), independently of age, gender, Body Mass Index, smoking status and family history of T2DM.

Conclusion: The consumption of honey is not associated with risk of developing T2DM, and may even have a protective role.

15. Stopping the cycle of food insecurity: an investigation of novel emergency food relief models in Canberra ACT and beyond

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Aims: The aim of this research is to conduct a Needs Assessment investigating the emergency food relief services in the ACT and beyond. Identifying gaps in the current emergency food relief services and providing recommendations to Uniting Care Kippax (UCK) to help improve their model of care.

Methods: A primary literature search was conducted across scientific databases (PubMed and EBSCO), identifying relevant articles (n=13). A grey literature search was conducted for food insecurity statistics and local and interstate emergency food relief organisations. To conduct the Needs Assessment, six key stakeholder interviews were organised to investigate emergency food relief programs in the ACT. The interviews were conducted with Canberra City Care, Communities at Work, Youth on a Mission, St John's Care, Mustard Seed and Early Morning Centre.

Results: The Emergency Material and Financial Aid program at UCK is available to all people living in Canberra and surrounding areas. Emergency food hampers and a no-cost food pantry, combined with a counselling service are offered within the model of care. Key stakeholder interviews indicated that five of the organisations, excluding the Early Morning Centre, provided food pantry services, with low cost (n=4) and no-cost (n=1) services. It was found that, 79% of foods stocked in the food pantries represented core foods and 21% were classified as discretionary foods.

Conclusion/Recommendations: To improve their model of care recommendations were provided to UCK to obtain nutritional guidance on pantry-foods from a Dietitian; to offer nutrition education among beneficiaries of the emergency food services using motivational interviewing and consider pantry design using the 'Nudge Method'.

16. The Effect of Curcumin Supplementation on Cognitive Function in Older Adults: A Systematic Review of Randomised Controlled Trials

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Introduction: Curcumin is a polyphenol present in turmeric credited with anti-inflammatory, antioxidant and chemoprotective properties with the potential to exert neuroprotective effects. To assess the current clinical evidence, a systematic review was conducted following PRISMA 2009 guidelines to identify double-blind, placebo-controlled clinical trials investigating the effects of curcumin supplementation on cognition in older adults.

Methods: Five databases were searched (CINAHL, Cochrane Library, PubMed, SCOPUS and Web of Science) for articles published between 2000 and 2017, with four studies meeting inclusion criteria. Primary outcome measures were cognitive function assessed by validated screening measures, with biochemical markers considered as secondary outcomes.

Results: In total, 226 participants aged 66.0-73.5 years were administered curcumin dosages varying from 0.4mg to 4000mg, or placebo. Compared to placebo, one study found improvement in Montreal Cognitive Assessment tool with 1500mg/day curcumin over 52 weeks (p=0.02). Another study reported 17% improvement in serial three subtraction task responses after four weeks compared to 3% in the placebo group following adjustment for demographic variables (p=0.044). The final two studies, of 24 and 21 weeks in duration respectively, observed no change in cognitive function between groups. In the third study, the curcumin group had lower haematocrit (p=0.014) and higher glucose levels (p=0.043). Of the adverse events reported (n=54) gastrointestinal symptoms were most common form (n=30).

Conclusion: Currently, there is insufficient evidence to support widespread recommendation of curcumin supplementation to assist with improvements in cognition. However, if tolerability is improved, future long-term trials may provide benefits with respect to cognition in older adults.

17. Nutrition and healthy ageing: A literature review to inform recommendations for a healthy ageing program within the Australian Capital Territory

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Introduction: Older Australians over the age of 45 years account for 40.9% of the population, a third of these adults suffer from at least one chronic disease. Evidence indicates that healthy eating can prevent development of chronic disease and associated mortality. However, there is a dearth of literature providing evidence-based nutritional guidelines for healthy ageing in adults within the ACT. Therefore this review aims to inform nutrition recommendations to support a healthy ageing program directed at adults aged 45 years and older within the ACT.

Methods: Literature searches were conducted across scientific databases (CINAHL, Cochrane Library, Pubmed) for peer-reviewed articles published from 2000 onwards. After initial database searches nine studies met inclusion criteria: clinical trials (n=6), study protocols (n=2) and observational studies (n=1). Primary outcome measures were food intake and dietary patterns, whilst secondary outcome measures were behavioural, social and psychological attributes e.g. confidence and autonomy.

Results: No ACT-based nutrition-focused healthy ageing programs were identified. Seven studies employed web- and booklet-based interventions to convey nutrition education, whilst two studies (clinical trial n=1, observational study n=1) implemented activity session interventions e.g. cooking workshops. Seven of nine studies reported improvements in primary (n=4) and secondary (n=3) outcomes.

Conclusion: A total of three recommendations were developed to facilitate the implementation of a healthy ageing program for older adults within the ACT. Employ a self-management program, with optional weekly face-to-face workshops. Create a two-fold healthy ageing program that encompasses nutrition and lifestyle components. Utilisation of appropriate validated assessment tools to identify key nutrition and lifestyle outcomes.

18. What is healthy eating? A qualitative exploration into the drivers of adult food choice

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Aim: (i) To explore current perceptions and definitions of healthy eating from a convenience sample of adults and, (ii) to use this information to inform how future public health messages can communicate healthy eating information more effectively.

Methods: Semi-structured face-to-face or telephone interviews were conducted from December 2016 to February 2017 in Canberra, Australia. Interviews were audio-recorded, transcribed verbatim and thematically analysed using a latent approach.

Results: A total of 23 semi-structured interviews were conducted and four main themes emerged from the data. Findings from this study indicate broad definitions of healthy eating are known, however are largely influenced by conflicting information on social media individuals are exposed to. Despite having a broad knowledge, the application of healthy eating principals into everyday life was viewed as challenging and not always a priority.

Clinical significance: How individuals perceive and define healthy eating is an important influencer of food choice and behaviour. The question 'What is healthy eating?' continues to be surrounded by confusion, considering the plethora of confounding nutrition messages constantly available. These nutrition messages are often influenced by non-evidenced based recommendations. There is limited understanding of how individuals use social media as a platform for healthy eating information. Further exploration may be critical for communicating future public health messages using social media. Thereby, collectively contributing efforts towards positively impacting obesity through improving healthy food choices.

19. Texture-modified Meal Audits within an Australian Residential Aged-Care Facility

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Aims: texture-modified diets are widely used in Australian residential aged-care facilities. Foods play an important role in residents' quality of life and overall health. This audit aims to examine the variety, quality and serving sizes of texture-modified meals in one Australian aged-care facility where foods are delivered from a centralised kitchen.

Methods: meal-time observation were performed to understand the available options for texture-modified meals. Texture of sample meals were assessed against the Agency for Clinical Innovation guidelines. A qualitative descriptive method was used to describe the texture of meals within the facility. Serving sizes were measured and mean weights were compared to the standards obtained from the centralised kitchen.

Results: about 22% of residents were on a texture-modified diet within the facility. There was a lack of variety in the smooth puree and minced and moist diets and there was no special menu for soft diets. The serving sizes of the texture-modified foods were generally under the recommended weights. Some food consistencies were inappropriate, containing gristles, seeds or lumps.

Conclusion: the variety, serving sizes and texture of the delivered texture-modified meals require consideration in order to meet the Quality of Care Principles, 2014.

Clinical Significance: staff training and standard food preparation method (e.g. using gravy and standard heating method) was recommended to improve the moisture and consistencies of the texture-modified foods and appropriate labelling was recommended to minimise the risk of providing the incorrect food.

20. Reviewing the nourishing diet (ND) – a preliminary study at the Canberra Hospital (TCH)

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Aim: Determine if the Nourishing Diet (ND) is effectively treating nutritionally at risk patients.

Methods: An action research approach with four phases: Firstly, dietitians at TCH were surveyed about the ND. Thematic analysis was employed to identify patterns. Secondly, student dietitians conducted an observational study. Food wastage was observed over 6 consecutive meals and mid-meals for 7 consenting patients consuming the ND. Thirdly, the current ND was compared to TCH standards. Finally, initial enhancements to the ND were implemented.

Results: Qualitative: six dietitian respondents identified six common themes: Heavy reliance on three oral nutrition supplements (ONS) provided daily; poor compliance with consumption of ONS; lack of patient education regarding benefit/indication; advocating for "food first" approach to achieve nutritional adequacy; concerns regarding appropriateness/safety of using ONS without patient consent; and ND identified as an interim solution.

Quantitative: ONS consumption was low at 33-45% with estimated wastage costs of \$5,900-\$11,700/year vs main meal consumption of 50-100%. The ND required enhancements to meet TCH standards for midmeals and food fortification.

Conclusion: A number of shortcomings have been identified in TCH ND. High protein and energy midmeals have been implemented for future evaluation. Further food fortification is planned.

Clinical Significance: Malnutrition has significant adverse clinical outcomes. At TCH, patients are screened for malnutrition upon admission. 23% of TCH patients screened were nutritionally at risk and commenced on a ND, with three ONS provided daily. High ONS wastage suggests this is suboptimal in improving patients' energy and protein intake. Providing energy and protein in a familiar 'food' format could improve patient intake.

21. Improving nutritional intake and well-being in older adults living in the community: A review of current health promotion interventions

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Aims: With the growing ageing population worldwide, health promotion interventions may play a key role in improving nutritional intake and well-being of older adults living in the community. The aim of this literature review was to evaluate current health promotion interventions designed to improve nutritional intake and physical activity levels in community-dwelling older adults.

Methods: Based on the PRISMA 2009 guidelines, peer-reviewed journal articles published from 2007 were sourced from the following electronic databases: CINAHL Plus, Academic Search Complete, Health Source: Nursing/Academic Edition, Medline, Pubmed and Scopus.

Results: There were six randomised controlled trials (RCTs) which assessed the effectiveness of health promotion interventions on nutritional intake and well-being. Four studies involving a combination of nutrition and exercise education interventions reported improvement in nutritional intake and engagement in physical activities. The remaining two RCTs involving only nutrition education interventions described enhancement in nutritional knowledge and positive behavioural outcomes regarding diet. Although all studies showed positive behavioural outcomes post-programme, one study reported a return to initial value at follow-up.

Conclusion: Health promotion interventions are beneficial to improve nutritional intake and physical activity levels in community-dwelling older adults, however booster programs that help maintain and sustain the effects of the intervention should be considered.

Clinical Significance: Health promotion Intervention programs are effective in improving the nutritional intake and physical activity levels of older adults. Community-based nutrition intervention programs should include monitoring several months after the completion of intervention to evaluate if the intervention is sustainable. In addition, a booster program is recommended to tailor interactive interventions for individuals and foster the newly acquired knowledge.

22. The effects of different dietary patterns on outcomes of Attention-Deficit/Hyperactivity Disorder (ADHD): A systematic review of cross-sectional and longitudinal studies

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Current research has focused on pharmacological interventions to treat attention-deficit/hyperactivity disorder (ADHD), but only limited research has investigated the link between the overall dietary pattern and ADHD. Following the PRISMA guidelines, peer-reviewed articles were located to evaluate the association between dietary patterns and ADHD diagnosis. In total, seven studies were identified by searching electronic databases (PubMed, Web of Science, CINAHL, Scopus and the Cochrane Library), four of which were case-control, two were longitudinal, and one cross-sectional. Two case-control studies found lower adherence to Mediterranean diet (MD) was associated with an ADHD diagnosis using the MD quality index for children and adolescents (KIDMED) test. One study identified that a score below 7 (range -4 to 12) was positively associated with an ADHD diagnosis ($P=0.046$), while the other found greater odds of a diagnosis with low versus high diet adherence (OR: 7.07; 95% CI: 2.65-18.84). Greater adherence to a traditional-healthy Korean diet was inversely associated with an ADHD diagnosis (OR: 0.31, 95% CI: 0.12-0.79; $P=0.003$), as was a Chinese fish-white meat dietary pattern (OR: 0.44, 95% CI: 0.27-0.73; $P=0.006$). In the remaining studies, an unhealthy dietary pattern (OR: 2.17, 95% CI: 1.39-3.38; $P<0.05$) and poor diet quality characterised by a diet high in sweets (OR: 3.95, 95% CI: 1.16-15.31; $P=0.03$) and fast-food (OR: 3.21, 95% CI: 1.05-10.9; $P=0.03$) increased the odds of an ADHD diagnosis, as did a Western dietary pattern (OR: 2.21, 95% CI: 1.18-4.12; $P<0.05$). Further research surrounding the prevention and possible treatment of ADHD with dietary interventions are required.

23. Seasonal variation in the phytochemical content of the Australian Prickly Pear (*Opuntia Ficus Indica*)

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Introduction: Internationally, the Prickly Pear (PP) is reportedly a good source of fiber and contains relatively high mineral content, numerous amino acids and significant phytosterol content, which is influenced by seasonal variation. This study aimed to determine the phytochemical content of Australian commercially grown PP between harvesting seasons.

Methods: White, orange and purple PP fruit skin and flesh were dried using microwave drying, followed by methanolic extraction. Antioxidant characteristics; free radical scavenging activity (DPPH), reducing capacity (CUPRAC) and antioxidant capacity (FRAP) were expressed as Trolox equivalents (TE). Total phenolic (Folin-Ciocalteu; Gallic acid equiv. (GAE)), flavanol (AlCl₃; Catechin equiv. (CE)), betalain (betaxanthin (Indicaxanthin equiv. (IE)) and betacyanin (Betanin equiv. (BE)) contents were also determined. The differences between harvests were determined using the Students t-test, where statistical significance was set at p<0.05 and results were represented as 2015 vs 2016.

Results: The 2015 PP harvest was higher in antioxidant characteristics for; white flesh CUPRAC (3189±292µMTE vs. 1399±283µMTE; p=0.002), FRAP white flesh (1499±102µMTE vs. 630±121µMTE; p=0.001), white skin (1417±8.73µMTE vs. 847±101µMTE; p=0.001) and orange skin (1473±146µMTE vs. 763±40.9µMTE; P=0.01). Orange skin was higher in GAE (84.5±34.73µgGAE vs. 75.6±31.9µgGAE; p=0.004). Only Purple PP skin of the 2016 harvest was higher in DPPH (163±48.9µMTE vs. 258±15.2µMTE; p=0.032) and FRAP (1558±0.001µMTE vs. 900±146µMTE; p=0.001); CE (86.6±3.25µgCE vs. 171±6.23µgCE; p<0.001), BE (1.43±0.05mgBE vs. 2.40±0.39mgBE; p=0.048) and IE (1.19±0.12mgIE vs. 2.04±0.19mgIE; p=0.003) content.

Conclusions: Variation in content was observed between harvests and is suggested a result of the plants protective mechanisms and should be recognised during nutraceutical production.

24. Potential influences of geographical positioning on phytochemical characteristics of Australian grown Prickly Pear (*Opuntia Ficus Indica*)

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Introduction: Previous preliminary analysis into the Australian PP, used for its numerous beneficial health properties concludes that nutritional variation is present between fruit colours, fruit components and various drying techniques. This study examines the antioxidant and bioactive characteristic variation between PP fruit from selected Australian locations.

Methods: PP samples (white, orange and purple) were collected from three sites; two commercially grown (NSW and VIC) and one non-farmed region (ACT). Samples were microwave dried (adapted AOAC method). Dried samples were analysed for antioxidant characteristics; free radical scavenging activity (DPPH), reducing capacity (CUPRAC) and antioxidant capacity (FRAP) (Trolox Equivalents). Bioactive compounds; Total phenolic content (Folin-Ciocalteu; Gallic acid equivalent (GAE)); total flavanol content (AlCl₃; Catechin Equiv. (CE)); and total betalain (betaxanthin (Indicaxanthin eq. (IE)) and betacyanin (Betanin eq. (BE)) contents were also examined. Statistical analysis was performed, and results are expressed as mean±SE.

Results: Non-farmed fruits (ACT) were observed to contain the greatest DPPH content (purple skin; 851.44±191.62µMTE) and other bioactives; total phenolic content (white flesh; 166.16±14.29µgGAE), total betalain content (purple skin; 11.46±2.75mgBE), more specifically, individual betalains; betacyanin (purple skin; 14.53±1.30mgBE) and total betaxanthin content (purple skin; 5.18±0.58mgIE). Commercially grown fruit from VIC contained the highest values for CUPRAC (purple flesh; 3359.00±529.16µMTE) and FRAP (purple skin; 919.18±529.16µMTE). Separately, commercially grown fruit from NSW were observed to contain the greatest total flavonoid content (white skin; 174.89±57.24µgCE).

