



## Contents

<b>Critical Care and Clinical Support Services .....</b>	<b>1</b>
<b>Emergency and Trauma Centre .....</b>	<b>2</b>
<b>Genetic Health Queensland.....</b>	<b>9</b>
<b>Hyperbaric Medicine Service .....</b>	<b>15</b>
<b>Intensive Care Services .....</b>	<b>16</b>
<b>Professor Tess Cramond Multidisciplinary Pain Centre .....</b>	<b>24</b>

Published by the State of Queensland (Metro North Hospital and Health Service), May 2021

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## Critical Care and Clinical Support Services



**Peter Buttrum**  
**A/Executive Director**  
**Critical Care and Clinical Support Services**

The Critical Care and Clinical Support Services (CC&CSS) has a strong and established research program integrated across its clinical teams. The programs are supported by dedicated research teams, national and international collaborations, and professorial roles with academic partners. Equally importantly however, the programs are underpinned by scores of clinician-researchers who combine their clinical roles with identifying and investigating better ways to support our patients and our health system.

Whilst our clinicians and health services have had to adapt during the challenges of the Covid-19 pandemic, so too have our researchers demonstrated their flexibility and innovation in responding to these challenges. Research partnerships were created, projects developed, and findings were even published within unprecedented timeframes, which continues to guide our approach in this new pandemic-impacted environment.

A few of the research highlights in 2020 included:

- Professor Jeffrey Lipman being recognised twice during 2020, firstly receiving a Member of the Order of Australia (AM) in the Queen's Birthday Awards, and secondly an Honorary Membership of the European Society of Intensive Care Medicine (ESICM) for his achievements in medicine, science and research.
- Several of our Emergency and Trauma Centre (ETC) staff are collaborating in two successful NHMRC Partnership Project grants worth over \$1.7 over 4 years, one investigating improved diagnostics for cardiac patients and the second, optimising evidence translation for high risk acute cardiac chest pain. Dr Jaime Greenslade is leading one of these projects, and of note, Dr Louise Cullen is a collaborator on both of these projects.
- Dr Jayesh Dhanani being awarded a Metro North Research Scholarship continuing his post-doctoral work in nebulised pharmaceuticals.
- Partnerships across the Service Line were created and strengthened, including the Australian Genomic Health Alliance (AGHA) which is a multisite \$25 million 5-year grant from the NHMRC preparing Australia for the Genomics Revolution in Healthcare, the Australian eHealth Research Centre at CSIRO to support machine learning algorithms, and the School of Mathematical Sciences at the Queensland University of Technology (QUT) to assist in the modelling of patient flow.
- The dissemination of research outcomes, which has been challenging with the reduction of conferences in 2020 but has included over 125 journal articles and book chapters across the teams.

Metro North continues to strengthen its focus on Closing the Gap in health and life expectancy outcomes between Aboriginal and Torres Strait Islander peoples and non-indigenous Australians. Importantly, the Critical Care teams are leading several research projects with a focus on first Australians, including patients presenting to the Emergency Department with coronary care syndrome, a variety of genetic health projects, and Aboriginal and Torres Strait Islander people living with chronic pain.

I commend the following CC&CSS research summary and would like to thank all of our industry and academic partners for the valuable role they play in supporting our research programs and improving the outcomes of our patients. More importantly however, I would like to thank all the CC&CSS staff who continue to provide exceptional care for our patients, but also continue to investigate and support research-based initiatives to improve this care.

## Emergency and Trauma Centre

The research activities at the Emergency and Trauma Centre continued apace throughout 2020. As expected, the COVID-19 pandemic disrupted and delayed some projects, however it also provided opportunities to explore some new fields of research. We commend all our medical, nursing and allied health clinician-researchers who, led by our wonderful senior researchers, advanced their various research interests despite weathering pandemic-related surges in emergency department presentations. We acknowledge the contributions and efforts of clinicians who took on research projects for the first time in 2020 and take pleasure in the new ideas and energy that they bring. Our researchers' efforts have been rewarded with 13 new research grants, including two from NHMRC, to a total value of over 2.3 million dollars.

Our multidisciplinary intradepartmental clinical team care for a broad spectrum of patients with diverse presenting complaints. This is reflected in the types of research that we do and the research collaborations in which we engage. Collaboration is a key component of our research, with collaborators bringing specialist skills and resources that help us achieve ambitious research goals. In 2020, we established a partnership with the Australian eHealth Research Centre at CSIRO for a project to develop machine learning algorithms for use as clinical research tools. We also established a collaboration with the School of Mathematical Sciences at the Queensland University of Technology to apply discrete event simulation techniques to model the flow of patients through our department.

We were pleased to host two visiting research fellows from the Republic of Korea: Dr Minjoung Kim (Department of Emergency Medicine, Severance Hospital, Seoul) and Dr Joon Min Park (Department of Emergency Medicine, Inje University Ilsan Paik Hospital, Goyang). Drs Kim and Park are interested in big data, especially the application of artificial intelligence to solve challenges imposed by the need to expedite patients through the Emergency Department. We look forward to further collaborations between our institutions.

## Research Awards and Achievements

Recipient	Award	Event
<b>Anthony Brown</b>	Medical Program Teaching Award Nominee	The University of Queensland: Royal Brisbane Clinical School; 2020

## Research Grants Awarded in 2020

Investigator Names	RBWH Departments / Research Groups	Research Project Title	Granting Body	Total Awarded	Year/s
<b>McCormick E, Greenslade J, Crilly J, Brough P, Markwell A, Rule M, Hughes JA, Foran L, Brownlee E</b>	Emergency and Trauma Centre, Royal Brisbane and Women's Hospital	Helping our healers: health and performance of ED staff	RBWH & RBWH Foundation Project Grant	\$39,539.24	2020
<b>Hughes J</b>	Emergency and Trauma Centre, Royal Brisbane and Women's Hospital.	From Big Data to the Bedside – Answering big questions in emergency department pain care using artificial intelligence and patient-reported outcomes	Emergency Medicine Foundation Leading Edge Grant	\$97,326	2020-2022
<b>Burke J, Spratt B, Corry P, Brown NJ, Chu K</b>	Emergency and Trauma Centre, Royal Brisbane and Women's Hospital.	Modelling Emergency Department Patient Flow under Normal Operating Conditions and in a Pandemic	Emergency Medicine Foundation Leading Edge Grant	\$95,770	2020-2022
<b>Brownlee E, Cullen L, Greenslade J, Parsonage W, Hawkins T, Foran L, et al</b>	Emergency and Trauma Centre, Royal Brisbane and Women's Hospital	Relief of chest pain in the Emergency Department (RELIEF)	Emergency Medicine Foundation Jumpstart Grant	\$36,396	2020-2022

Investigator Names	RBWH Departments / Research Groups	Research Project Title	Granting Body	Total Awarded	Year/s
<b>Bodnar D, Mitchell G, Brown NJ, Hughes J, Chu K</b>	Emergency and Trauma Centre, Royal Brisbane and Women's Hospital.	How long can a clinician wearing personal protective equipment safely work in a high-risk isolation area during one continuous shift?	RBWH & RBWH Foundation Project Grant Special Round COVID-19	\$9,823	2020
<b>Baldwin M, Rothwell S, Brown NJ, Chu K</b>	Emergency and Trauma Centre, Royal Brisbane and Women's Hospital.	Can telepresence robots enhance social distancing and maintain clinical care of undifferentiated respiratory patients isolated in one area of ED?	Emergency Medicine Foundation Special Funding Round COVID-19	\$21,425	2020

### Current RBWH Department / Research Group Led Research Activity

Lead Investigator Name	Other Study Investigators (RBWH staff in bold)	Research Project Title
<b>Daniel Bodnar</b>	Emma Bosley (QAS), Stephen Rashford (QAS), Mark Shirran (GCUH), <b>Catherine Hurn</b> , Matthew Meister, Glenn Ryan (PAH)	Queensland pre-hospital study identifying which trauma patients are at risk of bleeding to death
<b>Daniel Bodnar</b>	Zoe Stevens (UQ), Stephen Rashford (QAS), <b>Michael Handy, Sue Williams</b>	A retrospective, observational study examining the coagulation, full blood count and blood gas profiles for trauma patients receiving pre-hospital packed red blood cell transfusions
<b>Daniel Bodnar</b>	<b>Nathan Brown</b> , Stephen Rashford (QAS), Jacob Serena (UQ)	A retrospective study of the effect of pre-notification of Retrieval Services Queensland by the Queensland Ambulance Service on pre-hospital transfer times of patients with ST elevation myocardial infarctions to percutaneous coronary intervention centres
<b>Daniel Bodnar</b>	<b>Gary Mitchell, Nathan Brown, James Hughes, Kevin Chu</b>	How long can a clinician wearing personal protective equipment safely work in a high-risk isolation area during one continuous shift?
<b>Emily Brownlee</b>	<b>Louise Cullen, Jaimi Greenslade, Will Parsonage, Tracey Hawkins, Laura Foran, Elly McCormick, James Hughes, Jessica Carl, Aaron Robinson, Iliah Said</b>	Relief of chest pain in the Emergency Department (RELIEF)
<b>John Burke</b>	Gerald Fitzgerald (QUT)	Four-hour rule project - validation and impact of the four-hour rule in the ED: a large data linkage study
<b>John Burke</b>	Belinda Spratt (QUT), Paul Corry (QUT), <b>Nathan Brown, Kevin Chu</b>	Modelling emergency department patient flow under normal operating conditions and in a pandemic
<b>Kevin Chu</b>	<b>Judith Bellapart, Craig Winter, Rosalind Jeffrey, Jeffrey Lipman</b> , Jacobus Ungerer (Pathology Qld), Anita Pelecanos (QIMR Berghofer), <b>Anthony Brown, Nathan Brown</b>	Timing of lumbar puncture for the detection of xanthochromia in suspected subarachnoid haemorrhage
<b>Kevin Chu</b>	<b>Nathan Brown, James Hughes</b>	The incidence and characteristics of missed subarachnoid haemorrhage diagnosis in Queensland from 2009 to 2018
<b>Louise Cullen</b>	<b>William Parsonage</b>	Basel Syncope Evaluation Study (Basel IX)

Lead Investigator Name	Other Study Investigators (RBWH staff in bold)	Research Project Title
Louise Cullen	<b>Jaimi Greenslade (ETC), William Parsonage (Cardiology), Adam Scott (Cardiology)</b> , Jacobus Ungerer (Pathology Queensland), <b>Tracey Hawkins (ETC)</b> , Gerben Keijzers (GCUH), Julia Crilly (Griffith University), Nicholas Graves (QUT), Ariel Ho (UQ)	Examining translation of research into improved assessment for heart attack
Louise Cullen	<b>Jaimi Greenslade, William Parsonage</b> , Jacobus Ungerer (Path Qld), Carel Pretorius (Path Qld), Siegfried Perez (Logan Hospital), Gavin Fincher (TPCH), Gerben Keijzers (GCUH), Vinay Gangathimmaiah (The Townsville Hospital), Andrew Staib (PAH) Andrew Hobbins-King (SCUH)	Use of the Siemen's Atellica high sensitivity troponin assay for assessment of patients with suspected acute myocardial infarction
Jaimi Greenslade	<b>Louise Cullen (ETC), William Parsonage (RBWH Cardiology)</b> , Nicholas Graves (QUT), Siegfried Perez (Logan Hospital), Fran Kinnear (TPCH), Christian Hamilton-Craig (TPCH), Niranjan Gaikwad (TPCH), <b>Tracey Hawkins (ETC)</b>	Limit of detection in the emergency department (LEGEND) trial: a pre-post intervention trial of a clinical decision rule to rule out acute myocardial infarction
Debra Harcourt	<b>Leonie Cartlidge-Gaan (Internal Medicine), Clancy McDonald (ETC), John Burke (ETC), Anthony Nesbit (Patient Flow Unit), Amanda Dines (Executive Services)</b>	Working together to connect care: emergency department frequent presenters response project
Leonie Higgs	<b>Di Atkinson (ETC), Nathan Brown (ETC), Leanne Bennett (ETC), Dave Kramer (ETC)</b> , Greg Merlo (UQ), Linda Schnitker (QUT), <b>James Hughes (ETC)</b>	A pragmatic randomised controlled trial of the effects of therapeutic activity kits in emergency department patients with dementia and responsive behaviours
James Hughes	Anthony Nguyen (CSIRO), <b>Nathan Brown, Kevin Chu</b> , Clint Douglas (QUT/MNHHS), Lee Jones (QUT)	The application of machine and deep learning techniques to the identification of patients arriving in pain to the adult emergency department
James Hughes	Lee Jones (QUT), <b>Nathan Brown, Kevin Chu</b> , Rajeev Jarugala (TPCH), Clint Douglas (QUT/MNHHS)	A psychometric evaluation of the APS-POQ-R in acute pain presenting to the adult emergency department
James Hughes	Brendan Shultz (QAS), Vivienne Tippett (QUT)	The Influence of Prehospital Care in Emergency Department Treatment of Patients Presenting with Painful Conditions.
James Hughes	<b>Tiarne Campbell, Brodie Rostin, Jasmine Khan, Alison Bell, Iina Vuorinem, Rechel McLeish, Caitlin Parsons, Shelly Watson, Alexandra Cornell, Grace Millar, Jarrah Flemming-Gardner, Gaywin Mans, Nikesh Gopalkumar</b>	Pain assessment in the emergency department – does the documentation tool make a difference? A retrospective cohort study
Clancy McDonald	<b>James Hughes</b> , Niall Higgins (QUT/MNHHS), <b>Lisa Fawcett, Emma Grozdanovic</b>	An investigation of the educational needs of emergency department nurses in mental health nursing and evaluation of a clinical immersion program in mental health nursing or emergency department nurses.
Gary Mitchell	<b>Louise Cullen, Cliff Pollard, Nathan Brown</b> , Warwick Locke (CSIRO), Jason Ross (CSIRO), <b>Jack Taylor</b> , Fatimah Nasrallah (UQ), <b>Michael O'Sullivan</b>	The characteristics of brain-origin circulating cell-free DNA in adult emergency department patients with suspected mild traumatic brain injury
Tina Moriarty	<b>Kevin Chu, Daniel Bodnar</b>	Roll-overs in field triage (RIFT)
Mercedes Ray	<b>Julian Williams, James Hughes, Melisa Dixon, Angela Hills, Jill Duncan</b> , Jacqui Harper (Path Qld)	Identification of blood culture quality and current practices in the emergency and trauma centre
Matilda Schmidt	<b>James Hughes, Kim Lai, Julia Brownlie, Amy Arnold</b>	Identifying the Usage and Appropriateness of Anti-D Immunoglobulin in the Pregnant Female Presenting to the Emergency Department

Lead Investigator Name	Other Study Investigators (RBWH staff in bold)	Research Project Title
Julian Williams	<b>Jaimi Greenslade, Mercedes Ray, Angie Hills, Hayley Carmichael</b>	ICARUS - Intervention with Concentrated Albumin for Resuscitation of Undifferentiated Sepsis
Julian Williams	<b>James Hughes, Melisa Dixon, Angela Hills, Jill Duncan, Jacqui Harper (Path Qld), Jaimi Greenslade</b>	A prospective intervention study to improve the quality of blood cultures in the Emergency and Trauma Centre. – The Bugs in Bottles Project

### Collaborative Research Activity Involving RBWH Department / Research Group

Lead Investigator Name	Other Study Investigators (RBWH staff in bold)	Research Project Title
Elyse Button (QUT)	Joshua Byrnes (Griffith University), <b>James Hughes, Nicole Gavin, John Burke</b>	An economic evaluation of a cancer care services nurse-led model of emergent care for people with cancer
Doug Morel (Redcliffe Hospital)	<b>Kevin Chu</b>	What influences the choice made by patients between emergency department and primary healthcare for acute illness?
Nam Nguyen (Royal Adelaide Hospital)	<b>Anthony Brown</b>	The utility of the Glasgow-Blatchford score in predicting clinical outcome and stratifying the need for therapeutic intervention in hospitalised patients with upper gastrointestinal bleeding: a prospective validating study
Julia Crilly (Griffith University and GCUH)	<b>David Rosengren , Sean Rothwell , Jill Duncan , Nathan Brown</b>	Evaluating the impact of alcohol on emergency department presentations (ETOH)
Shane George (GCUH)	<b>Catherine Hurn , Anthony Holley</b>	Fibrinogen early in children with severe trauma study (FEISTY Junior)
Thomas Torpie (GCUH)	<b>James Hughes , James Ready</b>	Domestic and family violence screening in the emergency department
Richard Skoien (RBWH Gastroenterology)	<b>Anthony Brown</b>	Examination of health outcomes associated with paracentesis in patients admitted with decompensated cirrhosis
Christopher Reid (Curtin University of Technology, WA)	<b>Louise Cullen</b>	Centre for Research Excellence in Cardiovascular Outcomes Improvement
John Fraser (TPCH)	<b>Louise Cullen</b>	Cardiovascular haemodynamics in an ovine model of brain stem death
Stephen Rashford (QAS)	<b>Daniel Bodnar</b>	A prospective blinded evaluation of the sensitivity and specificity of pre-hospital Focused Abdominal Sonogram for Trauma (FAST)
Mark Cruickshank (RBWH Physiotherapy)	<b>Venkat Acholi , Janelle Heine , David Kramer</b>	Physiotherapy defined scope of practice (prescribing)
Julia Crilly (Griffith University and GCUH)	<b>Jaimi Greenslade , James Hughes</b>	Morale, stress and coping strategies of staff working in the emergency department: A national and international comparison
Kirsten Vallmuur (QUT)	<b>Nathan Brown</b>	Understanding serious quad bike-related injuries in Queensland and Northern Territory: Comparing circumstances, patterns, severity, costs and outcomes
Fran Kinnear (TPCH)	<b>Clancy McDonald, James Hughes , Amanda Petrie</b>	Impact of legislation changes to involuntary orders on emergency department presentations: a retrospective chart audit
Flavia Huygens (QUT)	<b>James Hughes , Julian Williams , Graeme Nimo</b>	Testing of InfectID® using blood samples