Conclusions: Phytochemical variations was observed between different PP fruit colours, fruit components and harvest locations and are suggested to be attributed to farming practices, variations in geographical location and the plants' protective mechanisms.

25. Impact of a new Consensus Model of Competency-based Assessment on Graduates Employment Outcomes

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Aim: To measure graduate outcomes for Master of Nutrition and Dietetics (MND) students who participated in a new Consensus Model of competency-based assessment.

Methods: In 2016, a new programmatic interpretivist model of competency-based assessment was implemented in a postgraduate MND course. The model was designed to support critical thinking, transformative practice and life-long-learning. In September 2017, with ethics approval (HREC 16-74), all 29 graduates from the 2015-16 cohort were invited to participate in a 31-items (19 open-ended and 18 close-ended questions) pilot-tested purpose-built telephone survey. A descriptive approach was used to analyse all data, with open questions categorised and counted.

Results: A response rate of 62% (n=19/29) was achieved. Of the graduates, 94% (n=16/17) were employed (x = 34 hours/week) within 12 months as a dietitian (n=14) or in a related position (n=2). All the graduates felt their placement experiences and sustainable assessment practices supported their learning and readiness for the workforce. In addition, all graduates felt the course adequately prepared them for their current dietetic role. Additional suggestions were offered to further improve the MND.

Conclusion: This study suggests the Consensus Model assisted graduates in their transition to the workforce.

Clinical significance: The types of positions available to new graduates have changed from hospital-based positions to new growth areas including private practice, community and ambulatory care, and e-health services. The Consensus Model offers an approach to support graduates to learn and adapt to these new workforce demands. This research was funded by the Office of Learning and Teaching as part of a national project led by Dr Stephen Billett.

26. A Worksite Educators Perspective – Supporting Graduate Employability using Outcome-based Placement and Assessment Practices

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Aims: In 2016, a new programmatic competency-based assessment model was introduced into a postgraduate nutrition and dietetics program. Based on stakeholder feedback, in 2017 new online resources were implemented to support the delivery of the model. This study aimed to evaluate the experiences and satisfaction of worksite educators with the second iteration. It also explores the initial feedback of reflective practice within the assessment model from educators.

Methods: With ethics approval (HREC 16-74), an anonymous purpose-built piloted-tested 17-item (five qualitative and 12 quantitative) online questionnaire, that incorporated a validated seven-point Employability Impact Scale, was distributed to the worksite educators at all 16 placement sites. Data was analysed using inductive content analysis and parametric statistics.

Results: A response rate of 20% was achieved for the survey (n=10/50). Educators had implemented the model as intended by the university and reported the online resources as adequate (satisfaction score $x=7.4/10$; $\mu = 1.0$). More time for reflective practice meetings and their prioritized content were suggested. Educators perceived the model as supporting students' employability development (Employability Impact Scale $x=5.5/7$; $\mu = 1.0$). Further improvements including increased utilisation of the online resources and better guidance for navigating resources are required.

Conclusion: Although caution is required when interpreting these results due to the low response rate, this research suggests that sustainable outcome-based assessment practices can assist students in their transition to the workforce. This research was funded by the Office of Learning and Teaching as part of a national project titled, 'Augmenting student learning through post practicum interventions' led by Dr S Billett.

27. An exploration of allied health (AH) students' perceived stress, resilience and wellbeing during work integrated learning (WIL) placements in healthcare settings

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Aim: Students experience stress during educational training. This stress may be heightened during WIL placements. This study aims to explore students' perceived stress, wellbeing and resilience during WIL placements in the AH profession populations, which has not been widely investigated.

Methods: A mixed-methods approach was taken. Students completed an online survey incorporating a modified Perceived Stress Scale 10 (PSS-10), followed by semi-structured interviews exploring students' perceived stress, and understanding of resilience and wellbeing. Only qualitative results are discussed.

Results: Five themes emerged. These were: (1) A whole new world, (2) Great expectations, (3) Wanting to impress, perform and feel safe, (4) Getting to the finish line, unscathed, and (5) Perceived barriers and enablers for healthy placements. Stressors included assessment, university assignments, busy supervisors, responsibility for patients, and the transition to the clinical environment. Students employed positive coping strategies to manage wellbeing including seeking emotional support from friends, family and peers, and establishing routines. Students described resilience in terms of reactive coping, rather than proactive managing of stressors.

Conclusion: AH students from five disciplines experienced similar stress, stressors and wellbeing in the WIL environment. Supportive supervisors/clinical educators, and coming together with peers on placement, ameliorated some of the stressors experienced. Resilience is well placed as an appropriate intervention to support student wellbeing.

Clinical Significance: Investment in clinical educators and supportive workplace cultures for AH students is warranted. Students across a range of health professions share an uncertain transitional experience into the WIL environment, and interventions to support wellbeing during this period should be explored, and could be delivered inter-professionally.

28. Adequacy of glucose control and its effect on intensive care patient clinical outcomes: a retrospective observational study

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Aim: To evaluate the adequacy of blood glucose control and its effect on clinical outcomes between patients who either received insulin or did not require insulin for glycaemic control during intensive care unit (ICU) admission.

Methods: This was a retrospective observational study including all adult patients admitted to The Canberra Hospital ICU over a three-month period who were not previously receiving insulin for diabetes. Adequacy of glucose control was determined by median glucose levels. The primary outcome measure was ICU mortality. Secondary outcome measures were hospital mortality, number of days in ICU and mean patient days on vasopressors, renal replacement therapy and mechanical ventilation.

Results: A total of 328 patients were included of which 76 received insulin and 252 did not. Median APACHE III score was significantly increased ($p < 0.001$) in the insulin group. The median values of the median glucose levels were higher ($p < 0.001$) in the insulin group [9.85 (8.90-10.64) mmol/L] compared to the non-insulin group [6.98 (5.91-8.38) mmol/L]. The following outcomes were higher in the insulin group: ICU mortality (14.5% vs 7.5%, $p > 0.05$), hospital mortality (22.4% vs 13.1%, $p = 0.049$) and median days in ICU [3.10 (1.06-7.66) vs 1.74 (0.96-3.14), $p < 0.001$].

Conclusion: Adequacy of glucose control was observed to be superior in the insulin group, but mortality in this group was higher. However, due to the retrospective nature of the study, further studies are required to confirm our findings.

Clinical significance: The administration of insulin in critically ill adult patients may allow for improved adequacy of glycaemic control.

29. Identifying preventable admissions to the emergency department by specialist palliative care patients to inform better care

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Background: Multiple emergency department (ED) visits can be considered markers of sub-optimal care, and can cause distress to patients and carers. Presentation to the ED for palliative care patients may be preventable. Preventable presentations were defined as those where the problem could have been dealt with by another service, e.g. GP or the home care team.

Aims: To understand (i) the rate of preventable ED presentations among specialist palliative care patients, and (ii) the reasons and clinical context of preventable presentations. The data sought to inform the refinement of the model of care in the city, to reduce preventable presentations.

Methods: A retrospective case note audit of two years' of presentations at Calvary ED and one year at Canberra Hospital ED. The determination of whether a presentation was preventable was made by at least two clinicians per case, with a third arbitrating where required. Analysis drew on descriptive statistics.

Results: Ninety-two cases of preventable presentations were recorded at Calvary (accounting for 31.8% of all presentations by specialist palliative care patients) and 58 cases of preventable presentations were recorded at Canberra Hospital (24.5% of all specialist palliative care patient presentations). ACT Ambulance Service transferred 88 patients in preventable presentations, resulting in over \$82,000 of preventable costs.

Conclusions: By developing an enhanced model of care, quality of care can be substantially improved and healthcare costs (such as those incurred by ambulance transfers to ED) can be reduced. Strategies for addressing preventable presentations could be translated to other services across Australia.

30. The relationship between families of deceased organ donors and transplant recipients

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Introduction: Following deceased organ donation and transplantation, the narratives of families of donors and organ recipients become connected. This is acknowledged when parties receive anonymous information from donation agencies and transplant centres, when they exchange correspondence, or when they meet in person.

Research problem: Although various researchers have explored the complex relationship between families of deceased organ donors and transplant recipients, there is a lack of clarity regarding the nature of the connection and its potential benefits and risks. This gap is a hindrance to organisations making decisions about the facilitation of the relationship and to healthcare professionals who support donor families and recipients.

Research questions: What is the nature of the complex adaptive system that evolves around this relationship? What leverage points can be identified to improve the functioning of that system?

Method: This systematic review explores the phenomenon from multiple points of view to illuminate how the interaction between stakeholders contributes to the emergent properties of the system.

Data collection: Sources consulted deal with recipient care, the needs of donor families, the metaphors used in this field, contact between donor families and recipients, and the roles and opinions of healthcare professionals and regulating authorities.

Results: A systemic map was created to explicate this complex system highlighting the potential emergence of both benefits and risks. Links between the relationships involved, identity development and ongoing adjustment are identified, and leverage points are suggested that could facilitate improved outcomes.

Clinical significance: These findings will assist regulating authorities and those supporting donor families and recipients to make decisions that fit meaningfully.

31. A repeated measures study of psychological and physiological stress in emergency department nurses and doctors

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Aim: The aim of this study was to describe responses on the Job Content Questionnaire (JCQ) in association with indicators of Hypothalamus-Pituitary-Adrenal (HPA) axis and Sympatho-Adrenal (SA) system activation.

Methods: A descriptive exploratory design was used to assess perceived freedom to make decisions, psychological demand, and social support in association with repeated measures of salivary cortisol and μ -amylase. The study was conducted in an emergency department. The department employed 119 nurse and doctors. Thirty-seven (31%) completed a self-administered survey. A sub-sample of seven participants (6%) provided saliva samples three-times a day for seven days (valid $n=141$ samples). Samples were provided after waking, mid-shift, and before sleep. Descriptive statistics were calculated for the constructs, cortisol and μ -amylase. Responses from the sub-sample were assessed against the larger group.

Results: Experience was positively associated with freedom to make decisions. Social support was negatively correlated with psychological demand. In practitioners with the highest and lowest levels of cortisol there were no associations with psychological demand, decision freedom or social support. Physical activity was not reflected in elevated μ -amylase.

Conclusions: This is the first study to describe combined measures of psychological and physiological stress in Australian practitioners. The divergent activation of the HPA and SA systems highlights the importance of combined measurement. Experience and social support moderate psychological and physiological stress. Particularly in junior roles where delegated decision-making diminishes psychological demand; and age effects HPA and SA activation.

Clinical Significance: The results presented here reinforce the importance of skill-mix to counteract the workplace stress; the results have implications for team structure and practitioner well-being.

32. Recognising the subtle clinicopathological features of C3GN compared to other complement mediated glomerulopathy in an Australian Tertiary institution

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C3 glomerulonephritis (C3GN) a recently described entity with heterogeneous histopathological features. Morphologically similar to dense deposit disease (DDD) and post-infectious glomerulonephritis (PIGN), C3GN maybe distinguished by electron microscopy (EM) and clinical history. This study was conducted to reclassify patients displaying predominant C3 staining on renal biopsies and C3GN, plus examine response to therapy.

Methods: We undertook a retrospective analysis of 883 renal biopsies collected at the Canberra Hospital. Samples with predominant C3 (> 2 orders of magnitude higher than other immunoreactants) were re-reviewed by a renal histopathologist. Of 30 biopsies with predominant C3 staining, 9/30 (30%) fulfilled histological criteria for C3GN.

Results: Histological reclassification revealed 11% were originally diagnosed with PIGN and another 22% as C3 deposition disease, with the remainder being Mesangiocapillary glomerulonephritis (MCGN). EM demonstrated 33% of C3GN cases had C3 deposition in all 3 glomerular sites. Presentation demographics were similar between C3GN and non-C3GN individuals, with the exception of elevated creatinine in patients with C3GN (136.81mmol/L vs 245.55mmol/L $p=0.006$). C3GN patients trended to lower serum C3 levels (0.865g/L vs 1.085g/L, $p=0.2$). Of the patients diagnosed with C3GN 33% received immunosuppression, achieving remission in 66%. 33% of C3GN cases were lost to follow up. Patients requiring long-term dialysis was 11% in the C3GN vs. 14% in others. All-cause mortality was higher in C3GN patients 66% vs 14%.

Conclusion: Recognising C3GN's distinguishing features remains challenging however, it is noted that C3GN exists as a separate entity with differing progression when compared with other complement mediated GNs. Our series suggests C3GN cases are associated with worse all-cause mortality.

33. Improving Nursing Management of Invasive Devices

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Aim: The project's primary aim was to prevent healthcare acquired Staph Aureus Bacteraemia (SAB) infections on an acute hospital ward for the duration of the project. The secondary aim was to achieve 90% compliance with organisational policy for Peripheral Intravenous Cannulas (PIVC) and Central Venous Access Device (CVAD) nursing documentation and bedside handover.

Method: Two strategies were identified – firstly, the creation of documentation stickers to improve documentation of PIVCs and CVADs, and secondly, the integration of visual checks for all invasive devices into nursing bedside handover. Emphasis was placed on communication about the project with nurses and patients. A 'bottom-up' approach was used among nursing staff, which fostered ownership, collaboration, and participation.

Results: By project's end, the ward had achieved the primary aim of no SAB infections. The secondary aim of achieving 90% in audits of documentation and handover was not achieved but important progress had been made. From a baseline result of 19% complete documentation of PIVCs, by project's end 70% of documentation was fully completed. At baseline, no CVAD documentation was fully complete. By project's end, 50% of CVAD documentation was fully completed.

Conclusion: While the primary aim of no SAB infections during the project was achieved, no causal link was established. However the new documentation stickers were key to improving nursing documentation.

Clinical Significance: The use of a structured tool improves consistency and compliance in documentation, by acting as a prompt. An inclusive project team with clear channels of communication and a strong focus on the project's goals is essential, fostering a bottom-up approach to change.

34. Advances in Linear Modelling Contribute to Advances in Clinical Research Alice Richardson

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Aims: This presentation will demonstrate that advances in biostatistical research on linear modelling are contributing to advances in clinical research.

Methods: I will present a unified view of biostatistical concepts ranging from multilevel models for clustered data, random effects models for longitudinal data, spatial data, to multiple imputation for missing data.

Results: Multilevel modelling is found to change statistical significance of exposures when it is appropriately applied to health survey data with a complex, clustered sampling design. Longitudinal modelling of data is found to enhance the understanding of how ferritin levels respond over time. Multiple imputation is found to enhance the predictive value of routine pathology data where not every test is ordered for every individual.

Conclusion: A better understanding of the variation in three different clinical data sets has led to stronger conclusions for each one. First, the relationship of contraceptive use, marital status and wealth to the risk of HIV infection in India has become more important when the multilevel structure of the data was fully modelled. Second, ferritin can be used as an early warning system for iron deficiency. Third, multiple imputation ensures that important variables in the laboratory prediction of hepatitis C, e.g. red cell distribution width and potassium, are retained in the prediction models compared to when single imputation is used.

Clinical Significance: More significant advances in health research are possible when researchers fully account for the variation in their data. The rich and ever-expanding class of linear models is able to describe a wide variety of patterns of variation, whilst maintaining a unified conceptual approach.

35. Women's Health Service RCT to Assess the impact of an innovative Privacy Cover: The WRAP study

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Aim: To evaluate the effect a wrap-around skirt on client experience during cervical screening.

Background: In 2014, 223 deaths from cervical cancer were recorded across Australia. Previous studies have reported 80% of cervical cancer occurs in women who have never been or are under-screened, with 43% of Australian women not being screened as currently recommended. The Women's Health Service (WHS) provides a holistic health services to vulnerable women in the community.

Methods: We undertook a Randomised Controlled Trial (RCT) at the WHS over a 16-week period in 2017. Clients were randomised to two groups 1) Control (standard practice): bassinette sheet or 2) Experimental (new practice): a wrap-around skirt during cervical screening. Participants completed a satisfaction survey post intervention. Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS version 22).

Results: 103 women participated. Control (n=53) Experimental (n=50). Over 80% of the total participant group rated extreme satisfaction with their privacy cover with no statistical difference between both groups. 70% of participants said having a choice in privacy cover was important. In the experimental group, when asked for a preference in privacy cover, 55% said they would choose to have the skirt.

Conclusion: Our study has identified that having a choice in privacy cover is important. We have also shown that when clients are given the option, wearing a skirt is the preferred choice.

Clinical Significance: We will continue to offer and use appropriate privacy covers for cervical screening and encourage women to consider wearing their own skirts for appointments as this will be more cost effective.

36. The health impacts of waste incineration: a systematic review

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Introduction: Waste incineration is increasingly used for waste management. It has co-benefits in waste volume reduction and energy production. Several incinerators have been proposed recently in Australia, including Canberra. An overview of the evidence on health effects is needed.

Method: We applied standard systematic review methodology (PRISMA) to English language literature focusing on waste incinerator facilities and health outcomes.

Results: 93 papers met inclusion criteria. 61 (66%) reported a significant association to negative outcomes, including non-Hodgkin lymphoma, soft tissue sarcoma, and bowel cancers (9; 10%), pre-term delivery, sperm quantity and quality, congenital anomalies, infant deaths, and miscarriage (9; 10%), and other diseases including non-specific lung function impairment, hypertension, and hyperglycaemia (9; 10%). Ingestion was the dominant exposure pathway, while occupational groups were the most at risk group. Certain incinerator design elements, such as flue-gas cleaning systems, were shown to reduce emissions and negative effects.

Conclusion: Some older incinerators that have outdated cleaning systems and infrequent maintenance schedules have been strongly linked with certain types of ill health. Newer incinerators have fewer reported ill effects, but have only been in operation for a brief time, so effects may not have had time to emerge.

Clinical significance: Clinicians have the responsibility to advocate for the health of their patients. This systematic review highlights the significant risk associated with waste incineration and the need for future research in the area. We recommend clinicians advocate for legislated upgrades in existing incinerators, regular maintenance schedules in all incinerators and that all new incinerators be located away from farming and food production.

37. Faecal calprotectin is the most important predictor of endoscopic remission

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Background: Faecal calprotectin (FCP) and anti TNF levels are commonly used non-invasive markers in guiding clinical decision making in patients with inflammatory bowel disease (IBD). This study aims to evaluate the association of FCP, serum levels of anti TNF agents and biochemical markers with endoscopic findings as well as disease activity scores in IBD patients.

Methods: A retrospective analysis of all patients attending the IBD clinic with available anti TNF levels, and corresponding FCP and biochemical markers were compared to endoscopic and clinical disease activity scores (Crohn's Disease Activity Index [CDAI], Mayo score). Simple linear regression and logistic regression models was performed to correlate individual indices.

Results: There were 50 patients included at this single tertiary centre who had FCP and biochemical markers close to the time of serum anti TNF levels; mean age of 36 years and 24 (48%) were female, and the majority were on maintenance infliximab (82%). FCP negatively correlates with anti TNF and albumin levels but positively with C-reactive protein (CRP) and platelet count. Anti TNF levels and FCP are not helpful indicators of disease activity scores. Logistic regression demonstrated anti TNF levels ($p=0.665$), CRP ($p=0.684$), platelet count ($p=0.275$) and albumin levels ($p=0.353$) were not predictive of endoscopic remission. However FCP was the only statistically significant predictor of endoscopic remission ($p = 0.025$).

Conclusion: FCP is the only non-invasive marker that predicts endoscopic remission in this cohort of patients with IBD. Although anti-TNF levels and biochemical markers can be valuable in guiding clinical decisions, it was not useful in determining disease activity scores or endoscopic activity.

38. Mice lacking caspase 1, inducible nitric oxide synthase, and interferon gamma receptor genes exhibit altered depressive- and anxiety-like behaviour, and exhibit an altered gut microbiome

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Converging evidence support the involvement of pro-inflammatory pathways and the gut microbiome in major depressive disorder (MDD). Pre-clinical and clinical studies suggest that decreasing pro-inflammatory signalling might provide clinical benefit in MDD. In this study, we used the chronic unpredictable mild stress (CUMS) paradigm of MDD to assess whether mice lacking the pro-inflammatory caspase 1, interferon gamma-receptor, and nitric oxide synthase (Casp1, Ifngr, Nos2)-/- present altered depressive- and anxiety- behaviour, either at baseline or in response to chronic stress exposure. The impact of stress on adrenocorticotrophic hormone (ACTH) and corticosterone (CORT) levels, and faecal microbiota composition, were relative to wild type (wt) mice. (Casp1, Ifngr, Nos2)-/- mice were found to display decreased depressive- and anxiety-like behaviour, increased hedonic-like behaviour, and increased locomotor activity. Casp1, Ifngr and Nos2 deficiency was also associated with resistance to the development of anhedonic-like behaviour, and with a heightened emotional state following stress. Plasma levels of ACTH and CORT did not differ between knockout mice and wt mice following stress. The faecal microbiome of (Casp1, Ifngr, Nos2)-/- mice differed to that of wt mice in the absence of stress, and displayed reduced changes in response to stress exposure. Our results demonstrate that simultaneously inhibiting multiple pro-inflammatory pathways decreases depressive- and anxiety-like behaviour while conferring resilience to developing anhedonic-like behaviour following stress. Moreover, that these phenotypes are accompanied by changes in gut microbiome composition, suggesting that CASP1, IFNGR and NOS2 might play a role in maintaining microbiome homeostasis.

39. Use of CT colonography as an alternative to colonoscopy for investigating patients with comorbidities or advanced age in a public hospital gastroenterology clinic

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Aims: To describe the findings, indications and patient demographics for patients who underwent CT Colonography (CTC) after review in the gastroenterology clinic at the Canberra Hospital.

Methods: Retrospective audit of all patients who underwent CTC after review in the gastroenterology clinic since the release of the new MBS item for CT colonography (56533). Patient demographics, comorbidities, procedure indication, radiological findings, and patient's subsequent management were collated.

Results: 17 patients (9 male, 8 female) were included. The average age was 70.9. The indications for CTC included incomplete colonoscopy (2, 9%), rectal bleeding (5, 23%), iron deficiency (6, 27%), abdominal pain/bloating (3, 14%) and changed bowel habit (6, 27%). Patient comorbidities included cardiac disease (5, 20%), COPD/asthma (2, 12%), diabetes (4, 16%), chronic kidney disease (1, 4%), previous cerebrovascular events (4, 16%) and obstructive sleep apnoea (2, 8%). 6 patients were taking aspirin (35%); 2 were on dual anti-platelet agent therapy (12%). Three patients were anticoagulated.

Findings of the CT scans included diverticulosis (8, 40%), redundant colon (5, 25%) and lesions suspicious for a polyp (3, 15%). 4 patients (20%) had unremarkable studies. No lesions thought likely to be a cancer were detected. One patient underwent sigmoidoscopy after unremarkable CTC. The three patients with suspected polyps detected have follow-up clinic appointments booked.

Conclusions: The use of CTC in this cohort revealed benign pathology and avoided colonoscopy in the majority of patients.

Clinical Significance: CTC may play a role in investigating patients deemed high risk for sedation or bowel preparation associated with colonoscopy.

40. Characterising structural variation in Indigenous Australian genomes

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Introduction: Structural variation, large-scale genomic structural differences, contribute greater genomic diversity at a nucleotide level than any other type of genetic variation and are linked to a range of Mendelian diseases and complex traits. Recent studies have indicated that analysing genomic variation in a population-specific context significantly improves the accuracy of clinical variant interpretations. As such, precise identification of structural variants from whole-genome sequencing (WGS) data at a population scale will provide useful information in understanding human genetic diversity and its role in disease. Traditionally, structural variant detection using short-reads generated from WGS have used a single caller/program. However, using a single caller presents a lack of sensitivity in structural variation detection, as each caller has limitations in accurately calling specific structural variant types. As such, pipelines integrating calls from multiple methods will provide a more robust and accurate structural variant callset.

Methods: Here, we used LUMPY to analyse structural variation in 64 Indigenous Australian datasets generated using Illumina short-read WGS. Chromium 10X WGS was also performed for three samples, and were analysed using the Longranger tool suite (10X Genomics). Structural variant calls were then integrated and further validated.

Results: Data for structural variants of 64 Indigenous Australian genomes using LUMPY will be presented, in conjunction with genomic variants identified using linked reads using the Chromium 10X technology. A comment on the use of other approaches to increase specificity and sensitivity will also be presented.

Conclusion: The use of multiple approaches to detect structural variation improves the specificity and sensitivity of structural variant calls.

41. Homocysteine is associated with Alzheimer's disease but not as strongly as APOE4: a case-control study

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Introduction: Plasma homocysteine (Hcy) concentration is influenced by dietary B-vitamin intake and elevated Hcy levels are associated with greater risk of developing Alzheimer's disease (AD). The Apolipoprotein E- μ 4 (APOE4) isoform has also been found to strongly increase the risk of developing AD. However, there is conflicting evidence about its link to Hcy.

Methods: This retrospective case-control study of 126 aged-matched elderly Australians (65-83years), compared 63 clinically-diagnosed AD sufferers (35 females (F) and 28 males (M), age=77.1 \pm 5.3years) with 63 healthy controls (HC) (38F and 25M, age=76.9 \pm 4.7years). The plasma concentrations of Hcy and APOE4 were determined using high pressure liquid chromatography and an enzyme-linked immunosorbent assay kit, respectively.

Results: The Hcy levels in the AD group were significantly elevated (AD mean=11.61 \pm 4.9 μ mol/L) compared with the HC group (HC mean=9.39 \pm 2.6 μ mol/L; $p=0.028$). The prevalence of the APOE4 isoform in the plasma of the AD group was double (37/63, 59%) that of the HC group (18/63, 29%). Following adjustment for age and gender, logistic regression analysis revealed a significant independent relationship between Hcy and AD (Odd's ratio (OR) =1.18, 95% confidence interval (CI) 1.04-1.34, $p=0.01$). However, in the same model, the independent relationship between the presence of the APOE4 isoform and AD was much stronger (OR=3.69, 95% CI=1.66-8.20, $p=0.001$).

Conclusion: This suggests that although there is an independent association between an elevated Hcy and AD, this is not as strong as the association between the APOE4 phenotype and AD. Further investigation is required to understand the interaction between dietary B-vitamins, Hcy and APOE4 in AD prevention.

42. Relationship of B-vitamin biomarkers and dietary intake with APOE4 in Alzheimer's disease

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Introduction: Reducing elevated plasma homocysteine (Hcy) with B-vitamin supplementation offers a potential preventative measure for Alzheimer's disease (AD). However, the association between Apolipoprotein E- μ 4 (APOE4), the strongest genetic risk factor for AD, biomarkers of B-vitamin status (Serum B12, Serum Folate [SF], Hcy, Cysteine [Cys] and Cysteinyl-Glycine) and dietary B-vitamin intakes are not yet fully understood.

Methods: In this retrospective case-controlled study, in elderly age-matched Australians (n=126), the APOE4 phenotype was determined by ELISA for 63 AD cases (female=35; age=77.1 \pm 5.3yr) and 63 healthy controls (female=38; age=76.9 \pm 4.7yr). The plasma concentrations of the B-vitamin biomarkers were determined using high-pressure liquid chromatography, and the dietary B-vitamin intakes were determined by food frequency questionnaire and the FoodWorks software.

Results: APOE4 was found in 43.7% (55/126) of all participants, with 29.4% (37/126) of all participants possessing both AD and the APOE4 phenotype. Initial analysis showed there was no evidence of an association between the B-vitamin biomarkers and AD relative to APOE4 phenotype (all, $p>0.05$). However, subsequent analysis of covariates using receiver operating characteristic curves revealed an increased likelihood of AD when Hcy levels were $>11.0\mu$ mol/L ($p=0.012$), Cys levels were $<255\mu$ mol/L and SF was $<22.0\text{nmol/L}$ ($p=0.003$; in males only). In females only, dietary intake of B-vitamins (total folate $<336\mu$ g/day [$p=0.001$], natural folate $<270\mu$ g/day [$p=0.011$] and riboflavin $<1.12\text{mg/day}$ [$p=0.028$]) was associated with an increased likelihood of AD.

Conclusion: These results suggest that Hcy, Cys, and SF are useful biomarkers for AD, irrespective of APOE4 phenotype. However, gender differences related to dietary B-vitamin intake and AD require further investigation.

43. Comparing the CVD predictive ability of Mediterranean diet adherence scores: 10-year follow-up of the ATTICA study (2002-12)

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Introduction: The Mediterranean diet (MD) is established as the most protective dietary pattern against Cardiovascular Disease (CVD). It is widely recommended as an efficacious lifestyle approach for CVD primary prevention. However, the tools assessing the level of adherence to MD have significant differences in methodology and there is no recognised gold standard.

Methods: The present study aimed to compare some of the most widely cited scores (a-MED, t-MED, Italian Score, MedDietScore) for their performance in predicting CVD. The ATTICA study is a prospective study of individuals aged 18-89 years, living in the Athens metropolitan area, Greece, consisting of a random sample of 1514 males (M) (mean age: 44.9±14.3years) and 1528 females (F) (45.6±13.5years), recruited in 2001-2002 and followed-up for 10-years. CVD outcomes were diagnosed according to the ICD-10 criteria, with 2020 participants having valid information. Food intake was assessed with a validated Food Frequency Questionnaire.

Results: The 10-year CVD incidence was 15.7% (M=19.7% and F=11.7%, $p<0.001$). When scores were used separately in unadjusted models to predict 10-year CVD risk, only MedDietScore was inversely and independently associated with CVD risk (Hazard Ratio (HR)=0.909, 95% Confidence Interval (CI):0.891,0.928) and lowest -2logLikelihood (-2logL=166.416), which depicts superiority in prediction accuracy. The remaining scores were not independent CVD risk predictors, with lower

predictive accuracy (a-MED: HR=0.979, 95%CI:0.867,1.11, -2logL=487.169; t-MED: HR=1.082, 95%CI:0.943,1.24, -2logL=397.332; Italian Score: HR=1.01, 95%CI:0.881,1.16, -2logL=487.123).

Conclusion: Results highlight the emerging need for a widely accepted tool for assessing adherence to MD patterns, which should be based on predicting ability and correct classification performance.

44. Integrating specialist palliative care into residential aged care for older people: a randomised controlled stepped wedge trial – The INSPIRED trial

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Background: The specialist palliative care team at Clare Holland House Canberra provides in-reach nursing services to twenty eight residential aged care facilities across Canberra.

In 2014-15 we piloted a proactive model of care implementing “Palliative Care Needs Rounds” across four sites. We reduced avoidable time spent in hospital by 67%, saving \$115,000 over 6 months. 100 % of residents died in their preferred place. This both normalised death and dying and underlined the important role that specialist nurses play in providing staff education, timely access to medicines and advance care planning.

Aim: This study seeks to expand on the pilot model of care to establish further evidence for the effectiveness of the model of integrating specialist palliative care into residential aged care.

Method: A stepped wedge, phase 2 randomised controlled trial with embedded process evaluation. The model tested in the pilot study will be delivered to twelve facilities. Evaluation of outcome measures will be added in order that the trial is fully powered.

Results: Currently we collect data on 1100 residents in the ACT. 10 sites are currently in the intervention, by December 2017 all 12 sites will be in the intervention phase.

Conclusion: Preliminary data suggests the same results as the pilot study with decreased hospital stays, residents dying in their preferred place (residential aged care) with their symptoms managed well. Staff and families feel better supported and unnecessary hospital transfers are being avoided because palliative care needs can be managed in residential aged care.

45. The role of Nfkb2 in B cell ontogeny

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Introduction: The NF- κ B transcription factor p100/p52 is encoded by the gene Nfkb2, essential for the healthy development of antibody-producing B cells. When the noncanonical NF- κ B pathway is activated, the p100 molecule is processed into its shorter active form “p52”. Mutations in the c-terminal region of p100 can disrupt processing, increasing total p100 and reducing p52. Using CRISPR-generated mouse models of c-terminal p100 mutations, we aim to describe separate roles of the p100 and p52 molecule during the development of B cells in the spleen and bone marrow.

Method: Immune cell phenotype and protein analysis was conducted in six strains of mice with different Nfkb2 mutations. FACS was used to analyse B cells in the spleen and bone marrow, and western blots were used to determine amounts of p100 and p52 proteins.