Lead Investigator Name	Other Study Investigators (RBWH staff in bold)	Research Project Title
Jane Nikles (UQ)	<b>Rina Savage</b>	Extracting the musculoskeletal injury data from the results of an Emergency Department intervention to optimise discharge prescribing
Ann-Maree Kelly	<b>Kevin Chu</b> , and the HEAD Study investigators.	Headache in Emergency Departments: A multinational observation study (HEAD Study)
Lucy Thomas (UQ)	<b>Kevin Chu , Andrew Wong, Ian Parker, Claire Muller</b>	Validation of a diagnostic support tool for early recognition of cervical arterial dissection in people with acute neck pain and headache in primary care

## Research Activity With a Specific Focus on First Nations People

Lead Investigator Name	Other Study Investigators (RBWH staff in bold)	Research Project Title
Katrina Starmer (Cairns Hospital)	<b>Louise Cullen, Laura Foran, Jaimi Greenslade, William Parsonage, Nathan Brown, Louise McCormack</b>	Prevalence of coronary artery disease in Aboriginal and Torres Strait Islander people presenting to the Emergency Department with suspected acute coronary syndrome
<b>Louise Cullen</b>	<b>William Parsonage, Louise McCormack</b> , Raibhan Yadav, Luke Lawton, <b>Sarah Ashover, Tanya Milburn, Laura Foran.</b>	Validation of an accelerated diagnostic protocol for Aboriginal and Torres Strait Islander patients presenting to an emergency department (ED) with suspected Acute Coronary Syndrome

## Research Publications

### Journal Articles

1. Wong A, Potter J, **Brown NJ, Chu K, Hughes JA**. Patient-Reported outcomes of pain care research in the adult emergency department: A scoping review. *Australas Emerg Care*. 2020(In Press)
2. Bulle EB, Peake SL, Finnis M, Bellomo R, Delaney A, on behalf of the **ARISE Investigators**. Time to antimicrobial therapy in septic shock patients treated with an early goal-directed resuscitation protocol: A post-hoc analysis of the ARISE trial. *Emerg Med Australas*. 2020
3. Peacock WF, Baumann BM, ... **Cullen L**, et al. Using Sex-specific Cutoffs for High-sensitivity Cardiac Troponin T to Diagnose Acute Myocardial Infarction. *Acad Emerg Med*. 2020;00:1-4
4. **Ryan K, Greenslade J, Williams J**. Examining the association between triage streamed treatment location and time to appropriate antibiotics in emergency department patients with septic shock. *Emerg Med Australas*. 2020;32(6):1008-14
5. **Greenslade JH, Parsonage W, Foran L, McCormack L, Ashover S, Milburn T, Berndt S**, Than M, Brain D, Cullen L. Widespread Introduction of a High-Sensitivity Troponin Assay: Assessing the Impact on Patients and Health Services. *Journal of Clinical Medicine*. 2020;9(6):1883
6. **Parsonage WA, Cullen L**, Brieger D, Hillis GS, Nasis A, Dwyer N, et al. CSANZ Position Statement on the Evaluation of Patients Presenting With Suspected Acute Coronary Syndromes During the COVID-19 Pandemic. *Heart Lung Circ*. 2020;29(7):e105-e110
7. **Greenslade JH**, Ho A, **Hawkins T, Parsonage W**, Crilly J, **Cullen L**. Examining the translational success of an initiative to accelerate the assessment of chest pain for patients in an Australian emergency department: a pre-post study. *BMC Health Serv Res*. 2020;20(1):419
8. Kim D-u, Park SY, Park MJ, **Brown JN, Chu K**, Lee HJ, et al. Influence of Overcrowding in the Emergency Department on Return Visit within 72 Hours. *Journal of Clinical Medicine*. 2020;9(5):1406
9. Mair J, **Cullen L**, Giannitsis E, Hammarsten O, Huber K, Jaffe A, et al. Application of the fourth universal definition of myocardial infarction in clinical practice. *Biomarkers : biochemical indicators of exposure, response, and susceptibility to chemicals*. 2020;25(4):322-30



10. **Marks J, Markwell A, Randell T, Hughes J.** Domestic and family violence, non-lethal strangulation and social work intervention in the emergency department. *Emerg Med Australas.* 2020;32(4):676-8
11. **Coombes I, Markwell A,** Kubler P, Redmond A, McGurk G, Roberts J. Editorial: Principles of ethical prescribing for self and others: hydroxychloroquine in the COVID-19 pandemic. *Australian Prescriber.* 2020;43(3):76-7
12. **Markwell A,** Mitchell R, Wright AL, **Brown AFT.** Clinical and ethical challenges for emergency departments during communicable disease outbreaks: Can lessons from Ebola Virus Disease be applied to the COVID-19 pandemic? *Emerg Med Australas.*2020;32(3):520-4
13. **Higgs L, Atkinson D, Brown NJ,** Schnitker L, Lock C, Merlo G, **Kramer D, Bennett L, Hughes JA.** The effects of therapeutic activity kits in emergency department patients with dementia: Study protocol for a pragmatic randomised control trial. *J Adv Nurs.* 2020;76(6):1449-57
14. **Williamson F, Coulthard LG, Hacking C,** Martin-Dines P. Identifying risk factors for suboptimal pelvic binder placement in major trauma. *Injury.* 2020;51(4):971-7
15. Crilly J, **Greenslade JH, Berndt S, Hawkins T, Cullen L.** Facilitators and barriers for emergency department clinicians using a rapid chest pain assessment protocol: qualitative interview research.(Report). *BMC Health Serv Res.* 2020;20(1):74
16. **Greenslade JH,** Sieben N, **Parsonage WA,** Knowlman T, Ruane L, Than M, Pickering JW, **Hawkins T, Cullen L.** Factors influencing physician risk estimates for acute cardiac events in emergency patients with suspected acute coronary syndrome.*Emerg Med J.* 2020;37(1):2
17. Luethi N, Bailey M, Higgins A, Howe B, Peake S, Delaney A, Bellomo R, on behalf of the **ARISE Investigators.** Gender differences in mortality and quality of life after septic shock: A post-hoc analysis of the ARISE study. *Journal of Critical Care.*2020;55:177-83
18. **Hughes JA, Brown NJ,** Chiu J, **Allwood B, Chu K.** The relationship between time to analgesic administration and emergency department length of stay: A retrospective review. *J Adv Nurs.* 2020;76(1):183-90
19. Munday J, Higgins N, Mathew S, Dalgleish L, Batterbury AS, Burgess L, **Campbell J,** Delaney LJ, Griffin BR, **Hughes JA,**Ingleman J, Keogh S, **Coyer F.** Nurse-Led Randomized Controlled Trials in the Perioperative Setting: A Scoping Review. *Journal of Multidisciplinary Healthcare.* 2020;13:647-60
20. Zimmermann T, du Fay de Lavallaz J, Nestelberger T, Gualandro DM, Strelbel I,...**Cullen L,** et al. Incidence, characteristics, determinants, and prognostic impact of recurrent syncope. *EP Europace.* 2020;22(12):1885-95
21. Brown SGA, Ball EL, Perrin K, Asha SE, Braithwaite I, Egerton-Warburton D, Jones PG, Keijzers G, Kinnear FB, Kwan BCH, Lam KV, Lee YCG, Nowitz M, Read CA, Simpson G, Smith JA, Summers QA, Weatherall M, Beasley R for the **PSP Investigators.** Conservative versus Interventional Treatment for Spontaneous Pneumothorax. *New England Journal of Medicine.* 2020;382(5):405-15

## Book Chapters / Letters

1. **Mitchell G.** Traumatic brain injury biomarkers glial fibrillary acidic protein/ubiquitin C-terminal hydrolase L1. In: Wu AHB, Peacock FW, editors. *Biomarkers for traumatic brain injury.* London: Academic Press; 2020. p. 183-92
2. **Brown AFT.** Anaphylaxis. In: Firth J, Conlon C, Cox T, editors. *Oxford Textbook of Medicine.* 6th ed. Oxford: Oxford University Press; 2020