Results: Our Nfkb2 mutant mice have varying degrees of processing defect, forming a spectrum of total p100 and total p52. Spearman correlation analyses of cellular changes vs protein amount were performed, and an increasing amount of p100 in the spleen is significantly correlated with decreasing expression of CD21 in splenic B cells ($p=0.0054$). Decreasing amounts of p52 in the spleen is significantly correlated with decreasing total B cells ($p<0.0001$), and increasing IgM+ CD23- T1 subset of the CD93+ Transitional B cells ($p<0.0001$).

Conclusion: Nfkb2 mutants with varying p100 processing defects have been used to demonstrate the relationship between subtle changes in protein levels and distinct cellular abnormalities, and a novel role for p100 in CD21 expression has been identified.

46. A B1a cell expansion caused by IRF4 with a heterozygous point mutation on its DNA binding domain

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Introduction: B1 and B2 B cells are two major B cell subsets in mice. B1 cells are generated from foetal liver and are rare in spleen and lymph nodes but abundant in the peritoneal cavity. B1 cells are further divided into B1a and B1b B cells. B1a cells mainly secrete immunoglobulin M and form the first-line of pathogen defence. However, little is known about key transcription factors controlling B1 cell development, differentiation, survival, and proliferation. Our study now reveals the transcription factor IRF4 as a key regulator of B1a cell development. This adds a new dimension to the well-known function of IRF4 on B1 B cell development and differentiation.

Methods: Mice with a heterozygous mutation in the DNA binding domain of IRF4 (*Irf4point/+*) were analysed by flow cytometry.

Results: In *Irf4point/+* mice, expansion of B1a cells was detected in the peritoneal cavity, bone marrow, spleen and peripheral lymph nodes. During B cell development, cells that express a B cell receptor (BCR) specifically recognising phosphatidylcholine (PtC) get selected into the B1a cell lineage resulting in around 30% of B1a cells binding to PtC. We find a similar fraction of PtC binding B1a cells in *Irf4point/+* mice. This suggests that the expansion of B1a cells in *Irf4point/+* mice is not due to abnormal selection into the B1 cell lineage but rather results from abnormal cell proliferation and/or survival.

Conclusion: Mutations in IRF4 can cause B1a cells expansion without affecting the selection of B1a cells.

47. The role of a rare mutation in autoimmune pathogenesis

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Introduction: There is substantial evidence to support the role of genetics in the pathogenesis of autoimmune diseases. Identification of disease-causing mutations is an important step in understanding molecular pathways that lead to autoimmunity. Recent advances in next generation sequencing have enabled identification of previously undetectable disease-associated single nucleotide variants. In this study, whole exome sequencing revealed a rare deleterious mutation, in a gene we call AMIG, in a mother and daughter affected by systemic autoimmunity. This study will investigate the role of this rare mutation in autoimmune pathogenesis in vivo.

Methods: The impact of this mutation on lymphoid cell distribution was investigated via flowcytometric analysis of splenocytes from CRISPR/Cas9-edited mice carrying the variant. Enzyme-linked immunosorbent assay and immunofluorescent antinuclear antibody tests were performed on serum from these mice to establish serological consequences of the mutation.

Results: Preliminary immunophenotyping of mice homozygous for the mutation revealed abnormalities in splenic B cell subsets compared to wildtype littermates. Mutant mice had increased frequencies of germinal center and switched memory B cells and reductions in marginal zone B cells. Antibodies against double-stranded DNA were detected in serum from the mutant mice.

Further in-depth immunophenotyping and serological assays are being performed to confirm statistical significance and corroborate these findings.

Conclusion: This study provides preliminary evidence that a rare variant which segregates with systemic autoimmunity in a kindred causes hallmarks of autoimmunity in mice contributing to pathogenesis. Going forward we aim to validate the immunophenotypic changes identified in the mutant mice in peripheral blood mononuclear cells from affected family members.

48. Modelling human immune deficiency from novel missense mutations with orthologous heterozygous mutations engineered in mice by CRISPR/Cas9

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Introduction: Next generation sequencing has resulted in substantial progress in identification of Mendelian immune deficiency syndromes. In some cases, however, putative causal mutations occur in single kindred, or even individual patients. Under these circumstances, functional analysis of patient derived cells combined with in vitro analysis of genetically manipulated cell lines can provide additional evidence in support of genetic causation, but this might not be conclusive. In addition, understanding how genetic defects result in complex syndromes of immune deficiency and immune dysregulation can be impossible to achieve in vitro.

Methods: One method for overcoming these obstacles is to generate accurate mouse models of human immune deficiency, in which the murine genome is engineered to introduce a mutation orthologous to that discovered in the patient. We have applied this strategy to elucidate causation and mechanism of immunological defect in several mutations affecting the NF- κ B pathway.

Results and conclusion: So far, defects in both canonical and non-canonical pathways of NF- κ B activation have been shown to cause immune deficiency, often associated with immune dysregulation. We describe a known defects and novel putative defect identified in the canonical NF- κ B pathway, and illustrate how CRISPR-cas9 mouse models can be used to elucidate mechanism of disease and provide compelling evidence that mutations are causative.

49. RNA polymerase I inhibitors as novel therapies for osteosarcoma

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Introduction: Treatment for osteosarcoma (OS), an aggressive bone cancer most commonly seen in children, has not changed for several decades, often requires limb amputation, and fails in ~80% of patients with metastatic disease. Novel therapies are required to increase efficacy and reduce toxicity hence improving patient short- and long-term outcomes. RNA Polymerase (Pol) I activity is elevated in OS, thus supports rapid tumour cell proliferation and correlates with poor prognosis. It was hypothesised, therefore, that Pol I inhibitors may prove an effective adjunct therapy for OS.

Aim: To evaluate the anti-tumour effects of 2 Pol I inhibitors, PMR-116 and CX-5461, on human OS cell lines in-vitro and in-vivo.

Methods: The cytotoxicity of PMR-116 and CX-5461 in-vitro was determined using both an MTT and IncuCyte assay. The growth of OS subcutaneous tumours in Rag2 KO mice treated with Pol I inhibitors was monitored using digital calipers and in-vivo bioluminescent imaging.

Results: Preliminary results suggest p53 mutant OS cell lines are more sensitive to Pol I inhibition compared to p53 wild type OS cell lines with proliferation as the readout. In vivo treatment with PMR-116 resulted in a statistically significant anti-tumor effect ($p < 0.05$) compared to vehicle-treated controls, while CX-5461 treatment also demonstrated a therapeutic effect.

Conclusion: These results demonstrate that suppression of Pol I transcriptional activity with specific inhibitors is effective in models of OS, in-vitro and in-vivo. This supports pre-clinical development of PMR-116 and CX-5461 as novel adjunct therapies for children and adults with OS.

50. The incidence of chronic renal injury in patients undergoing autologous stem cell transplant therapy

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Aims: Haematopoietic stem cell transplant (HSCT) is a well-established treatment option for many haematologic immunologic and oncologic diseases, allowing the safe administration of high dose chemotherapy. Increased risk of acute renal injury is associated with HSCT, however the risk of chronic kidney injury in autologous HSCT remains unclear. This retrospective cohort study investigated the incidence of chronic renal injury in a single-centre population of 107 patients who underwent autologous PBSCT.

Methods: Patient characteristics were retrospectively collated from hospital records and pathology reports. eGFR was measured at baseline, three months, six months, 12 months, and 24 months following autologous stem cell re-infusion, and used as a marker of renal dysfunction.

Results: A significant reduction in mean eGFR of patients was observed from baseline ($80.62 \pm 2.97 \text{ ml/min}$) to 24 months ($71.54 \pm 4.14 \text{ ml/min}$), independent of primary diagnosis ($p = 0.001$).

Conclusion: Our results indicate there is an increased incidence of chronic renal injury in patients who have undergone autologous PBSCT therapy and this injury is potentiated by the autologous stem cell transplant procedure.

Clinical Significance: Protective measures to preserve short-term and long-term renal function should be investigated to lower the burden of chronic renal injury in this population.

51. CTLA-4 and DECTIN-1 in a patient with immune dysregulation syndrome, hypereosinophilia and clonally expanded $\gamma\delta$ T cells

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Through whole-exome-sequencing (WES) we have identified two rare and potentially deleterious heterozygous mutations in a patient with severe immune dysregulation syndrome (type I diabetes, gastroenteritis, eczema). The patient presents with hypereosinophilia and expanded gamma-delta ($\mu\mu$) T cells, and recently tested positive for latent tuberculosis (TB). The mutations occur in cytotoxic T lymphocyte associated protein (CTLA-4) a co-inhibitory receptor important for T cell suppression and DECTIN-1, a fungal/microbial recognition receptor also able to suppress T cells through recruitment of T regulatory cells (Tregs).

We hypothesise that an epistatic relationship exists between these proteins, with mutations in both leading to compromised T cell suppression. This could account for the dysregulated expansion of gamma delta ($\mu\mu$) T cells, which upon exposure to TB phosphoantigen, have been found to produce eosinophil stimulating cytokine IL-5. Excessive IL-5 may consequently lead to hypereosinophilia exacerbating the patient's eczema and gastroenteritis. This project will aim to investigate epistasis between DECTIN-1 and CTLA-4 mutations as a cause for impaired Treg function and a major driver of this severe case of disease. This will be achieved through a variety of in vitro studies including characterisation of patient $\mu\mu$ T cells through flow cytometric analysis and development of a DECTIN-1 driven Treg differentiation assay. Breeding of CTLA-4 and DECTIN-1 knock out mice may also be used to establish epistasis in vivo.

The outcomes of the project will thus reveal new molecular and cellular pre-cursors of immune dysregulation syndrome and may help to tailor a more effective treatment plan for our patient.

52. Characterisation of a Novel Human IL21R Mutation

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Introduction: A novel heterozygous missense mutation in the gene encoding the IL21 receptor (IL21R) protein was identified by whole exome sequencing of siblings diagnosed with common variable immunodeficiency (CVID). Since IL21 signalling plays a crucial role in B and T cell development and proliferation, this study aims to identify the cellular abnormalities caused by the mutation.

Methods: Cellular and functional phenotyping of cells from the patients in relation to healthy individuals was analysed by flow cytometry. Similar phenotyping assays were also performed using cells from mice CRISPR-engineered to bear the orthologous IL21R mutation identified in the patients.

Results: Analysis of the patients' PBMCs revealed a cellular phenotype of increased CXCR5+ CD45RA- T cells (P value=0.0357). Identification of increased CXCR5+ T cells in the CRISPR mice confirms that the mutation is responsible for the observed cellular phenotype (P value=0.0159). Additionally, B cell proliferation assays using cells from the patients have shown an increase in proliferative capacity in response to IL21 when compared to healthy controls.

Conclusion: Patients with a STAT3 gain-of-function mutation are reported to have a similar phenotype of increased CXCR5+ T cells as seen in our patients. Since IL21 signalling acts through STAT3 and other STAT family transcription factors, our results collectively suggest that the novel IL21R mutation results in a gain of function. Further studies are underway to investigate how this mutation affects the IL21/STAT3 signalling pathway in both B and T cells.

53. Investigating the role of NOD2 and RNF31 variants in Yao Syndrome

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Introduction: A patient, presenting with severe auto-inflammation, arthritis, tendon nodules and avascular necrosis, and diagnosed with Yao Syndrome, has required intensive treatment. She has inherited two heterozygous mutations, in NOD2 and RNF31 (encodes for HOIP). NOD2 and HOIP proteins are important players in inflammatory pathways such as NFκB, and MAP kinase pathways – p38 and ERK. NOD2 and RNF31 variants have previously been identified in patients with Yao syndrome and auto-inflammation/combined immunodeficiency, respectively. We aim to discover whether these variants have functional consequences on the inflammatory pathways in which they act.

Methods: RNF31 knock-out HEK293 cells were transfected with various NOD2 and RNF31 plasmid combinations. Post-transfection, cells were stimulated with L-18 MDP. To determine NFκB pathway activation, phosphorylation of IκB was detected via Western Blot at various time points over a three hour period.

Results: Preliminary data reveals that in response to MDP stimulation phosphorylation of IκB peaks at 120 minutes for all plasmid combinations. In all scenarios, compared to wild type, phosphorylation of IκB is reduced. Mutant NOD2 appears to produce a greater loss in phosphorylation than mutant RNF31 alone. In heterozygous and double mutant conditions the reduction in IκB phosphorylation is similar to that of NOD2 mutant alone. In the heterozygous state, it appears that despite the presence of wild type proteins there is not enough to generate effective NFκB signalling.

Conclusion: Both NOD2 and RNF31 variants individually and in combination appear to impair NFκB signalling. These data reveal that in heterozygous conditions NFκB signalling may be impaired in the patient. Replication of this study using the patient and parental PMBCs would be useful to substantiate these observations.

54. Deciphering Neutrophil Subpopulations and Functions in Skin Inflammation.

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Introduction: Psoriasis is a chronic auto-inflammatory skin disorder which is characterised by thickened skin and increased immune infiltration. Neutrophils are a major population of these infiltrating cells and previous studies using imiquimod induced mouse models of psoriasis have shown that neutrophil depletion can reduce disease severity. Neutrophils, however, are a heterogeneous population, with roles in both driving inflammation and repairing tissue. These different subpopulations have been linked to maturation state. It is currently unknown how the different subpopulations of neutrophils change in frequency and function during the progression of psoriasis.

Methods: Using a novel flow cytometric approach developed in our lab, we are examining these subpopulations of neutrophils in the imiquimod model of psoriasis. We are working to quantify the neutrophil effector functions, including the production of reactive oxygen species and formation of extracellular traps.

Results: Here we show preliminary data indicating increased proportions of immature neutrophil populations in the skin and periphery during psoriasis inflammation.

Conclusion: We aim to decipher the contribution of neutrophils to psoriasis pathology, and clarify the underlying neutrophil dependent mechanisms in this model.

55. Analysis of a Novel Heterozygous missense mutation in IKBKB

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Introduction: Currently, more than 300 Primary immune deficiencies have been attributed to single gene defects. We recently added to this number by identifying a patient with a novel heterozygous gain-of-function mutation in IKBKB, which encodes IKK β , a key component of the activation complex necessary for canonical NF- κ B signalling. NF- κ B is crucial for regulation of immune-related genes. To help characterise and prove causation of this mutation, our study used a CRISPR/cas9 bespoke mouse model which was engineered to carry the orthologous mutation.

Methods: Splenocytes were harvested from wild type and mutant mice, and were used for western blot and flow cytometry analysis to investigate immune system development and function.

Results: Analysis of the mice, combined with previous work that characterised the patient's immune phenotype, confirmed that the Ikbkb GoF resulted in enhanced and prolonged phosphorylation of I μ B. Cellular analysis showed derangement of B and T cell development, specifically reduced naïve T cells, and increased effector memory and regulatory T cells. T cells also exhibited an increased propensity to activation. Additionally, the biochemical and cellular phenotypes showed evidence of a gene dosage effect. Student's t test was used to determine statistical significance, and a 95% confidence interval was set.

Conclusion: Overall, the model exhibited combined cellular features of immunodeficiency and dysregulation, which was consistent with the patient's immune phenotype. This study has led to the discovery of a novel human immune deficiency. Furthermore, this study has also highlighted the usefulness of precise mouse models to confirm function of novel mutations in immunological diseases.

56. Understanding stem cell-niche interactions in the Drosophila germline

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The cellular microenvironment of the stem cell niche orchestrates the complex cellular interactions essential to stem cell self-renewal and differentiation. Proper organization and positioning of the niche is critical for preventing stem cell loss and tissue degeneration, or conversely, the emergence of cancer stem cells (CSCs) capable of unbridled proliferation. However, the mechanisms of oncogenic changes in the tumour microenvironment are still unclear. Here, we use the Drosophila model organism to demonstrate that the RNA recognition motif (RRM) protein Half-pint (Hfp) is important for germline stem cell niche signalling in vivo. Half-pint (Hfp), the Drosophila ortholog of the human tumour suppressor FIR, has been attributed to dual functions in mRNA splicing and transcription, particularly as a repressor of the MYC oncogene (Mitchell, 2010). Our exciting preliminary data demonstrate that depletion of the RNA recognition motif (RRM) protein Half-pint (Hfp) specifically in the Drosophila ovarian stem cell niche drives a phenomenon not previously reported; formation of an ectopic stem cell niche able to drive germline tumour formation. Interestingly the ability of depletion of Hfp in the stem cell niche to establish an ectopic niche, capable of non-autonomously driving germline stem cell tumours, was not dependent on MYC. Based on our observation that Hfp can bind genes in addition to MYC, we aim to determine 1) the direct Hfp binding targets in specifically in niche cells using Tandem-DamID and 2) identify targets responsible for the ectopic niche and germline tumour phenotype. Thus, we will identify the how Hfp regulates germline stem cell signalling, which will provide insight into oncogenic changes in the cancer microenvironment that might support cancer stem cell formation.

57. Intravascular device bloodstream infections: an effective and sustained hospital-wide prevention program over 18 years

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Aims: Canberra Hospital introduced a hospital-wide surveillance and intervention program in 1998 with the aim of reducing the entire hospital incidence of bloodstream infections (BSIs) caused by intravascular (IV) catheters.

Methods: Prospective surveillance of all inpatients and outpatient attendees with positive blood cultures (both hospital-onset and community-onset) at a 600 plus bed tertiary referral hospital from 1998 to 2016. Prompt review of all positive blood cultures with identification of BSIs due to IV catheters and associated preventable factors; weekly team meetings with microbiologist, regular reports to clinical areas, and the implementation of targeted interventions.

Results: BSI episodes caused by IV catheters fell from 110 per year in 1998 to 43 in 2016. The rate fell greater than 80% from 0.67 to 0.11 per 1000 occupied bed days. This lowered rate from 1998 to 2016, has been sustained and the rate has remained consistently below 0.20 per 1000 occupied bed days since June 2011. Over the 18 year study period there were over 880 cases of BSI related to IV catheters. Only 60 of these (7%) were identified as being from the commonly targeted surveillance area of ICU.

Conclusions: The program was associated with a profound and sustained drop in the number of IV catheter-related BSIs per year at Canberra Hospital. Whole of hospital, active surveillance and intervention programs can lead to substantial and sustained reductions in common life-threatening infections.

Clinical Significance: Whole of hospital blood stream infection data surveillance can show trends in data that may not be realised if only targeted ICU blood stream infection surveillance data is collected.

58. Vancomycin-resistant enterococci in the neonatal intensive care unit at Canberra Hospital – an unfortunate premiere

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Background and Aims: Nosocomial infections with vancomycin resistant enterococci (VRE) is cause of significant morbidity and mortality worldwide. Colonisation usually precede infections and therefore it is crucial to minimise the burden of colonisation in highly vulnerable patient populations. This study investigates the transmission pathways and origins of the first occurrence of VRE colonisation in the Neonatal Intensive Care Unit (NICU) at the Canberra Hospital.

Methods: Demographic and clinical variables for a cohort of 14 colonised infants and 77 non-colonised infants, representing all admitted patients at the NICU and special-care nursery (SCN) over the outbreak period January to May 2017, were analysed to assess possible risk factors for VRE colonisation. Whole genome sequencing of the VRE isolates was used to determine the origin of the outbreak strain.

Results: Swift implementation of wide-ranging infection control measures brought the outbreak under control. Multivariate-logistic regression revealed a strong association between gestational age and colonisation. Whole genome sequencing showed the isolates to be highly clonal non-typeable *Enterococcus faecium* (NTEfm) vanA and closely related to other NTEfm recently sequenced from the hospital. Staffing data revealed a high proportion of non-regular staff during the period leading up to the discovery of the outbreak.

Conclusion: The colonisation of NICU patients was with a highly successful clone endemic to the Canberra Hospital likely introduced into the NICU environment from other wards, with subsequent cross contamination spreading it among the neonate patients.

Clinical significance: The outbreak emphasises the vigilance required to prevent the introduction of an established VRE clone into naive hospital environments as a consequence of lapses in infection control.

59. Clinical trial of CATH TAG: an innovative new device to reduce infections associated with indwelling medical devices

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Aims: to reduce device related infections due to poor compliance. The Canberra Hospital conducted a short trial to determine if using CATH TAGs would improve compliance with its 72-hour PIVC removal policy. CATH TAG is a disposable electronic timer that prompts clinical staff to remove or review an indwelling medical device after a set time.

Methods: The trial was performed over four weeks in two wards (Ward A-medical and Ward B-surgical). Standard point prevalence studies were conducted at the start and the end of the trial period. During the trial, a CATH TAG was placed in the patient's notes whenever a PIVC was placed by staff in the two wards. PIVCs that had been placed in other wards of the hospital did not have a CATH TAG placed in the patient's notes.

Results: At the start of the trial, 65% of PIVCs in Ward A and 28% of PIVCs in Ward B had unknown dwell times or dwell times greater than 72 hours. At the end of the trial, this was reduced to 26% in Ward A and 20% in Ward B. When comparing the pre and post trial data, it is evident that the CATH TAGS had improved policy compliance. There was a decrease in both the 'expired' and 'unknown' categories as well as a significant increase in the 'in date' category.

Conclusion: This product was found to be effective in ensuring staff applied policy.

Clinical Significance: the product has the potential to reduce harm as staff will ensure PIVCs are removed within the designated timeframe.

60. Pattern and presentation of vitreo-retinal diseases: an analysis of hospital records in a tertiary eye care centre in Nepal

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Aim: To understand the pattern and presentation of vitreo-retinal (VR) diseases presenting to a typical tertiary eye care centre in Nepal.

Methods: Retrospective analysis of hospital records included all patients presenting for the first time to a VR clinic over one year. The data included patient demography, symptoms and duration, associated systemic diseases, ophthalmological examinations, diagnostic investigations and final diagnoses. Statistical Package for Social Sciences (SPSS, version 20.0, IBM, New York NY; and MATLAB (2016b, The MathWorks, Natick, MA) were used to analyse the data.

Results: Of 1905 cases age ranging from 2 months to 116 years, 1148 were males (60.3%). The 25th-percentile of ages was 29 for males and 38 for females, indicating females presented later ($p < 0.0001$). Hypertension was the commonest systemic disease (40.8%), followed by diabetes (32.5%). Macular degeneration (AMD) and diabetic retinopathy (DR) were the commonest VR diseases affecting 447 eyes (11.8%) and 416 eyes (10.9%) respectively. Male and female AMD and DR patients were symmetric in their ages. Male and female diabetics had the same duration of disease, which was not correlated with DR severity. In AMD and DR asymmetry of severity between eyes was largest in patients with one normal eye. Amongst AMD patients males had marginally higher prevalence of wet AMD in their worst eye ($p = 0.063$). Presenting visual acuity was asymmetric between eyes ($p < 0.0001$).

Conclusions: Females presented later but AMD and DR developed in an age specific way in which one eye commonly proceeded to proliferative disease independently. The asymmetric visual acuities highlight the need to take eye dominance into account when assessing disability.

61. The role of the classical complement pathway in retinal degenerations

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Introduction: Dysregulation of the complement cascade is strongly implicated in the pathogenesis of Age-Related Macular Degeneration (AMD), however the contribution of each complement pathway to AMD progression is not fully understood. It has been suggested that the classical pathway is required for prolonged damage, after initial activation of the alternative pathway. This study aims to investigate the role of the classical pathway in the progression of retinal degenerations using C2-/- mice, deficient in complement component 2 (C2), a key component of the classical pathway.

Methods: C2-/- mice were exposed to photo-oxidative damage (PD) for seven days, with some animals recovered for a further seven days post-PD (14-day time point) prior to tissue collection. Histological analysis of C2-/- retinas from dim-reared and PD groups were investigated using haematoxylin and eosin staining and compared to wild type (WT) controls. Photoreceptor cell death and macrophage recruitment in the outer retina were quantified using a TUNEL assay and IBA-1 immunohistochemistry, respectively. Retinal function was investigated using electroretinography.

Results: C2-/- mice showed higher retinal function compared to WT controls, with significantly less photoreceptor cell death and macrophage recruitment after 14 days ($P < 0.05$). At 7 days there was no difference between C2-/- mice and WT controls in retinal function, photoreceptor cell death or macrophage recruitment.

Conclusions: These findings implicate C2 and the classical pathway in the later stages of the progression of retinal degenerations. This data from C2-/- mice suggest that gene therapy targeting C2 locally in the retina may slow the progression of retinal degenerations.

62. 64. Correlation of visual field loss with MRI findings in patients with pituitary tumours

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Introduction: The exact mechanism which gives rise to bitemporal hemianopia in chiasmal compression by pituitary tumors is currently unknown. One theory suggests that crossing fibres experience greater stress from compressive forces than uncrossed fibres (which have a larger contact area). Finite-element modelling has been used to investigate this in silico but the hypothesis needs testing in vivo. This study aimed to determine whether extrinsic chiasmal compression was associated with patterns of visual field loss which supported the 'crossing hypothesis' or not.

Method: Subjects with chiasmal compression secondary to pituitary tumours who also had clear visual field abnormalities were identified from the Canberra Hospital database. Visual fields were analysed to derive 'temporality' and 'bitemporality' indices. MRI scans were analysed to determine the relative elevations of centre and peripheral portions of the optic chiasm and, in turn, the eccentricity of compression. Temporality indices were plotted against central chiasmal elevation, and both temporal and nasal hemifield abnormalities were plotted against eccentricity.

Results: In total, 122 patients were identified, but only 12 were suitable for analysis. Both temporality and bitemporality indices were significantly correlated with central chiasmal elevation ($p = 0.004$). Hemifield studies demonstrated patterns of visual loss with increasing eccentricity which were more consistent with the 'crossing hypothesis', though the correlations failed to reach significance.

Conclusion: The results are more supportive of the 'crossing hypothesis'.

Clinical Significance: This study provides tentative support for the 'crossing hypothesis'. The information will be used to inform further finite-element models of chiasmal compression. A larger, prospective study is warranted.

63. Role of MicroRNA-223 in NLRP3 Inflammasome Regulation in Retinal Degenerations

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Background: NLRP3 inflammasome activation in retinal microglia is known to promote pro-inflammatory cytokine secretion, contributing to Age-Related Macular Degeneration (AMD) pathogenesis. Uncovering therapeutic targets to regulate this inflammatory pathway may be useful in slowing the progression of retinal degenerations. Dysregulation of miR-223, a microRNA known to regulate post-transcriptional NLRP3 gene expression, has been linked to several inflammatory disorders, however its role in AMD is unknown. This study aimed to characterise the role of miR-223 in regulating NLRP3 inflammasome in retinal degenerations.

Methods: Primary mouse retinal microglia and immortalised brain microglia (C8B4) were stimulated for inflammasome activation. RNA was extracted from microglia and whole retinas obtained from mice exposed to photo-oxidative damage (PD) for up to 7 days. Expression changes of miR-223 and inflammasome genes (Nlrp3, Casp1, Il-1 β) were assessed by quantitative real-time PCR.

Results: Downregulation of miR-223 was detected in all stimulated microglia, while inflammasome gene expression was significantly increased ($P < 0.05$). In vivo, miR-223 and inflammasome genes were upregulated following 1, 3, 5 and 7 days of PD, with miR-223 and Nlrp3 significantly upregulated after 5 days of PD ($P < 0.05$).

Conclusions and Clinical Significance: Expression of miR-223 was dysregulated upon NLRP3 inflammasome activation in retinal microglia and photo-oxidative damaged retinas. It is possible that miR-223 modulates NLRP3 inflammasome activation in retinal microglia, however further studies are required to validate its retinal localisation. Alteration of miR-223 levels using miRNA mimics/inhibitors will determine if miR-223 manipulation in the retina is a potential therapeutic strategy for reducing NLRP3 inflammasome-mediated inflammation in retinal degenerations.

64. More than just selling glasses – ocular therapeutic prescribing by NZ optometrists

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Aims: In July 2014, New Zealand (NZ) optometrists became Authorised Prescribers and therefore able to prescribe any therapeutic pharmaceutical agent (TPA), including oral medications, within their scope of practice. The aim of this study was to document TPAs prescribed by NZ optometrists between 2014 and 2016.

Methods: A retrospective audit of de-identified prescribing data collected by the Ministry of Health for the years 2014-2016 inclusive. Optometrists' prescribing patterns were assessed using descriptive statistics to investigate the total number of therapeutic agents prescribed per year, types of medications prescribed and regional differences.

Results: There was a 60% increase in the number of prescriptions written by optometrists between 2014 and 2016. Optometrists were most likely to prescribe topical anti-infective agents (28.4% of total prescriptions) followed by anti-allergy (26.9%) and anti-inflammatory medications (23.0%). Oral medication prescribing made up only 1.4% of TPAs prescribed. Significant regional differences in optometrist prescribing existed: Canterbury had a disproportionately smaller number of TPAs prescribed, relative to the size of the population, than other regions in NZ (chi-squared goodness of fit, $p = 0.009$).

Conclusion: Increases in the number of pharmaceutical prescriptions suggest that optometrists are playing an increasing role in the management of eye disease. Disproportionately lower optometrist prescribing patterns in some regions of NZ require further investigation.

Clinical Significance: In NZ, the number of ophthalmologists is insufficient to meet the growing need for ocular health services. Therapeutically endorsed optometrists represent a group of community-based eye care professionals who can help provide primary eye care services including managing many common eye diseases.

65. Regulation of complement activation by miR-155 in retinal degeneration

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Background: MicroRNA (miRNA) are small noncoding RNAs (~18-22 nucleotides) that regulate biological pathways through suppression of mRNA translation. MiR-155 is linked to the progression of neurological pathologies, including Age Related Macular degeneration (AMD). Complement activation is correlated to AMD progression. Complement factor H, (CFH), a negative regulator of the alternative complement pathway, is one of many predicted targets of miR-155. Therefore, suppression of complement activation through miR-155 inhibition may prove an effective therapeutic strategy.

Methods: A luciferase assay was utilised to validate CFH as a target of miR-155. MiR-155 inhibitors were delivered in vivo via intravitreal injection halfway during photo-oxidative damage (PD) to assess therapeutic efficacy. Retinal function of miR-155 inhibitor-injected mice was measured at 5 days by electroretinography. IBA-1 immunohistochemistry was used to detect mononuclear phagocyte migration to the outer retina as a measure of inflammation. Gene expression changes of the complement components, CFH and C3 were measured by RT-qPCR.

Results: CFH was validated as a target of miR-155. Retinal function was significantly improved in mice treated with miR-155 inhibitors. No significant difference was seen in mononuclear phagocyte recruitment to the outer retina following PD. However, a significant decrease in gene expression was shown in central complement molecule, complement component 3 (C3) in both the KO and inhibitor injected mice.

Conclusion: Suppressing miR-155 activity in the PD model of retinal degeneration reduced C3 deposition by mononuclear phagocytes, suggesting that miR-155 plays a role in complement activation in retinal degenerations and is worth further exploration as a potential therapy.

66. Photoreceptor survival is regulated by GSTO1-1 in the degenerating retina

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Purpose: Glutathione transferase omega 1-1 (GSTO1-1) is a cytosolic glutathione transferase enzyme, involved in glutathionylation, toll-like receptor signaling and calcium channel regulation. GSTO1-1 dysregulation has been implicated in oxidative stress and inflammation, and contributes to the pathogenesis of several diseases and neurological disorders; however, its role in retinal degenerations is unknown. The aim of this study was to investigate the role of GSTO1-1 in modulating oxidative stress and consequent inflammation in the normal and degenerating retina.

Methods: The role of GSTO1-1 in retinal degenerations was explored using *Gsto1*^{-/-} mice in a model of retinal degeneration. The expression and localization of GSTO1-1 was investigated using immunohistochemistry and western blot. Changes in the expression of inflammatory (Ccl2, Il-1 μ and C3) and oxidative stress genes (Nox1, Sod2, Gpx3, Hmox1, Nrf2 and Nqo1) were investigated via quantitative real time polymerase chain reaction (qRT-PCR). Retinal function in *Gsto1*^{-/-} mice was investigated using electroretinography.

Results: GSTO1-1 was localized to the inner segment of cone photoreceptors in the superior retina. *Gsto1*^{-/-} PD mice had decreased photoreceptor cell death as well as decreased expression of inflammatory (Ccl2, Il-1 μ and C3) markers and oxidative stress marker Nqo1. Further, retinal function in the *Gsto1*^{-/-} PD mice was increased compared to WT PD mice.

Conclusions: These results indicate that GSTO1-1 is required for inflammatory-mediated photoreceptor death in retinal degenerations. Targeting GSTO1-1 may be a useful strategy to reduce oxidative stress and inflammation and ameliorate photoreceptor loss, slowing the progression of retinal degenerations.