## Invited Speaker

1. **Hughes JA.** Australian Institute of Digital Health Summit, Brisbane November 2020 - Invited panellist
2. **Cullen L.** Royal College of Emergency Medicine (UK), October 2020 - Virtual panel member: Shared Decision Making
3. **Cullen L.** Troponin assays in ANZ - In Practice and in Trials. CSANZ Annual Scientific Meeting, December 2020

## Oral Presentations

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1. **Wilkinson S, Greenslade J, Cullen L.** 576 What is an Acceptable Risk of a Major Adverse Cardiac Event in Chest Pain Patients Soon After Discharge From the Emergency Department: The Patient's Perspective. *Heart Lung Circ.* 2020;29:S297
  2. Singaravelu Jaganathan, Sullivan K, **Greenslade J, Lyrstedt A, Mitchell G.** A-141 An Inclusive Recruitment Strategy Can Help to Improve mTBI Research. *Archives of Clinical Neuropsychology.* 2020;35(6):934
  3. **McCormack L, Milburn T, Ashover S, Berndt S, Foran L, Cullen L.** 438 Accelerating the Care of Patients Presenting to Queensland Health EDs with Suspected ACS. *Timely Translation of Advances in Care. – The Statewide ACRE II Project.* *Heart Lung Circ.* 2020;29:S234
  4. **Hughes J, Brown N,** Vu T, Nguyen A. Towards Automatic and Interpretable Assignments of Patients Presenting with Pain to the Emergency Department. Australian Institute of Digital Health Summit; Brisbane, Australia. November, 2020
  5. **Hughes J, Brown N,** Vu T, Nguyen A. Did the patient present to the emergency department in pain? An application of machine and deep learning. Herston Healthcare Symposium; Brisbane, Australia. December, 2020
  6. **Brown NJ, Doran E, Greenslade J, Lukin B,** Cottrell N, Jaramillo F, **Coombes I, Donovan P, Cullen L.** The prevalence and characteristics of adverse drug events in adults who present to the Emergency Department. Herston Healthcare Symposium; Brisbane, Australia. December, 2020
  7. Al Marashi H, Bhuiyan K, Sankhla V, Khan L, Carroll M, Symington L, Fincher G, Grant N, Ranasinghe I, **Cullen L,** Gaikwad, N. 503 Implementation of a High Sensitivity Troponin Assay and Overnight Rapid Emergency Department (ED) Discharge of Intermediate Risk Patients: Impact on the ED Length of Stay. *Heart Lung Circ.* 2020;29:S264
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## Genetic Health Queensland

This was another productive year for research at GHQ, despite the pandemic challenges which saw recruitment rates and research sample collections slow during restrictions. Genetic Health Queensland (QLD) continued its close involvement in the Australian Genomic Health Alliance (AGHA) (a \$25 million 5-year grant from the NHMRC to prepare Australia for the Genomics Revolution in Healthcare) and have made a significant contribution to the development and success of several Australian Genomics clinical and infrastructure projects.

GHQ is participating in most AGHA rare disease and cancer flagships including ICCon hereditary cancer (Dr Helen MarFan), Cardiovascular Genetic Disorders (Co-lead: Professor Julie McGaughran), HIDDEN renal (Dr Chirag Patel), KidGen (Dr Chirag Patel), Acute Care (Dr Chirag Patel) and Genomics Autopsy (Professor McGaughran). Professor McGaughran is the state lead for the AGHA National Diagnostic and Research Network and an active member in the subprojects: National clinical consent (chair), and MSAC application pipeline. The manuscript for the sub-study 'Investigation of current models of care for genetic heart disease in Australia: A National Clinical Audit' was accepted by the International Journal of Cardiology and presented at the Herston Health Precinct Symposium. Study data also contributed to the MSAC Applications for cardiomyopathies/ Arrhythmias.

GHQ has consistently been one of the highest recruitment sites in Australia: As at January 2021 we have recruited over 329 participants for the flagships. GHQ had extensive input into the creation of the national consensus cancer gene/variant list that arose from the ICCon flagship, a significant achievement.

Professor McGaughran is involved in the Clinical Committee and Disease and Gene Selection Committee of MacKenzie's Mission - A \$20M Medical Research Future Fund (MRFF) project. The study will provide information to couples about their chance of having children with a severe childhood genetic condition. The project has now commenced at GHQ: Recruitment of QLD couples began in late 2020 with a recruitment target of 1199 couples throughout Queensland.

The WGS Program is a partnership between Metro North Hospital and Health Service (MNHHS), Pathology Queensland (PQ) and Illumina®. The Program enables the provision of whole genome sequencing testing and analysis by PQ for paediatric patients suspected of having a rare and undiagnosed disease. All patients in the Program will be referred and clinically assessed by GHQ Clinical Geneticists. Dr Patel and Professor McGaughran are the clinical leads of the Program.

GHQ is committed to improving health care access and outcomes for First Nations people and have made it a priority to be actively involved in the following research projects: Better Indigenous Genetic Health services (BIG); Achieving Equity in Genomic Health for Indigenous Australians (AEGH); and Referral Pathways: Genetic Health Services for Aboriginal and Torres Strait Islander Queenslanders'.

Lastly, the Breast Cancer Refined analysis of Sequence Tests: Risk and Penetrance (BRA STRAP) study commenced in 2020 and will provide over 1400 QLD Women affected by breast/Ovarian cancer with a new format of panel genetic testing and will lead the translation of this new test format and the genetic information generated into clinical genetics services across Australia.

### Research Grants Awarded in 2020

Investigator Names (RBWH staff in bold)	RBWH Departments / Research Groups	Research Project Title	Granting Body	Total Awarded	Year/s
<b>Prof Julie McGaughran</b>	GHQ (UQ)	The TELO-SCOPE study: Attenuating Telomere Attrition with Danazol. Is there Scope to Dramatically Improve Health Outcomes for Adults and Children with Pulmonary Fibrosis	MRFF	\$1,828,446 (all sites)	2020-2025
<b>Dr Chirag Patel</b>	GHQ (UQ)	National rapid genomic diagnosis program for critically ill children	MRFF	\$5,000,000 (all sites)	2020-2023
<b>Prof Julie McGaughran</b>	GHQ (UQ)	Genomic Health Futures Mission: Achieving Equity in Genomic Health for Indigenous Australians (AEGH)	MRFF	\$499,990	Jun 2020- Jun 2023

Investigator Names (RBWH staff in bold)	RBWH Departments / Research Groups	Research Project Title	Granting Body	Total Awarded	Year/s
Greg Pratt, <b>Prof Julie McGaughran</b> , Kelly Dingli	GHQ	Genetic Health Referral Pathways	Queensland Genomics	\$200,000	2020-2021

### Current RBWH Department / Research Group Led Research Activity

Lead Investigator Name (RBWH staff in bold)	Other Study Investigators (RBWH staff in bold)	Research Project Title	Number of Patients Recruited in 2020	Total number of Patients Recruited
<b>Prof Julie McGaughran</b>	Prof Chris Semsarian (Co lead), AGHA Flagship, <b>Linda Wornham</b> (GC), <b>Rachel Austin</b> (Coord), <b>Dr Michael Quinn</b> (PO), <b>Dr Karin Van Spaendonck-Zwarts</b>	Cardiovascular Genetic Disorders Flagship (AGHA)	63	125 (QLD)
<b>Dr Mohammad Al-Shinnag, Dr Helen MarFan</b>	Dr Jonas Bjorkman, Dr Shu Fen Lee	Association between uterine serous carcinoma and BRCA mutation (USC & BRCA)	11	28

### Collaborative Research Activity Involving RBWH Department / Research Group

Lead Investigator Name (RBWH staff in bold)	Other Study Investigators (RBWH staff in bold)	Research Project Title	Number of Patients Recruited in 2020	Total number of Patients Recruited
Prof Kathryn North	<b>Prof Julie McGaughran</b>	Australia Genomics Health Alliance (AGHA)	See responses below	
AGHA ICCOn Cancer Flagship	<b>Prof Julie McGaughran, Dr Helen Marfan, Rachel Austin, Dr Rachel Susman, Jan Wakeling (GC), Julie White (GC)</b>	AGHA: Preparing Australia for genomic medicine	23	55
A/Prof Zornitza Stark, Dr Sebastian Lunke	<b>Dr Chirag Patel, Prof Julie McGaughran, Dr Michael Quinn</b>	AGHA Acute Care flagship	15	28
Prof Hamish Scott, Assoc Prof Chris Barnett	<b>Prof Julie McGaughran, Dr Chirag Patel</b>	Genomic Autopsy AGHA Flagship	1	3
A/Prof Andrew Mallett	<b>Prof Julie McGaughran, Dr Chirag Patel</b> , AGHA Renal Flagship	Applying genomics to inherited tubulointerstitial and cystic kidney diseases in Australia (RBWH Foundation research grant)	N/A	84
A/Prof Andrew Mallett	<b>Mohammad Al-Shinnag, Helen Mar Fan, Rachel Susman</b>	Clinical audit of BHD, HLRCC and VHL at RBWH	N/A	N/A
A/Prof Andrew Mallett	AGHA Renal Flagship, <b>Dr Chirag Patel (CI), Prof Julie McGaughran (PI), Dr Lindsay Fowles (GC)</b>	KidGen – renal genetics flagship (HIDDEN)	N/A	35
Prof Ingrid Winship (Lead)	<b>Dr Rachel Susman</b>	Genetics of Sebaceous Skin Lesions Study	N/A	N/A
IMPACT (Lead by Geoffrey Lindeman)	<b>Rachel Susman</b>	Identification of Men with a genetic predisposition to ProstAte Cancer: Targeted screening in men at higher genetic risk and controls (IMPACT)	TBC	TBC

Lead Investigator Name (RBWH staff in bold)	Other Study Investigators (RBWH staff in bold)	Research Project Title	Number of Patients Recruited in 2020	Total number of Patients Recruited
kConFab (Lead by Stephen Fox)	<b>Julie McGaughran</b>	The Kathleen Cunningham National Research Consortium For Research on Familial Breast Cancer	N/A	N/A
QIMR-Berghofer (Lead by Barbara Leggett)	<b>Helen Mar Fan</b>	Identification of the Gene Causing Hereditary Flat Adenoma Syndrome (RBWH Research Foundation grant)	TBC	TBC
Prof Finlay Macrae (lead)	<b>Dr Helen Marfan (PI) Rachel Austin (CRA)</b>	A randomised double-blind dose noninferiority Trial of aspirin in Lynch syndrome. CaPP3	N/A	1
A/Prof Dan Buchanan	<b>Dr Rachel Susman, Dr Helen Marfan, Jan Wakeling, Rachel Austin, Julie White</b>	ANGELS: Applying Novel Genomic approaches to Early-onset and suspected Lynch Syndrome colorectal and endometrial Cancer	~24	51
Prof Bettina Meiser	<b>Dr Rachel Susman, Rachel Austin</b>	A qualitative study to explore patient attitudes and system enablers to establishing a national genomics registry of inherited cancer predisposition	10 health professionals	10
Prof Diane Fatkin	<b>Dr Karin van Spaendonck-Zwarts, Prof Julie McGaughran</b>	Molecular Mechanisms of Inherited Cardiomyopathies and Arrhythmias (TTNtv Penetrance study)	N/A	15
Prof Melissa Southey	<b>Dr Helen Marfan (PI) Rachel Austin (CRA)</b>	Breast Cancer Refined Analysis of Sequence Tests: Risk and Penetrance (BRASTRAP)	1485	1485
A/Prof Andrew Mallett	<b>Dr Chirag Patel (working group), Dr Lindsay Fowles (working group)</b>	Statewide Renal Clinical Network Genomics Education Project	N/A	N/A
Prof Martin Delatycki, Prof Edwin Kirk, Prof Nigel Laing	<b>Prof Julie McGaughran (site PI), Camron Ebzery (GC)</b>	Genomic Health Futures Mission: McKenzie's Mission	~3	5

### Research Activity with a Specific Focus on First Nations People

Lead Investigator Name (RBWH staff in bold)	Other Study Investigators (RBWH staff in bold)	Research Project Title	Number of Patients Recruited in 2020	Total number of Patients Recruited
BIG project team - Prof Margaret Kelaher (Lead)	<b>Prof Julie McGaughran (PI), Julie White, Rachel Austin (CRA)</b>	Better Indigenous Genetic (BIG) Health Services	Recruitment complete in 2019	247 (Audit)
Prof Margaret Kelaher	<b>Prof Julie McGaughran</b>	Genomic Health Futures Mission: Achieving Equity in Genomic Health for Indigenous Australians (AEGH)	0	pending
Greg Pratt	<b>Prof Julie McGaughran</b> Kelly Dingli, Victoria Donoghue	Genetic Health Referral Pathways	0	3 workshop participants

## Research Publications

### Journal Articles

1. Scott, H, **Marfan, H, Susman, R.** RUNX1 mutated families show phenotype heterogeneity and a somatic mutation profile unique to germline predisposed AML. *Blood Advances*
2. Meiser B, Kaur R, Kirk J, Morrow A, Peate M, Wong WKT, McPike E, Cops E, Dowson C, **Austin R**, Fine M, Thrupp L, Ward R, Macrae F, Hiller JE, Trainer AH, Mitchell G; ICCon Audit Study Collaborative Group. Evaluation of implementation of risk management guidelines for carriers of pathogenic variants in mismatch repair genes: a nationwide audit of familial cancer clinics. *Fam Cancer*. 2020 Oct;19(4):337-346. doi: 10.1007/s10689-020-00183-4. PMID: 32385704
3. Gale DP, Mallett A, **Patel C**, Sneddon TP, Rehm HL, Sampson MG, Bockenbauer D. Diagnoses of uncertain significance: kidney genetics in the 21st century. *Nat Rev Nephrol*. 2020 Nov;16(11):616-618. doi: 10.1038/s41581-020-0277-6. PMID: 32265521
4. Hudson R, **Patel C**, Hawley CM, O'Shea S, Snelling P, Ho G, Holman K, Bennetts B, Crawford J, Francis L, Simons C, Mallett A. Adult-Diagnosed Nonsyndromic Nephronophthisis in Australian Families Caused by Biallelic NPHP4 Variants. *Am J Kidney Dis*. 2020 Aug;76(2):282-287. doi: 10.1053/j.ajkd.2019.08.031. Epub 2019 Dec 4. PMID: 31810733\*
5. Nisselle A, Martyn M, Jordan H, Kaunein N, McEwen A, **Patel C**, Terrill B, Bishop M, Metcalfe S, Gaff C. Ensuring Best Practice in Genomic Education and Evaluation: A Program Logic Approach. *Front Genet*. 2019 Nov 8;10:1057. doi: 10.3389/fgene.2019.01057. PMID: 31781158; PMCID: PMC6857516\*
6. Kumuthini J, van Woerden C, Mallett A, Zass L, Chaouch M, Thompson M, Johnston K, Mbiyavanga M, Baichoo S, Mungloo-Dilmohamud Z, **Patel C**, Mulder N. Proposed minimum information guideline for kidney disease-research and clinical data reporting: a cross-sectional study. *BMJ Open*. 2019 Nov 26;9(11):e029539. doi: 10.1136/bmjopen-2019-029539. PMID: 31772086; PMCID: PMC6887010\*
7. Sekiguchi F, Tsurusaki Y, Okamoto N...**Patel C**, et al. Genetic abnormalities in a large cohort of Coffin-Siris syndrome patients. *J Hum Genet*. 2019 Dec;64(12):1173-1186. doi: 10.1038/s10038-019-0667-4. Epub 2019 Sep 17. PMID: 31530938\*
8. Gleeson M, Kentwell M, Meiser B, Do J, Nevin S, Taylor N, Barlow-Stewart K, Kirk J, James P, Scott CL, Williams R, Gamet K, Burke J, Murphy M, Antill YC, Pearn A, Pachter N, **Ebzerly C**, Poplawski N, Friedlander M, Tucker KM; Australian Genetic Testing Mainstreaming Collaborative Group. The development and evaluation of a nationwide training program for oncology health professionals in the provision of genetic testing for ovarian cancer patients. *Gynecol Oncol*. 2020 Aug;158(2):431-439. doi: 10.1016/j.ygyno.2020.05.001. Epub 2020 May 22. PMID: 32451123
9. Huynh VT, Audrézet MP, Sayer JA, Ong AC, Lefevre S, Le Brun V, Després A, Senum SR, Chebib FT, Barroso-Gil M, **Patel C**, Mallett AJ, Goel H, Mallawaarachchi AC, Van Eerde AM, Ponlot E, Kribs M; Genkyst Study Group, Genomics England Research Consortium, Le Meur Y, Harris PC, Cornec-Le Gall E. Clinical spectrum, prognosis and estimated prevalence of DNAJB11-kidney disease. *Kidney Int*. 2020 Aug;98(2):476-487. doi: 10.1016/j.kint.2020.02.022. Epub 2020 Mar 23. PMID: 32631624
10. Australian Genomics Health Alliance Acute Care Flagship, Lunke S, Eggers S, Wilson M, **Patel C**, Barnett CP, Pinner J, Sandaradura SA, Buckley MF, Krzesinski EI, de Silva MG, Brett GR, Boggs K, Mowat D, Kirk EP, Adès LC, Akesson LS, Amor DJ, Ayres S, Baxendale A, Borrie S, Bray A, Brown NJ, Chan CY, Chong B, Cliffe C, Delatycki MB, Edwards M, Elakis G, Fahey MC, Fennell A, **Fowles L**, Gallacher L, **Higgins M**, Howell KB, **Hunt L**, Hunter MF, Jones KJ, King S, Kumble S, Lang S, Le Moing M, Ma A, Phelan D, **Quinn MCJ**, Richards A, Richmond CM, Riseley J, **Rodgers J**, Sachdev R, Sadedin S, Schlapbach LJ, Smith J, Springer A, Tan NB, Tan TY, Temple SL, Theda C, Vasudevan A, White SM, Yeung A, Zhu Y, Martyn M, Best S, Roscioli T, Christodoulou J, Stark Z. Feasibility of Ultra-Rapid Exome Sequencing in Critically Ill Infants and Children With Suspected Monogenic Conditions in the Australian Public Health Care System. *JAMA*. 2020 Jun 23;323(24):2503-2511. doi: 10.1001/jama.2020.7671. PMID: 32573669; PMCID: PMC7312414
11. Kirk EP, Ong R, Boggs K, Hardy T, Righetti S, Kamien B...**McGaughran J** et al. Gene selection for the Australian Reproductive Genetic Carrier Screening Project ("Mackenzie's Mission"). *European journal of human genetics: EJHG*. 2020