67. The Impact of Multipinhole Array Dimensions in L-SPECT Imaging Reconstruction Quality

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Light field SPECT(L-SPECT) is an advanced version of SPECT, implemented by incorporating concept of plenoptic imaging to reduce information loss and scanning time. Unlike conventional SPECT with collimator that blocks radiation except in prescribed directions, L-SPECT uses multipinhole array as collimator allows all radiations within the field of view to fall on detector. Apart from this projection behind each pinhole gives different views of same scanned object. This paper discusses effect of multipinhole array dimensions in reconstruction quality. L-SPECT imaging set up is simulated with 49.152x49.152 mm² detector. Dimension of each pixel is 0.048x0.048 mm² and they are grouped into grids based on location with respect to pinhole. Simulation is done by considering different pinhole pitch, pinhole radius and source to pinhole plate gap. Pinhole pitch is varied from 0.96mm to 2.112 and pinhole radius is varied from 0.096mm to 0.2112mm. Detector to pinhole gap is selected in such a way that to avoid overlapping between projections. Reconstruction is implemented by projecting a ray from every non- zero pixels through corresponding pinhole center towards cubical volume of interest. Intersected voxels in cubical area of interest is identified and values are updated based on Siddon's ray raytracing algorithm. This reconstruction method considers direction of incoming radiation. Results indicates that pinhole plates with ratio of pinhole pitch to pinhole radius nearly 10 gives better reconstruction quality compared to other ratios.

68. Preventing osteoporotic fractures in the elderly beyond anti-resorptive therapy: optimising iron status and rationalising the use of psychoactive drugs

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Aims: To evaluate in hospitalised older patients the incidence of iron deficient anaemia, the prevalence and appropriateness of psychoactive drugs prescribing, factors strongly associated with falls and negative effects on bone metabolism.

Methods: Clinical and laboratory data in two cohorts – medical (n=807, mean age 86.4±6.2 years, 63.8% females) and hip fracture (HF) patients (n=455, mean age 82.8±8.4 years, 74.0% females) – were analysed and appropriateness of medication use assessed (Beers 2015 and STOPP criteria); in medical patients risk of osteoporosis was evaluated (Osteoporosis Self-assessment Tool, OST).

Results: Among medical patients, 167 (20.7%) had a history of falls, 127 (15.7%) had previous fractures, 505 (62.6%) presented with anaemia and 508 (71.1%) had high OST (<-3).Of these patients, only 54 (10.7%) were treated with iron supplements and only 81(15.9%) received anti-osteoporotic drugs, but 66 (39.6%) fallers and 47 (37.0%) patients with fractures were prescribed at least one falls-risk psychoactive medication: an antidepressant (18.6% and 17.3%, respectively), benzodiazepine (6.6% and 9.4%) or antipsychotic (14.4% and 10.2%) which was inappropriate in 67.9%, 82.6% and 75.7%, respectively. On admission, of 455 HF patients, 383 (84.2%) were anaemic, 137 (30.1%) were using psychoactive medications (in 98 [71.5%] prescribed inappropriately), but only 29 (7.6%) patients were treated for iron deficiency and only 83 (18.2%) subjects were receiving anti-osteoporotic drugs.

Conclusions: In the elderly with high risk for osteoporotic fracture iron deficiency is very common (>70%) but rarely treated, whereas psychoactive medications are often overused.

Clinical significance: Optimisation of anti-anaemic along with anti-osteoporotic therapies and deprescribing inappropriate psychoactive drugs are essential for falls and fracture prevention.

69. Use of patient reported outcome measures as predictors of predictors of manipulation under anaesthetic following total knee arthroplasty

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Introduction: Arthrofibrosis is a common complication of total knee arthroplasty, causing severe stiffness in 2-10% of patients. Manipulation under anaesthetic (MUA) is generally successful in restoring function to arthrofibrotic knees, but places patients under additional trauma immediately following arthroplasty. The identification of reliable risk factors for arthrofibrosis would potentially provide important prognostic data. This study explored the utility of patient-reported outcome measures as predictors of manipulation under anaesthetic.

Method: We conducted a retrospective case-control study of 50 patients requiring manipulation between 2009 and 2016. These patients were matched by age, knee, and sex to a cohort of patients who did not require manipulation. Pre-operative and 1-year follow-up Oxford knee, WOMAC, and SF-12 scores were obtained from the Canberra Arthroplasty database and compared between groups using multivariate generalised linear models.

Results: We detected no difference in outcome scores between the patients who had undergone manipulation and those who had not. Extensive overlap was observed between groups, and mean scores were similar both pre-operatively and at 1-year post-arthroplasty. No pre-operative score was predictive of manipulation, but pre-operative scores were highly correlated with post-operative scores.

Conclusion: Pre-operative patient-reported outcome measures did not predict MUA following arthroplasty. The similarity of scores at 1-year provides evidence that function and quality of life after arthrofibrosis are not significantly diminished at 1-year compared to a non-arthrofibrotic group.

Clinical Significance: The evidence from this study suggests that surgeons can reassure their patients that their outcomes at one year after TKR will not be reduced even if they have had post-surgical arthrofibrosis requiring MUA.

70. Is the capsule implicated in FAI?

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Introduction: Femoroacetabular impingement (FAI) is determined from bony morphology. Imaging suggest that the hip capsule can increase in thickness following repeated trauma, degeneration, and FAI surgery. The aim of this study was to investigate the relationship between capsular thickness, and pre- and post-operative function.

Method: In this retrospective observational study, patients were included if they completed the International Hip Outcome Tool (iHOT33) prior to surgery for FAI (2013 to 2016) and were ≥ 18 . Exclusions included a twelve-month post-operative iHOT33, pre-operative Magnetic Resonance Arthrogram within three years of their operation, and revision surgery. Adjusted linear regression models were used to assess the effect of capsule thickness on iHOT33 score.

Results: 17 participants (6 males; 39(11.5) years) were eligible. Participants were classified as having thin (1.4mm to 1.7mm; n=6), medium (1.8mm to 2.2mm; n=6) and thick (≥ 2.3 mm; n=5) capsules. The adjusted means (SE) for preoperative iHOT33 by group were not significantly different (thin 39.7(6.3) p=0.69; medium 36.1(5.2) p=0.39; and thick 46.5(5.4) p=0.17). The adjusted means(SE) for the iHOT33 difference (twelve months minus baseline) were not significantly different (thin 18.4(10.5) p=0.3, medium 33.5(8.8) p=0.5 and thick 9.4(9.5) p=0.07). However, there were more patients in the thick capsule group who failed to improve in terms of a clinically significant iHOT33.

Conclusion: Although capsular thickness was not a significant predictor of functional outcome overall, having a thicker capsule may be a feature of patients who fail to improve after surgery.

Clinical Significance: Surgical management of the capsule may lead to more consistent improvement after surgery for FAI but more data is required.

71. Ulnar Styloid Fractures at Canberra Hospital: Should we do more?

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Introduction: Distal radius fractures (DRF) are one of the most common fractures to present for treatment and fractures of the ulnar styloid process are associated with up to 65% of DRF. The ulnar styloid is an attachment for the triangular fibrocartilage complex, which is crucial to the stability of the wrist. However, the evidence for the clinical importance of these fractures and whether operative fixation is warranted remains equivocal.

Method: We reviewed records of all adult patients presenting to Canberra Hospital with distal radius fractures in 2015 and 2016. Diagnosis of a DRF alone and DRF with USF were verified from available imaging. Patients were excluded if they had other fracture patterns or an old USF. Data extracted included demographics, mechanism of fracture, management, follow-up duration and fracture union.

Results: Of 686 DRF, 389 (57%) also had USF. The most common mechanism was a fall from standing. The mean age at fracture was 55yo and 68% were female. 73% were at the base and 27% at the tip. 80% of patients with both DRF+USF had internal fixation with ORIF but only 2% had fixation of the USF. Of the 310 patients with imaging >6 weeks, patients with USF fixation had 89% union of USF compared to 17% union without USF fixation.

Conclusion: USF fixation appears to lead to better outcomes at 6 weeks but is rarely done at Canberra Hospital.

Clinical Significance: The long-term outcomes, feasibility and scalability of USF fixation needs to be further investigated to determine whether routine fixation is warranted.

72. Radiographic analysis of implant position and articular subsidence in tibial plateau fractures

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Introduction: Tibial-plateau fractures with depressed osteochondral or 'die-punch' fragments have a high incidence of articular subsidence after reduction. Locking plates aim to prevent this via 'raft' screws below the subchondral bone. However, differences in plate design and patient anatomy result in screw-position variability in relation to the fragments they are designed to support. We aimed to investigate whether the between the raft-screw to articular-surface distance was associated with loss of articular reduction.

Method: A retrospective-cohort study of operatively-treated tibial-plateau fractures with die-punch fragments (2008 to 2017) was conducted. We compared radiographic parameters and screw placement between fractures with subsidence versus those without. Secondary outcomes included whether bicortical fixation, presence of bone graft, fracture characteristics and patient age influenced rates of subsidence.

Results: Sixty-eight of 309 operatively-treated tibial-plateau fractures had die-punch fragments (22%). Forty-nine patients were followed up at TCH. Fractures with raft screws placed closer to the joint than the thickness of the die-punch fragment were less likely to subside ($p=0.02$). The use of bone graft and bicortical fixation did not significantly alter subsidence rates. Articular comminution ($p=0.04$) and being female > 65 years ($p=0.03$) were associated with increased risk of articular subsidence.

Conclusion: Screw placement, injury severity and patient age and sex, were significantly associated with increased articular subsidence.

Clinical Significance: Articular subsidence after tibial-plateau fracture disrupts the joint and leads to an increased risk of osteoarthritis in the knee. These results indicate that placing raft screws closer to the joint than the die punch fragment may reduce the likelihood of articular subsidence.

73. Knee kinematics predict pain and function score during stair ascent

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Aim: To determine if one or more of six kinematic parameters, measured during a step-up movement, predicts Oxford Knee Scores (OKS) in patients with severe knee osteoarthritis (OA).

Patients and Methods: Five males and 5 females aged 63 – 84 with medial knee OA awaiting total knee replacement surgery from a larger study were included. CT scans for each patient were registered to fluoroscopy images of a step-up activity. The resultant kinematic data were described in terms of range, maxima in each direction, and rate of change as a function of flexion. The OKS surveys were administered when the images were taken. Linear regression models were used to investigate which kinematic parameters predicted OKS.

Results: Each 1° increase in internal/external rotation (Int/Ext) and abduction/adduction (Ab/Add) range increased OKS by 0.7 ($p = 0.046$) and 1.3 ($p = 0.003$) respectively. In addition, each 1 mm increase in maximum lateral translation and 1 mm decrease in maximum medial translation increased OKS by 0.48 ($p = 0.035$) and 0.94 (0.002).

Conclusion: OKS is influenced by knee kinematics, particularly excessive medial translation.

Clinical Relevance: Medial/Lateral translation, Int/External rotation, and Ab/Adduction may be important kinematic targets for improving performance on stairs.

74. Mechanical and biocompatible characterisation of laser polished Poly-lactic acid for surgical guide fabricated by 3D printing

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Aims: Conventional standard orthopaedic surgical guidance hardly matches the geometry of an individual patient. The mismatch not only has potential neural or visceral injury, but also includes biomechanical disadvantages. 3D printing is usually applied to fabricate personalized surgical guide for optimal fit. However, the 3D printing process usually generates deleterious surface topography. This study aims at improving surface quality of 3D printed object by post treatment, and investigating its mechanical and biocompatible properties.

Methods: Fused deposition modelling (FDM) technique is applied to fabricate testing specimens. Laser polishing and surface grinding was used to improve the surface quality. Tensile, compression and flexure testing were performed to investigate the mechanical strength of specimens before and after post polishing. Osteoblasts (OBs) and osteoclasts (OCs) was cultured onto the pieces.

Results: The tests of tensile, compression and bending on the post processed samples, demonstrated that laser treatment had less negative influence on mechanical strength than that of grinding. In addition, the laser treated surface showed better biocompatibility than that of the grinded surface, which was observed from the inhibition of osteoclasts (OCs) and growth promotion of osteoblasts (OBs).

Conclusion: The laser polished samples matched up the properties of FDM object mechanically and biocompatibly. More importantly, the laser polishing method is superior to the surface grinding method.

Clinical Significance: The described FDM and laser post treatment may be a potential method for manufacturing intra-operative guides with favourable mechanical strength and biocompatibility.

75. 'Compassion and vulnerability': clinician perspectives on disseminating the Circle of Security Parenting (COS-P) Program

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Aims: The Circle of Security Parenting Program (COS-P) is a group intervention designed to strengthen the quality of the parent-child relationship. Despite extensive uptake, there is a need for more research evidence for its effectiveness in clinical settings. Qualitative approaches that solicit clinician perspectives on how parenting programs are translated into 'real-world' settings have been largely underutilised. However, they have great potential to highlight the factors associated with effective implementation efforts. We aimed to investigate the perspectives of clinicians who routinely deliver COS-P to vulnerable families, including mothers affected by mental illness.

Methods: Two focus group interviews, involving 8 clinicians and clinical supervisors from a diverse range of professional backgrounds, were conducted by an independent interviewer. A psychologist-researcher reviewed and analysed the transcripts using inductive thematic analysis.

Results: According to the participants, the strengths of COS-P include its ease of use, brief, engaging format, widespread applicability, and empathic, non-judgemental stance. We report on what clinicians view as critical components to its successful implementation, highlighting the major themes arising, including the important role of compassion and vulnerability in this work.

Conclusions: COS-P is a promising intervention that aims to assist caregivers to raise a securely attached child. Using qualitative methods, the findings highlight the strengths and weaknesses of this model, factors associated with successful implementation and potential improvements.

Clinical Significance: Bridging the gap between the research findings for parenting programs and implementing such programs in clinical settings remains a significant public health challenge. The results provide an in-depth picture of how the COS-P intervention can be successfully delivered in community settings.

76. Developmental changes of neurokinin receptor expression and function in cholinergic interneurons of the striatum: potential pathological implications

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Drug trials targeting a neurokinin receptor were conducted in developed cases of schizophrenia, finding no significant alleviation of symptoms. These trials may have incorrectly discredited the receptor, as they did not explore receptor function during early stages of brain development. Our aims are to determine developmental changes to the receptor's expression and how these modifications affect the properties of striatal cholinergic interneurons. In this study, we used in vitro electrophysiology, calcium imaging, pharmacology, and immunohistochemistry approaches to determine developmental changes in expression and activity of the receptor in genetically modified mice. Preliminary data shows the neurokinin receptor mRNA is upregulated in early stages of postnatal development and protein internalises to the nucleus in response to increased cellular activity. As the receptor is highly expressed in early development, we propose that early modulation of this neurokinin receptor could lead to epigenetic changes, alteration in cell and circuit function in adult mice. Analysis of the receptor's developmental function could thus provide insight into early pathogenic mechanisms of schizophrenia, and other striatum-related pathologies.

77. Optimising Resources for Endovascular Clot Retrieval for Acute Ischaemic Stroke Using a Discrete-Event Simulation Model

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Background: Endovascular Clot Retrieval (ECR) is the standard of care for acute ischaemic stroke due to a large vessel occlusion. It is a time critical and complex process involving many specialised care providers and resources. Maximising patient benefit while minimising cost of this service requires optimisation of human and physical assets.

Aim: The aim of this study is to develop a computational model of an ECR service, designed to optimise resource allocation.

Methods: Using Simmer -- an R-based Discrete Event Simulation (DES) package -- as frequently employed in complex logistical operations, we have developed a comprehensive computational model that closely mimics the environment of an ECR service from presentation to emergency department to the angio suite. This model was tested using real data collected from a quaternary institution with ECR service.

Results: Our model assesses the impact of available services, and aids optimisation of resource distribution and access, allowing comparison of various competing strategies. In this simulation, the numbers of different human or capital resources such as stroke physicians, neuro-interventionists, and angiography equipment can be varied to assess the impact on efficiency and availability of service delivery. Other factors and variables such as equipment breakdown, servicing or times taken during components of an individual stroke management pathway can also be integrated, to identify sources of systemic delay and cost-points, with a view to service improvement.

Conclusion: A novel computation model is proposed to help existing ECR services, in targeting optimum service delivery and best patient outcomes.