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12. Pennings M, Schouten MI, van Gaalen J, Meijer RPP, de Bot ST, Kriek M, Saris CGJ, van den Berg LH, van Es MA, Zuidgeest DMH, Elting MW, van de Kamp JM, **van Spaendonck-Zwarts KY**, Die-Smulders C, Brilstra EH, Verschuuren CC, de Vries BBA, Bruijn J, Sofou K, Duijkers FA, Jaeger B, Schieving JH, van de Warrenburg BP, Kamsteeg EJ. KIF1A variants are a frequent cause of autosomal dominant hereditary spastic paraplegia. *Eur J Hum Genet.* 2020 Jan;28(1):40-49. doi: 10.1038/s41431-019-0497-z. Epub 2019 Sep 5. PMID: 31488895; PMCID: PMC6906463
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13. Dorsch LM, Kuster DWD, Jongbloed JDH, Boven LG, **van Spaendonck-Zwarts KY**, Suurmeijer AJH, Vink A, du Marchie Sarvaas GJ, van den Berg MP, van der Velden J, Brundel BJJM, van der Zwaag PA. The effect of tropomyosin variants on cardiomyocyte function and structure that underlie different clinical cardiomyopathy phenotypes. *Int J Cardiol.* 2021 Jan 15;323:251-258. doi: 10.1016/j.ijcard.2020.08.101. Epub 2020 Sep 1. PMID: 32882290
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14. Sliwa K, Petrie MC, van der Meer P, Mebazaa A, Hilfiker-Kleiner D, Jackson AM, Maggioni AP, Laroche C, Regitz-Zagrosek V, Schaufelberger M, Tavazzi L, Roos-Hesselink JW, Seferovic P, **van Spaendonck-Zwarts K**, Mbakwem A, Böhm M, Mouquet F, Pieske B, Johnson MR, Hamdan R, Ponikowski P, Van Veldhuisen DJ, McMurray JJV, Bauersachs J. Clinical presentation, management, and 6-month outcomes in women with peripartum cardiomyopathy: an ESC EORP registry. *Eur Heart J.* 2020 Oct 14;41(39):3787-3797. doi: 10.1093/eurheartj/ehaa455. PMID: 32840318
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15. Ravenscroft G, Clayton JS, Faiz F, Sivadurai P, **Milnes D**, Cincotta R, Moon P, Kamien B, Edwards M, Delatycki M, Lamont PJ, Chan SH, Colley A, Ma A, Collins F, Hennington L, Zhao T, McGillivray G, Ghedia S, Chao K, O'Donnell-Luria A, Laing NG, Davis MR. Neurogenetic fetal akinesia and arthrogryposis: genetics, expanding genotype-phenotypes and functional genomics. *J Med Genet.* 2020 Oct 15:jmedgenet-2020-106901. doi: 10.1136/jmedgenet-2020-106901. Epub ahead of print. PMID: 33060286
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16. Tudini E, Davidson AL, Dressel U, Andrews L, Antill Y, Crook A, Field M, **Gattas M**, Harris R, Kirk J, Pachter N, Salmon L, **Susman R**, Townshend S, Trainer AH, Tucker KM, Mitchell G, James PA, Ward RL, **Mar Fan H**, Poplawski NK, Spurdle AB. Implementing gene curation for hereditary cancer susceptibility in Australia: achieving consensus on genes with clinical utility. *J Med Genet.* 2020 Nov 9:jmedgenet-2020-107140. doi: 10.1136/jmedgenet-2020-107140. Epub ahead of print. PMID: 33168572
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17. "The International Mismatch Repair consortium" (**Susman R, Austin R**) Variation in the risk of Colorectal Cancer for Lynch Syndrome. The International Mismatch Repair Consortium. Submitted to *Lancet Oncology*, Dec 2020
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18. Gately R, Lock G, **Patel C**, Clouston J, Hawley C, Mallett A. Multiple Cerebral Aneurysms in an Adult With Autosomal Recessive Polycystic Kidney Disease. *Kidney Int Rep.* 2020;6(1):219-223. Published 2020 Oct 22 doi:10.1016/j.ekir.2020.10.001
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19. Stamberger H, ...**Patel C**, et al. NEXMIF encephalopathy: an X-linked disorder with male and female phenotypic patterns. *Genet Med.* 2020 Nov 4. doi: 10.1038/s41436-020-00988-9. Epub ahead of print. PMID: 33144681
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20. Ebrahimi-Fakhari D...**Patel C** et al. Defining the clinical, molecular and imaging spectrum of adaptor protein complex 4-associated hereditary spastic paraplegia, *Brain*, Volume 143, Issue 10, October 2020, Pages 2929–2944, <https://doi.org/10.1093/brain/awz307>
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21. Wilson GJ, Wood S, **Patel C**, Oliver K, John G, Ranganathan D, Mallett A, Isbel N. *DNAJB11*-Related Atypical ADPKD in a Kidney Transplant Donor. *Kidney Int Rep.* 2020 Jun 2;5(8):1363-1366. doi: 10.1016/j.ekir.2020.05.022. PMID: 32775842; PMCID: PMC7403562
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22. Brett GR, Martyn M, Lynch F, de Silva MG, Ayres S, Gallacher L, Boggs K, Baxendale A, Schenscher S, King-Smith S, **Fowles L**, Springer A, Lunke S, Vasudevan A, Krzesinski E, Pinner J, Sandaradura SA, Barnett C, **Patel C**, Wilson M, Stark Z. Parental experiences of ultrarapid genomic testing for their critically unwell infants and children. *Genet Med.* 2020 Dec;22(12):1976-1985. doi: 10.1038/s41436-020-0912-4. Epub 2020 Jul 28. PMID: 32719395
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23. Hagen CM, Elson JL, Hedley PL, Aidt FH, Havndrup O, Jensen MK, Kanters JK, Atherton JJ, **McGaughran J**, Bundgaard H, Christiansen M. Evolutionary dissection of mtDNA hg H: a susceptibility factor for hypertrophic cardiomyopathy. *Mitochondrial DNA A DNA Mapp Seq Anal.* 2020 Aug;31(6):238-244. doi: 10.1080/24701394.2020.1782897. Epub 2020 Jun 30
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24. Thai MHN, Gardner A, Redpath L, Mattiske T, Dearsley O, Shaw M, Vulto-van Silfhout AT, Pfundt R, Dixon J, **McGaughran J**, Pérez-Jurado LA, Géczi J, Shoubridge C. Constraint and conservation of paired-type homeodomains predicts the clinical outcome of missense variants of uncertain significance. *Hum Mutat.* 2020 Aug;41(8):1407-1424. doi: 10.1002/humu.24034. Epub 2020 Jun 2
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## Book Chapters / Letters

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1. Jansweijer J, Hershberger R, **Van Spaendonck-Zwarts KY**. (2020) 'Dilated Cardiomyopathy' in *Clinical Cardiogenetics*. 3<sup>rd</sup> ed
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## Conference Presentations – Invited Speaker, Oral and Poster

### Invited Speaker

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1. Fowles L. Genetic Counselling: The not, what, why and where. Southern Cross University, 2020
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### Oral Presentations

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1. Meiser B...**MarFan M**. Pilot study of an online training intervention to increase genetic literacy and communication skills in oncology healthcare professionals discussing genetic testing with breast and ovarian cancer patients. COSA Annual Scientific Meeting (Virtual), 2020
  2. **Ebzero C**. Mainstreaming Genetic Testing. COSA Annual Scientific Meeting (Virtual), 2020
  3. **Ebzero C, Crowe K, MarFan, H, Susman R, McGaughran J**. Telehealth and Cancer Genetic Counselling, the Queensland Experience. COSA Annual Scientific Meeting (Virtual), 2020
  4. Meiser B...**Ebzero C**. The development and evaluation of a nationwide training program for oncology health professionals in the provision of genetic testing for ovarian cancer patients. COSA Annual Scientific Meeting (Virtual), 2020
  5. **Austin R, Quinn M**, Afoakwah C, Metke-Jimenez A, Leroux H, **Atherton J**, Brown J, **Wornham L**, Macciocca I, de Silva M, Thompson T, Martin E, Hilton D, Devery S, Wu K, Jackson M, Correnti G, Overkov A, Elbracht-Leong S, Ingles J, Scuffham P, Semsarian C, **McGaughran J**. Investigation of current models of care for genetic heart disease in Australia: A national clinical audit. Herston Health Precinct Symposium 2020. Herston, Brisbane
  6. **McGaughran, J**. The Heart of the Matter; AGHA Cardiovascular Flagship. Herston Health Precinct Symposium 2020. Herston, Brisbane
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### Poster Presentations

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1. **Austin R, Quinn M**, Afoakwah C, Metke-Jimenez A, Leroux H, **Atherton J**, Brown J, **Wornham L**, Macciocca I, de Silva M, Thompson T, Martin E, Hilton D, Devery S, Wu K, Jackson M, Correnti G, Overkov A, Elbracht-Leong S, Ingles J, Scuffham P, Semsarian C, **McGaughran J**. Investigation of current models of care for genetic heart disease in Australia: A national clinical audit. Herston Health Precinct Symposium 2020. Herston, Brisbane
  2. Isbister J, Yeates L, Hunyor I, **McGaughran J**, Semsarian C, Skinner J, PERTH AUTHORS, van **Spaendonck-Zwarts K**, Raju H, Ingles J. Seek and You Shall Find: A Case Highlighting the Importance of Multisystem Assessment in Arrhythmogenic Cardiomyopathy. CSANZ 2020 Meeting
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## Hyperbaric Medicine Service

RBWH has participated in the development of a national data registry for outcomes associated with practice. The RBWH Hyperbaric Medicine Service researched and developed a novel use of the Amron Oxygen Treatment Hood as a secretion containing, high flow oxygen hood as part of the health response to COVID-19 at the RBWH. Dr Sherlock led the Development a protocol for a multi-centred single blinded RCT to study the effectiveness of hyperbaric oxygen therapy in the treatment of Idiopathic Sudden Sensorineural Hearing Loss. Ongoing research into treatment tables and CNS oxygen toxicity, haemorrhagic radiation cystitis and the nature and management of carbon monoxide poisoning at the RBWH

### Current RBWH Department / Research Group Led Research Activity

Lead Investigator Name (RBWH staff in bold)	Other Study Investigators (RBWH staff in bold)	Research Project Title	Number of Patients Recruited in 2020	Total number of Patients Recruited
<b>Dr David Kramer</b>		The nature of and management of Carbon Monoxide poisoning presentations at the RBWH		
Dr Adam Storey, Dr Kenneth Thistlethwaite, Dr Meg O'Connell		A proposal for a novel use of the Amron Oxygen Treatment Hood as part of the health response to COVID-19 at the RBWH		
Dr Susannah Sherlock	Dr Sharon Kelly, Dr David Kramer, Dr Robert Webb, Dr Kenneth Thistlethwaite, Dr Adam Storey, Dr Neil Banham, Dr David Cooper, Dr Michael Bennett, Dr Alexis Tabah, Ms Carla Rose, Ms Mandy Way	Steroids and Hyperbaric Oxygen for Sudden Sensorineural Hearing Loss (SHOOSH): a randomised controlled trial		
Dr Yena Hwang		A retrospective audit of outcomes for the treatment of haemorrhagic radiation cystitis and hyperbaric oxygen therapy		

## Intensive Care Services

The RBWH ICU has a well-established research program, boasting an international profile. During 2020, the department generated 72 publications in peer reviewed journals. There are 24 studies active. A further 4 studies are pending approval and will commence in 2021. Further, the department was honoured with several awards both nationally and internationally recognised.

Professor Lipman was honoured twice this year, receiving a member of the Order of Australia (AM) in the Queen's Birthday Awards and Honorary Membership of the European Society of Intensive Care Medicine (ESICM) for his achievements in medicine, science and research.

Further Associate Professor Mark Mattiussi in conjunction with the research office was awarded second prize in the Medical Journal of Australia's annual Christmas competition for their research into the mystery of disappearing communal kitchen cutlery.

Professor Kevin Laupland (QUT) has consolidated his position as Director of the RBWH Intensive Care Research Program. Prof Laupland is working on collaborative partnerships within Australia and internationally. He was awarded his PhD by Griffith University.

Dr George Pang has developed 3D printed models for medical training and education. This is an exciting new area of academic endeavour and has led to several publications and potentially a novel program of research.

Dr Jayesh Dhanani was awarded a Metro North Research Scholarship and has continued his post-doctoral work in nebulised pharmaceuticals.

The department continues to lead in the area of PK/PD pharmaceutical research. Professor Jeffrey Lipman is the lead investigator of the Bling III trial that continues to recruit strongly.

Dr Judith Bellapart has collaborated with national and international investigators to further neurocritical care research. Two large multicentre Trials "SAHARA" and "BONANZA" will commence late in 2020.

Associate Professor Jeremy Cohen has been active in sepsis and steroid research.

Dr Anthony Holley is continuing his PhD in Burns / Trauma and achieved co-authorship of a multicentre trial investigating IVC Filters, published in the NEJM.

Professor Michael Reade continues his research in collaboration with the Australian Defence Force, focusing on sedation in critical care and blood products.

A Research Steering Committee was convened in late 2018 to oversee the strategic direction of the research program and provide financial stewardship. A major challenge has been the funding of research given the competition for grants and the retreat of pharmaceutical companies relative to previous generous funding of drug trials. The department is looking to innovative funding sources, including philanthropy and profits from hosting educational courses directed toward future research endeavours. The RBWH Research Program is looking to diversify themes of research, while leveraging existing expertise. International consortiums with North American, Asian and European centres will provide scale and capability to produce world-leading research into the future.

## Research Awards and Achievements

Recipient (RBWH staff in bold)	Award	Event
<b>Professor Kevin Laupland</b>	Top 0.025% sepsis and 0.018% bacteremia (rank 10 <sup>th</sup> worldwide) researcher in the world	ExpertScape ( <a href="https://expertscape.com/ex/sepsis">https://expertscape.com/ex/sepsis</a> )
<b>Professor Jeffrey Lipman</b>	Member of the Order of Australia	Queen's Birthday Honours List
<b>Professor Jeffrey Lipman</b>	2020 Honorary Membership of European Society of Intensive Care Medicine	

## Research Grants Awarded in 2020

Investigator Names (RBWH staff in bold)	RBWH Departments / Research Groups	Research Project Title	Granting Body	Total Awarded	Year/s
Nasrallah F, Reutens D, Chandra SS, Walsham J, Russell T, Bhuta S, Ross JP, <b>Winter C</b> , Senthuran S, <b>Bellapart J, Reade MC</b>	Intensive Care, Neurosurgery	PREdiction and Diagnosis using Imaging and Clinical biomarkers Trial in Traumatic Brain Injury: the value of Magnetic Resonance Imaging (PREDICT-TBI)	Medical Research Future Fund Project Grant	A\$1.765 million	2020-2023
Philip I, Bell S, Kraus C, Hsu H, <b>Laupland KB</b> , Cook D	Intensive Care Services	Preventing the respiratory failure causing COVID-19 mortality, potent new drugs targeting hyperinflammation	Queensland Industry Research Fellowship	\$150,000	2020
<b>Laupland KB, Roberts J, Reade M, Stewart A</b>	Intensive Care Services	Use of therapeutic drug monitoring (TDM) to optimise oral/enteral hydroxychloroquine dosing in critically ill patients with COVID-19	Medical Research Future Fund	\$170,020	2020-2021
<b>Laupland KB</b>	Intensive Care Services	Optimising utilisation and outcomes of critical illness: A multicentred, interdisciplinary collaborative in South East Queensland	Brisbane Diamantia Health Partners	\$17,200	2020-2021