78. Decrypting the excitation-contraction coupling protein machinery

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Excitation-contraction coupling (ECC) is a crucial process in muscle physiology responsible for the conversion of electrical signals from the nervous system into mechanical response (muscle contractions). Despite the central role of ECC-related defects in the development of many debilitating neuromuscular disorders, the molecular details of the communication between two key ECC proteins in skeletal muscles (dihydropyridine receptor, DHPR, and ryanodine receptor, RyR1) are still unknown. This prominent gap in our understanding of the fundamental mechanism of the normal and defective ECC impedes our ability to develop new treatments for the related muscle diseases.

We set out to determine the fine molecular details of the crucial interactions between DHPR and RyR1, focusing on studying a recently discovered and potentially critical component of the ECC machinery – STAC3 protein. The critical role of STAC3 in the development of some muscle disorders, such as Native American myopathy (NAM), strongly suggests its direct involvement in ECC. While structures of related proteins STAC1 and STAC2 have been recently determined by X-ray crystallography, the structure of STAC3 has been elusive, most likely due to the instability of the protein in aqueous solutions as well as its tendency to aggregate and precipitate.

We found optimal conditions for maintaining highly concentrated samples of STAC3 for liquid-state nuclear magnetic resonance (NMR) spectroscopy. This paved the way for determination its three-dimensional structure, identification of key molecular interactions between DHPR, STAC3 and RyR1, and combining the established structural information into a comprehensive molecular model of ECC. Information available from the literature about disease-causing mutations, such as the NAM mutation in STAC3, will be mapped onto the protein complex in the developed molecular model, thus identifying the key disruptions and faults that occur in clinically disordered states of ECC.

79. Physical Health Assessment and Intervention within the Older Persons Mental Health Community Team: A Qualitative Needs Assessment

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Aims: Individuals >65 years and Aboriginals and Torres Strait Islanders >50 years with a mental illness are an understudied population and have 1.5 to 2 times higher rates of overweight/obesity than the general population. The aims of this needs assessment were to i) identify weight management interventions previously implemented and ii) obtain perspectives of clinicians within the Older Person Mental Health Community Team on physical health assessment and intervention.

Methods: Literature searches were conducted across scientific databases (Google Scholar, PubMed, UCFind, EBSCOhost, ACT Health Library) for peer-reviewed articles published from 2000 onwards. Fifteen studies met inclusion criteria: randomised control trials (n=5), mixed method (n=2), quasi-experimental (n=1), cohort studies (n=7). Studies focused on improved weight profile through psychoeducational, exercise or dietary interventions. Interviews with two stakeholders within the Older Persons Mental Health Community Team discussed facilitators and barriers to assessment of physical health. Interviews also gained views on appropriate communication methods to engage consumers. Thematic analysis was used to assess information.

Results: Studies showed that individually tailored interventions with a combination of psychoeducation components and practical elements of diet and exercise, could be effective for weight management. However, the literature did not specifically target older individuals. The interviews with stakeholders found no current protocols assessing physical health. The responsibility of physical health assessment was placed on the General Practitioners, due to frequent contact with consumers.

Conclusion: This needs assessment highlights the scope to develop an assessment and intervention for physical health within the Older Persons Mental Health Community Team.

80. HPA axis function and diurnal cortisol in post-traumatic stress disorder: A systematic review

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Aim: There is inconsistency in the literature investigating the nature of hypothalamic-pituitary-adrenal (HPA) axis functionality in post-traumatic stress disorder (PTSD). The review aimed to investigate HPA axis functionality via the diurnal profile of cortisol as it relates to PTSD.

Methods: The authors conducted a systematic review of the literature within the last decade (2007 – 2017) in accordance with The PRISMA Statement in the following four databases: PubMed, MEDLINE, ScienceDirect and PsycINFO with Full Text. The search strategy was limited to articles in English language, published in peer-reviewed journals and human studies. PTSD sufferers of all trauma types, ages, genders and socioeconomic statuses were included provided there was a “healthy” control group and an inclusion of reporting on inter-group measurements of diurnal cortisol profiles as a portrayal of HPA axis functionality.

Results: A total of nine studies met the criteria for inclusion in this review. The association between HPA axis functionality and PTSD was evaluated by the measurement of salivary and/or plasma cortisol concentrations. The majority of studies (n = 6) demonstrated decreased (morning: 20-40%) cortisol concentrations compared with respective control groups while one study published findings of diurnal hypercortisolism in the PTSD group and the final two studies did not demonstrate any findings for between-group differences in cortisol concentrations.

Conclusion: There is evidence that dysregulation within the HPA axis, as demonstrated by altered diurnal cortisol profiles, forms part of the pathophysiology of PTSD.

Clinical Significance: A complete understanding of the etiology of HPA axis dysregulation as it relates to PTSD remains unestablished and, as such, warrants further investigation.

81. The role of nutraceuticals in the treatment of Attention-Deficity Hyperactivity Disorder (ADHD) in adults: Systematic review of intervention trials

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Nutraceuticals have been investigated as a potential alternative to pharmacological treatments for attention-deficit hyperactivity disorder (ADHD) in children, but little is known about their use in adults with ADHD. We sought to examine peer-reviewed publications on nutraceutical use and ADHD symptoms in adults. Adhering to PRISMA guidelines, we searched the electronic databases Scopus, PubMed, CINAHL, Cochrane Library and Web of Science. In total, five studies (range: n=12-80) met the inclusion criteria. Two randomised controlled trials were identified. The first study found that neither Pycnogenol® (Pinus maritima) nor methylphenidate outperformed the placebo over three weeks based on self-report and observer completed measures (all, P>0.05). The second study examined EPowerplus™, a 36 ingredient micronutrient formula over the course of eight weeks. Symptom severity decreased in the treatment group based on the Conners Adult ADHD rating scale (P=0.009) and observer outcome measures (0.026), but this was not supported by clinician reports (P=0.331). Of the three open label studies, two originated from the same pilot trial of EPowerplus™, reporting improvements in self, observer, and clinician measures of symptom severity (all, P<0.05). The final study, an open label trial of L-tyrosine, revealed a reduction in symptoms based on the Physician's Global Rating Scale in eight of the twelve participants after a two-week period, but symptoms returned after six weeks. Our review highlights an absence of nutraceuticals research in the treatment of adult ADHD and a need for additional research aimed at examining the role of nutraceuticals and their effect on symptoms of ADHD in adults.

82. Soap and water wipes versus Chlorhexidine wipes. Does it make a difference in surgical site infections in emergency caesarean sections?

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Aim: to determine if there is a simple intervention available to reduce the occurrence of SSI in these procedures?

Method: Surveillance of emergency Cat A (within 30 minutes) and Cat B (within 45 minutes) caesarean sections undertaken over 6 months with the assistance of midwives. For the first 3 months, soap and water wipes were used on the abdomen pre-operatively on the women having a caesarean section. The following 3 months, chlorhexidine wipes were used instead of the soap and water wipes.

Education was provided to the appropriate wards and midwives to encourage participation in this study. The women were contacted 30 days post-caesarean by phone to determine if there were any signs of surgical site infection.

Results: For the first month that soap & water wipes were used in this study, there was a SSI rate of 5.3% for Cat A or Cat B Caesarean Sections. For the first month that Chlorhexidine wipes were used, there was a SSI rate of 11.9% for Cat A and Cat B Caesarean Sections.

Conclusion: With this limited data, it could be suggested that there is no need to use the Chlorhexidine wipes – that soap and water wipes pre-operatively would suffice, but as suggested above, the data here is limited and further work is required.

Clinical significance: by a simple intervention of using soap and water wipes preoperatively, a reduction in ssi during emergency caesarean sections was noted.

83. Discharged Inpatient Experience Survey Reporting Site

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Aims: Previously, patient survey feedback was a biannual report through an external provider. This was not received in a timely and effective way to inform areas needed for improvement. The Discharged Inpatient Survey commenced with a planned interactive reporting site to provide close to real time data.

Methods: All the executive and consumers had ongoing input into survey development including; volume, patient selection, questions, collection methods, management of information and reporting.

Randomly selected discharged inpatients aged between 18 to 99 years received the invitation and survey questions by mail every week. Participation is on paper or by phone.

Data is entered into a SharePoint database and uploaded weekly to the interactive reporting site.

Results: Quantitative data can be viewed by patient journey, areas for improvement or high performance, Picker Principles, patient demographic profile (including indigenous), carer, recognised safety and quality health service standards or by hospital area of interest. Qualitative data conveys the patient's personal messages, ideas and comments 'In their own words'. Users can adjust the dates and print the colourful Home Page.

Conclusion: Providing timely data was achieved. Over 1300 surveys, collected over two years provides a very robust patient's view of organisational performance.

Clinical Significance: Timely patient feedback on organisational performance is crucial to evaluate and monitor person centred, safe and effective care. Patients, carers or family members are surveyed weekly on their hospital experience. Executive have nominated leaders to have access to the reporting site, promoting direct responsibility for sharing and following-up on patient feedback.

84. Can a digital bedside chart increase nursing time spent with patients? A mixed method research evaluation in a live hospital environment.

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Aim: Electronic health records are expected to overcome common problems associated with the volume, legibility, accuracy, completeness and currency of paper based documentation of nursing care. Current vendors provide systems developed for international markets and adapted for Australia with varying success in supporting nursing care for patient safety and care quality. A new digital bedside nursing chart deployed on a 26-bed acute medical ward was evaluated with Commonwealth and industry funding.

Method: A quasi-experimental ethnographic approach was employed. Pre and post-implementation data collection included time and motion studies of minute-by-minute nursing work; ward demographics; nurse pedometers; staff and patient interviews; questionnaires regarding satisfaction, care quality and missed nursing care.

Results: Patient surveys (33), patient interviews (20), nurse surveys (51), focus groups (2), clinician interviews (48) and 'time and motion' nursing work (118 hours) were collected. The implementation was associated with marginal increases in nurses' time spent with patients at the bedside (2%); and decreased missed care by nurses (reported by patients (26%) and nurses (17%)). Qualitative analysis revealed: the positive potential of the tool; suggestions for improvement; design fragmentation; usage issues for nurses (pain and injury); and unforeseen management decisions including 30% bed closures and the removal of trained nurse champions.

Conclusion: The latest pilot evaluation revealed some positive elements of usability, a lack of acceptability, and indeterminable efficacy. Clinicians highlighted key issues in implementation, particularly in relation to clinical governance.

Clinical significance: Clinicians called for comprehensive and integrated digital implementation rather than 'trials of concept', and suggested better multi-level 'clinician-to-middle-managers-to-executive' engagement maintaining strong patient focus incorporating the nursing process.

85. Patient Experience: Collaborating to Improve Services for Tube Fed Patients

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Aims: To analyse patient experience feedback provided by patients receiving tube feeding and their carers to inform service improvements for this patient group.

Methods: All living tube fed patients who received Community Care (CC) Nutrition services in 2016 and their carers (where applicable) were invited to provide feedback on their tube feeding experience and care received; either through focus groups or self-administered surveys.

Results: A total of 34 individuals with feeding tubes, out of a possible 79 individuals, consented to participate in the project. Of these, 16 attended focus groups and 18 completed self-administered surveys. Additionally, 11 carers participated with six attending focus groups and 5 completing surveys. Three fifths (61%) of feedback provided was positive, with the remainder being constructive-negative (35%) or neutral (4%). Data was thematically analysed and common themes identified included: personal feelings; individual health professional care; inter-professional collaboration; health systems and structures; and enteral formula/equipment issues.

Conclusion: Most tube fed patients accessing CC Nutrition services have had positive experiences with their care. Improvements to the current service will continue to enrich patients' experiences.

Clinical Significance: Comparison of the themes against findings from similar work, best practice in tube feeding patient care and evidence from consumer experience research; have led to recommendations for service improvements through improving team processes, inter-professional collaboration and involving consumers as partners. The implementation of these recommendations will provide a better patient experience to all ACT Health patients receiving tube feeding who access community-based dietetic services.

86. Before and after interventional trial on the effect of a digital patient deteriorating system “Patientrack” on patient deterioration processes

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Aims: Patients who experience adverse hospital events, such as Medical Emergency Team (MET) calls, show prior acute physiological deterioration. Signs may be detectable at the bedside in vitals and triage scales such as the Modified Early Warning Score (MEWS), however, manual recording of vitals/MEWS is prone to error. We aimed to determine whether the digital observation system “Patientrack” was associated with increased observation (vitals) frequency, reduced MET and adverse outcomes rates (ICU admission/mortality), and to assess MEWS accuracy in manual calculations.

Methods: A quantitative observational study was conducted across two wards comprised of two, random 25% samples over two, four-month periods before (N = 160) and after (N = 237) implementation of Patientrack. Between-group differences were assessed using Mann-Whitney U and 2.

Results: Observations per patient per day were similar between controls and Patientrack (6.78 vs 7.36). There were no significant differences in MET rates nor post-MET ICU transfers or mortality: Patientrack MET rate 5.49% (13/237) vs 3.33% (5/160), ICU transfer rate 23.08% (3/13) vs 20% (1/5), mortality of 15.38% (2/13) vs 0% (0/5). In manual calculations, 56.87% (91/160) of controls were missing at least one MEWS during admission, and across all observations, 5.34% (2310/43248) of MEWS were calculated incorrectly -- with blood pressure most frequently incorrect (23.53%; 2064/8872) and respiratory rate least (0.39%; 34/8827).

Conclusion/Clinical Significance: The digital observation system “Patientrack” had similar observation frequency, MET rates and outcomes as manual recording of vitals/MEWS. However, Patientrack improved rates of assigned MEWS (100% vs 43.14%) and accuracy (100% vs 94.66%), compared with manual calculations, which may improve escalation of care.

87. Collaborating with consumers to develop handouts that enhance safe care, positive experiences, and meet community needs

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Aims: To standardise the process for developing and endorsing consumer handouts within ACT Health, with a focus on quality, consistent messaging and incorporating health literacy principles. To value consumer experiences by ensuring consumer involvement and consultation in the development and review of handouts.

Methods: Audit of existing handouts across ACT Health Divisions. Establishment of Consumer Handouts Committee including consumer meeting monthly to review handouts for endorsement. Development of toolkit and eLearning to support authors.

Results: A policy was developed to ensure a consistent process for the initiation, approval and development of consumer handouts occur, including consumer involvement. To date 311 handouts have been endorsed, 86 archived and 317 handouts are currently under review/development. Handouts are strategically aligned with business plans & NSQHS Standards. The work highlighted a number of similar handouts and consolidation has occurred. Consumer involvement improved from ad hoc to 100%.

Conclusion: At ACT Health our quality ambition is to be a high performing health service that provides person-centred, safe and effective care. We are committed to ensuring that relevant and reliable handouts are available for consumers, to enhance safe care, positive experience, and meet community needs. We can now be confident that the handouts we provide to consumers meet these aims.

Clinical Significance: By ensuring clear, understandable information is given to consumers, we empower them to take an active role in their health care. By incorporating the principles of health literacy into handouts consumers can easily follow any directions they are given. This has the potential to significantly contribute to consumers experiencing the best possible clinical outcome.

88. What follow-up are women at high risk of breast cancer having in the ACT?

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Introduction: The ACT Genetic Service evaluates genetic risk and eligibility for genetic testing for breast/ovarian cancer. EviQ guidelines recommend individuals at high risk of breast cancer are offered follow-up, screening and consideration of risk reducing procedures and chemoprevention. Currently the service provides a plan, co-ordinates investigations and doctor reviews, with the clinical follow-up performed by the patients' GP and/or specialists. There is concern that this system is unsustainable, fragmented and inadequate to meet patient needs.

Aim: To investigate current practice and patient satisfaction in regard to risk reduction and follow-up of high risk patients in the ACT.

Method: A survey was administered using Survey Monkey to participants at high risk of developing breast cancer, on the ACT Genetics database at Nov. 2015. The survey collected demographic data; details of recommended risk-reduction strategies; uptake of recommendations (patient recall); and participant satisfaction with follow-up.

Results: Seventy-two of 180 (40%) patients responded. Risk reducing surgery was discussed frequently with BRCA1 (100%) and BRCA2 (88%) patients, however few had undergone surgery. Compliance with screening was highest in the high-risk family history group (84%), compared to the BRCA1 (38%) and BRCA2 (47%) groups. Risk reducing medications were infrequently discussed and few patients were taking medications. Patients were generally satisfied with follow-up, but would use a specialised clinic if available.

Conclusion: Women at high risk of developing breast cancer in the ACT are not consistently following EviQ guidelines for risk management. A centralized high risk clinic could stream line services, standardize follow-up, and facilitate discussions and instigation of updated guideline recommendations as they occur.

89. "Pink Wednesday": A Quality and Safety initiative to improve hand hygiene compliance in intensive care

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Aims: Hand-hygiene is a key to limit and or prevent health care infections. A recent audit showed the compliance rate was poor among health care workers (HCWs) in the intensive care unit (ICU) at the Canberra hospital. We undertook a simple Quality and Safety initiative, which would appeal all the HCWs in the form of PINK WEDNESDAY to improve the hand-hygiene compliance rates.

Methods: Since November 2017, we suggested that all the HCWs in ICU to wear pink at work on Wednesdays. We compared the hand-hygiene compliance rates and monthly frequency of patients admitted to ICU with multi-resistant organisms during the "pre-PINK WEDNESDAY" initiation period (June 2017-October 2017) and during PINK WEDNESDAY period (November 2017- March 2018).

Results: The new intervention was popular among all HCWs and they found it simple, easy to use and had a visual impact. Compared to last audit conducted in pre-PINK WEDNESDAY period (October 2017), there was a statistically significant improvement in the hand-hygiene compliance rate among nursing (82.3% from 63.1%, p-value <0.0001) and medical staff (84.4% from 48.9%, p-value 0.001) conducted in March 2018 (PINK WEDNESDAY period). The use of alcohol-based rub went up by 6.1%. Moreover, the number of patients with Vancomycin resistant enterococcus (VRE) dropped by 35%, non-multi-resistant staphylococcus (NMRSa) dropped by 50% during the "PINK-WEDNESDAY" period.

Conclusion: By implementing a simple appealing initiative in the ICU, the hand-hygiene compliance improved significantly and may have decreased the incidence of some multi-resistant infections in ICU. We would propose that this simple initiative could be widely implemented across our Healthcare institution.

90. Impact of the lactation consultant role in the NICU: a quality improvement project

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Aim: To assess the impact of the introduction of a lactation consultant (LC) on 1) education and lactation support for mothers and staff, 2) provision of expressed breast milk (EBM) for neonates.

Background: Supporting mothers to establish and maintain lactation during their baby/s hospital admission is a complex issue. To increase breastfeeding rates, provide lactation support and standardise breastfeeding (BF) education, many neonatal units have a permanent LC on staff.

Method: A mixed methods study included; 1) a retrospective chart audit and 2) staff surveys pre/ post LC. Data collected included: 1st EBM, episodes of lactation education and support. Survey questions aimed to gain staff feedback regarding; education, access to support and meeting maternal needs. Data analysis included descriptive statistics and Pearson Chi-Square tests.

Results: 161 neonates were audited: 82 pre-and 79 post LC. Post LC service there was a significant increase in maternal access to LC appointments (12/82, 63/79, $p < 0.01$) as well as breast pump education (53/82, 64/79, $p < 0.01$). 91 staff surveys were returned; pre=36, post=56. Post LC there were significant increases in staff confidence in providing BF education to mothers (25% vs 46%; $p = 0.013$) and improved access to a LC appointment (5% vs 89%; $p < 0.01$). There was an increase in EBM provision at 12 hours postnatal (38/82, 48/79, $p < 0.01$).

Conclusion: Introduction of an LC service has improved maternal access to LC support with resultant improvement in early EBM provision to preterm neonates.

Clinical Significance: This study has led to the development of a lactation care plan and elearning program for staff across NICU/SCN.

91. AirRater: Using citizen science to reduce health impacts from atmospheric environmental hazards

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Aim: Poor air quality is a known hazard to human health. The AirRater app, available in Tasmania and the ACT, provides real-time, localised information on air quality, airborne pollen and meteorological conditions, tracks individual symptoms, and provides alerts when adverse conditions are forecast. We evaluate the app as a means of supporting high-risk individuals to improve their awareness of environmental conditions, and to better manage their health.

Methods: Registered users of the app completed a short online survey at sign-up, and were invited to provide further feedback via six-monthly online surveys. Surveys collected information on health status, utility of the app, behaviour change in response to information delivered via the app, and perceived benefits to health.

Results: The AirRater app currently has 6,132 users, 901 are based in the ACT. Based on all users, approximately 60% are registered participants, while the remainder are anonymous. Of the registered users, 50% have self-reported or doctor-diagnosed asthma, 65% allergic rhinitis and 35% have both. Results from the first ACT evaluation (response rate of 29.5%) show that of these respondents, 84% reported the app was useful. Users reported changes in behaviour showing improved self-management of their condition.

Conclusions: Access to real-time air quality and aero-allergen information is perceived as being useful by high risk groups, such as those with asthma and hay fever, and as a tool to identify and mitigate adverse health impacts precipitated by environmental conditions.

Clinical Significance: Smartphone technologies can potentially improve individual and public health response to atmospheric hazards by providing accurate, timely and customised health information.

92. Tube weaning – are we doing what they're doing over there?

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Aims: Tube dependence can be an expensive and detrimental side effect of managing medically complex children. Evidence from international sites shows that hunger provocation tube weaning is effective at increasing successful return to oral feeding. Research shows that 90% of hunger provocation tube weans are successful, with a 75% success rate on the first attempt and the majority of children weaned on the second attempt (Hartdorf et al, 2014). However, there are only anecdotal reports on the use and success of hunger provocation tube weaning in hospitals in Australia (Gardiner et al, 2016). This retrospective review examines success rates of hunger provocation tube weaning at the Canberra Hospital's (TCH) Children's Feeding Clinic (CFC) and the factors contributing to unsuccessful tube weans.

Methods: Retrospective review of outcomes since commencing hunger provocation tube weaning at TCH (2015 – 2018 inclusive). Review of patient, carer and environment characteristics of successful and unsuccessful tube weans.

Results: 42 tube weans managed by TCH CFC 2015 – 2018. 30/42 (71%) successful first time, 9 of the remaining successful second attempt (total successful = 39/42 = 93%). 3/42 unsuccessful in first two attempts (7%). Reasons for unsuccessful tube weans can be grouped into three main areas – patient specific, parent/carer expectations and stress, and environmental factors. Parent factors are most likely to result in a second unsuccessful tube wean attempt.

Conclusion: Hunger provocation tube weaning managed by TCH Children's Feeding Clinic has similar success rates to published international data.

Clinical significance: Hunger provocation tube weaning at TCH is generally effective and should be considered for all medically appropriate children.

93. Incidence of nasal injury comparing Fisher Paykel and Hudson CPAP interfaces

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Aim: To compare the incidence of nasal injuries using Fisher Paykel (FP) and Hudson (H) interfaces with (WD) and without (WOD) the use of a duoderm nose (D).

Background: Nasal continuous positive airway pressure (nCPAP) is a standard approach to respiratory support in neonates. Currently in the NICU nCPAP interfaces are the predominant cause of pressure injuries. To date there is limited research comparing different interfaces and the incidence of nasal septal/skin breakdown.

Methods: A prospective observational study was undertaken in 2016-17. Both interfaces were used exclusively with and without a duoderm nose generating four groups: 1) FPWD; 2) FPWOD; 3) HWD; 4) HWOD. Data collected included: Gestation (GA), Birthweight (BW), CPAP hours, incidence and stage of nasal injury. Rates of injury (I) per number of babies (IB) and CPAP hours (IC) were calculated.

Results: 150 neonates were included in the study: 1) FPWD n=51; 2) FPWOD, n=49; 3) HWD, n=25; 4) HWOD, n=25. 31 neonates (21%) acquired one or more injuries. There were no significant differences in GA and BW between the four groups (p = 0.151). HWD babies had significantly less nasal septal injuries when compared to FPWD (IB: 1 vs 15, p=0.01; IC: p=0.04). There was no significant difference between the HPWOD and FPWOD groups.

Conclusion: The addition of a duoderm nose results in less nasal injuries with nCPAP using the Hudson CPAP interface. Auditing nasal injuries and types of CPAP interfaces can result in improved clinical outcomes.

Clinical Significance: During 2018 we will transition to an interface that results in the least nasal injuries, continuing to use a care plan developed for all neonates who acquire a nasal injury.

CHARM

CANBERRA HEALTH
Annual Research Meeting

WORKSHOPS





Dietary consumption of advanced glycation end products – More than just hype?

A CHARM 2018 workshop facilitated by



Prof Josephine Forbes



A/Prof Melinda Coughlan

Other speakers include APDs Dr Nicole Kellow and Dr Catherine Itsiopoulos

9am-12pm, Friday 3 August 2018

Conference Room 1, Building 19, Canberra Region Cancer Centre, Canberra Hospital

This workshop has been developed for nutrition students, academics and clinicians but may be of interest to other health professionals working in aging and other degenerative diseases such as diabetes, atherosclerosis, chronic kidney disease and Alzheimer's disease.

Learning objectives:

1. To increase awareness of the deleterious impact of AGEs
2. To consider how this knowledge can be incorporated into general nutrition practice
3. To consider the key messages we should convey to our clients/patients.

To register, email preclinical.research@act.gov.au

Registration is essential as spaces are limited.

Prof Josephine Forbes is an Australian scientist specialising in the study of glycation and diabetes. She has been studying diabetes since 1999 and has worked at Royal Children's Hospital, University of Melbourne and Baker IDI Heart and Diabetes Institute in Melbourne Australia. Since 2012 she has led the Glycation and Diabetes team at Mater Research which is a world class medical research institute based at South Brisbane, and part of the Mater Group. Josephine is program leader for Mater's Chronic Disease Biology and Care theme, building greater understanding of the biological basis of a broad range of chronic diseases, and developing preventative strategies and innovative treatments to improve patient outcomes. Josephine and her team focus on how advanced glycation contributes to the pathogenesis of diabetes and its complications such as kidney disease.

A/Prof Melinda Coughlan has a BSc (Biology) with Honours in Human Nutrition from Deakin University, and a PhD in Obstetrics & Gynaecology from the University of Melbourne. Her PhD focused on mediators of inflammation and oxidative stress in the development of gestational diabetes (Mercy Hospital for Women). After completing her PhD, Melinda joined the Baker Heart Research Institute as a postdoctoral researcher in Prof Mark Cooper's Diabetes Complications Division. In 2012, she became the Head of the Glycation, Nutrition and Metabolism Laboratory at the Baker IDI Heart and Diabetes Institute. In 2016, she was recruited to Monash University's Central Clinical School to establish the Department of Diabetes. Associate Professor Coughlan holds a Career Development Fellowship from the JDRF and has research grants from the NHMRC.



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Pathways to an academic career in cardiology – A mentoring workshop

A CHARM 2018 Q&A session with



Professor Prashanthan Sanders

Director of Cardiac Electrophysiology and Pacing, Royal Adelaide Hospital; Director for Heart Rhythm Disorders, University of Adelaide Medical School and Group Leaders for Heart Rhythm Disorders, South Australian Health and Medical Research Institute

Facilitated by Professor Rajeev Kumar Pathak

2-3pm, Tuesday 31 July 2018

Conference Room 1, Building 2, Level 3, Canberra Hospital

This Q&A session is an opportunity for medical students and junior doctors to discuss pathways to an academic career in cardiology – balancing a clinical and research career.

To register, email preclinical.research@act.gov.au

Registration is essential as spaces are limited.

Professor Prash Sanders is a clinical and academic electrophysiologist. He undertook his Cardiology training at the Royal Adelaide Hospital, electrophysiology and doctoral training at the Royal Melbourne Hospital, before taking up a postdoctoral training in Bordeaux, France. Professor Sanders was appointed to the Knapman-National Heart Foundation Chair of Cardiology Research at the University of Adelaide and as Clinical Director of Cardiac Electrophysiology at the Royal Adelaide Hospital in 2005. He has since established an internationally recognised electrophysiology laboratory and research group which is at the forefront of strategies for the treatment and management of atrial fibrillation. Professor Sanders is an NHMRC Practitioner Fellow and has published >300 peer-reviewed publications. He has received a variety of accolades including being named the 2010 Australian Medical Researcher of the year under the age of 40, receiving a NHMRC Achievement award for the highest ranked Practitioner Award in 2013, and most recently the RT Hall Prize from the Cardiac Society of Australia and New Zealand in 2015

Biomedical Research Collaboration Workshop



A CHARM 2018 workshop with special guest presenter

Scientia Professor Nigel Lovell

Graduate School of Biomedical Engineering, UNSW Sydney

Facilitated by Professor Mark Pickering, UNSW Canberra

Professor Lovell is an internationally acknowledged expert in biomedical engineering and the application of advanced data analysis techniques to the biomedical field.

His presentation at CHARM on 1 August is about the role of wearables, implantables and data analysis in chronic disease management. This workshop is for biomedical researchers interested in collaboration.

2-4pm, Tuesday 31 July 2018

Building 30, LT04 UNSW Canberra

(map on reverse)

Are you a researcher whose research interests are applicable to biomedical research, but you aren't sure how to start a collaboration with medical and biomedical researchers?

Do you have an interest in biomedical science or engineering, or the application of social science to these fields?

The workshop will begin with a presentation by Prof Lovell of his experiences with interdisciplinary biomedical research, followed by an information workshop with the aim of developing ideas related to how academics in the ACT can collaborate to produce quality outcomes in biomedical research.

To register, email preclinical.research@act.gov.au

Registration is essential as spaces are limited.

Nigel Lovell received the B.E. (Hons) and Ph.D. degrees from the University of New South Wales (UNSW), Sydney. He is currently Head of the Graduate School of Biomedical Engineering UNSW Sydney, where he holds a position of Scientia Professor and Head of School. He has authored more than 250 journal papers and been awarded over \$80 million in research and development and infrastructure funding. He is a Fellow of seven learned academies throughout the world.

His research work has covered areas of expertise ranging from cardiac and retinal modelling, telehealth technologies, biological signal processing, and visual prosthesis design. Through a spin-out company from UNSW, TeleMedCare Pty. Ltd., he has commercialised a range of telehealth technologies for managing chronic disease and falls in the older population. He is also one of the key researchers leading a research and development program to advance in Australia a retinal neuroprosthesis or 'bionic eye'.

He has been conference or scientific chair of half a dozen international conferences including the triennial World Congress of Medical Physics and Biomedical Engineering in Sydney in 2003. For 2017 and 2018, he is the President of the world's largest biomedical engineering society – the Institute of Electrical and Electronics Engineers, Engineering in Medicine and Biology Society.



▶ **WORKSHOP**
**PATIENT-CENTRED
RESEARCH**
DATA SCIENCE AND PATIENT
REPORTED OUTCOMES
▶ 30 JULY 2018

Patient-centred research is critical to improve health care. This workshop brings together Patient-Reported Outcomes and Data Science to provide insights into the concepts, designs and application of this research to everyday clinical practice.

Learning Objectives

- Psychometric Appraisal of Patient Reported Measures
- Literature Searching and Evidence Management
- Patient-Centred Study Designs
- The Importance of Sample Size
- Data Analytical Techniques & Interpretation

Morning Session

- Exploring Patient Reported Outcomes
- Harnessing the Literature Through Technology

Afternoon Session

- Study Designs Centred on the Patient
- Data Science and Patient-Focused Research

Who Should Attend
Health and Medical Students,
New Researchers, Policy Makers,
Quality and Translational Researchers

Venue
Women's & Children's
Seminar Rooms,
Canberra Hospital

Registration Email your interest to:
preclinical.research@act.gov.au

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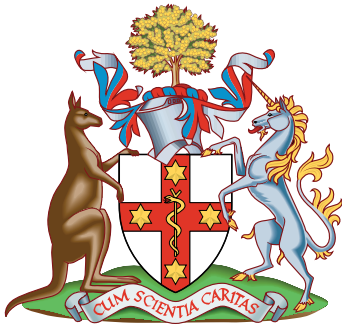


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ACT's primary health network



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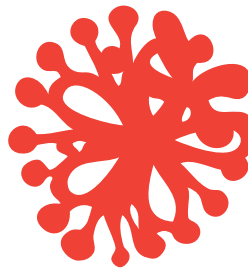
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Inspiring Australia Award For The Charm 3 Minute Thesis Winner

Smartleasing Awards For The Charm 3 Minute Thesis Second Place

Smartleasing Award For The Charm 3 Minute Thesis Third Place



Australian Association Of Gerontology Best Poster Prize –
High Quality And Important Research Regarding Ageing And Gerontology

Australian Association Of Gerontology Best 3Mt –
High Quality And Important Research Regarding Ageing And Gerontology