## Current RBWH Department / Research Group Led Research Activity

Lead Investigator Name (RBWH staff in bold)	Other Study Investigators (RBWH staff in bold)	Research Project Title	Number of Patients Recruited in 2020	Total number of Patients Recruited
<b>Dhanani J</b>	<b>Reade MC</b>	Innovation in delirium management: Comparative plasma pharmacokinetics of nebulised and intravenous clonidine in mechanically ventilated patients	0	0
<b>Reade MC</b>	Marks D, Weinberg L, Irving D, McQuilten Z, French C, Royse A, Bannon P, Johnson L, Gattas D	A phase III multicentre blinded randomised controlled clinical trial of cryopreserved platelets vs. conventional liquid-stored platelets for the management of post-surgical bleeding (The Cryopreserved vs. Liquid Platelets trial: CLIP-II)	0	0
<b>Liu D</b>	Pincus J, Hallt E, <b>Reade MC</b>	Clonidine at Low dOsage postoperatively to Nocturnally Enhance Sleep (CLONES) phase II pilot trial	83	83
<b>Seymour, M.</b>	<b>Reade MC</b> , Lipman J, Wallis S, Gruen RL	Tranexamic acid blood levels in patients achieved using CRASH-2 dosing: the PATCH-LEVELS study	200	200
<b>Lipman J</b>	Abdul-Aziz H, <b>Dhanani J, Fourie C, Roberts J</b>	Developing evidence-based antibiotic dosing guidelines during extracorporeal therapies using advanced pharmacometric methods: pharmacokinetics of cefepime, ceftriaxone and ceftolozane / tazobactam during extracorporeal membrane oxygenation (ECMO) and/or renal replacement therapy (RRT)	0	0

Lead Investigator Name (RBWH staff in bold)	Other Study Investigators (RBWH staff in bold)	Research Project Title	Number of Patients Recruited in 2020	Total number of Patients Recruited
<b>Lipman J</b>	<b>Roberts J</b> , Myburgh J, Peake S, <b>Dulhunty J</b> , <b>Paterson D</b> , McGuinness S, Rhodes A, de Waele J, Finfer S	BLING III: A phase III randomised controlled trial of continuous beta-lactam infusion compared with intermittent betalactam dosing in critically ill patients	4500	7000
<b>Lipman J</b>	<b>Marianne Kirrane</b> - Multiple external sites	BLING III Study	48	194
<b>Lipman J</b>	<b>Prof Jason Roberts, Dr Jayesh Dhanani</b> , Prof Andrew Udy, Dr Cornelia Landersdorfer, Prof Jan De Waele, Prof Jean-Yves Lefrant, Dr Claire Roger, Dr Lowell Ling, Dr Hafiz Abdul-Aziz, Dr Helmi Sulaiman, <b>Cheryl Fourie, Janine Stuart</b>	PNEUDOS Study	4	4
<b>Lipman J</b>	<b>Prof Jason Roberts, Dr Patrick Harris</b> , Dr Peter Kruger, Prof Luregn Schlapbach, Dr Kieran Shekar, <b>Prof David Paterson, Dr Krispin Hajkowicz</b>	DIRECT Study	28	

### Collaborative Research Activity Involving RBWH Department / Research Group

Lead Investigator Name (RBWH staff in bold)	Other Study Investigators (RBWH staff in bold)	Research Project Title	Number of Patients Recruited in 2020	Total number of Patients Recruited
Assoc Prof. Jeremy Cohen	James Walsham, Bala Venkatesh	FLUDRESS		
Assoc Prof. Jeremy Cohen	Simon Finfer, Richard Hotchkiss, James Walsham	PIVOTAL		
Assoc Prof. Jeremy Cohen	Bala Venkatesh, Simon Finfer, Djillali Annane	Steroid IPDMA		
Shehabi Y	<b>Reade MC</b> , Campbell L, Howe B, Webb S, Bellomo R, McArthur C, Presneill J, Hodgson C, Bailey M, Murray L	Early Sedation with Dexmedetomidine in Older Ventilated Critically Ill Patients: SPICE IV Trial.	0	0
Wood E	McQuilten Z, Cooper J, <b>Reade MC</b> , French CJ, Trotman J, Bielby L, Stanworth S, Higgins A, Harris A, Coiera E, Mo A, Flint A, Sanderson B, Reynolds J, Sparrow R, Nailon S, Martin A	Addressing Australia's National Transfusion Research Priorities	NA	NA
French C	Nichol A, Bellomo R, Cooper DJ, Bailey M, Higgins A, McArthur C, Hodgson C, Gabbe B, Duranteau J, Presneill J, Rosenfeld J, Napolitano L, Skrifvars M, <b>Reade MC</b> , Pettila V	ErythroPOietin alfa to prevent mortality and reduce severe disability in critically ill TRAUMA patients: a multicentre, stratified, double blind, placebo randomised controlled trial. (The EPO-TRAUMA trial)	7	7
Bernard S	Mitra B, Gruen R, Gantner D, <b>Reade MC</b> , Burns B, Balogh Z	Pre-hospital anti-fibrinolytics for traumatic coagulopathy and haemorrhage-2 (The PATCH2 Study)	200	1150

Lead Investigator Name (RBWH staff in bold)	Other Study Investigators (RBWH staff in bold)	Research Project Title	Number of Patients Recruited in 2020	Total number of Patients Recruited
Dr Marianne Kirrane	A/Prof Clair Sullivan, Dr David Forrestal, Dr Simon Bugden, Dr Michael Wagels	COVID19 Personal Protective Equipment Manufacturing Project, Herston Biofabrication Institute	N/A	N/A
<b>Laupland KB</b>	<b>Lipman J, Fourie C</b> , Tabah A, Stelfox T, Lefrant JY, Joynt G, Seoane L	Physician attire in the intensive care unit and family perceptions: An international study	38	38

## Research Publications

### Journal Articles

- Denny KJ, De Waele J, **Laupland KB**, Harris PNA, **Lipman J**. When Not to Start Antibiotics: Avoiding Antibiotic Overuse in the Intensive Care Unit. *Clin Microbiol Infect*. 2020 Jan;26(1):35-40
- Pandey S, **Dhanani J, Lipman J, Roberts JA**, Wallis SC, Parker SL. Development and validation of LC-MS/MS methods to measure tobramycin and lincomycin in plasma, microdialysis fluid and urine: application to a pilot pharmacokinetic research study. *Clin Chem Lab Med*. 2020;58(2):274-284
- Lonsdale DO, **Lipman J, Livermore A**, McWhinney B, Ungerer JPJ, **Roberts JA**. Amoxicillin-Clavulanate Dosing in the Intensive Care Unit: The Additive Effect of Renal Replacement Therapy in a Patient with Normal Kidney Function. *Chemotherapy*. 2019;64(4):173-176
- Roberts LW, Harris PNA, Forde BM, Ben Zakour NL, Catchpoole E, Stanton-Cook M, Phan MD, Sidjabat HE, Bergh H, Heney C, Gawthorne JA, **Lipman J**, Allworth A, Chan KG, Chong TM, Yin WF, Schembri MA, Paterson DL, Beatson SA. Integrating multiple genomic technologies to investigate an outbreak of carbapenemase-producing *Enterobacter hormaechei*. *Nat Commun*. 2020 Jan 24;11(1):466
- Arulkumaran N, Routledge M, Schlebusch S, **Lipman J**, Conway Morris A. Antimicrobial-associated harm in critical care: a narrative review. *Intensive Care Med*. 2020 Feb;46(2):225-235
- Koulenti D, Xu E, Mok IYS, Song A, Karageorgopoulos DE, Armaganidis A, **Lipman J**, Tsiodras S. Novel Antibiotics for Multidrug-Resistant Gram-Positive Microorganisms. *Microorganisms*. 2019 Aug 18;7(8):270
- Koulenti D, Arvaniti K, Judd M, Lalos N, Tjoeng I, Xu E, Armaganidis A, **Lipman J**. Ventilator-Associated Tracheobronchitis: To Treat or Not to Treat? *Antibiotics (Basel)*. 2020 Jan 31;9(2):51
- Pang G, Futter C, Pincus J, Dhanani J, Laupland KB**. Development and testing of a low cost simulation manikin for extracorporeal cardiopulmonary resuscitation (ECPR) using 3-dimensional printing. *Resuscitation*. 2020 Apr;149:24-29
- Jager NGL, van Hest RM, Xie J, Wong G, Uildemolins M, Brüggemann RJM, **Lipman J, Roberts JA**. Optimization of flucloxacillin dosing regimens in critically ill patients using population pharmacokinetic modelling of total and unbound concentrations. *J Antimicrob Chemother*. 2020 Sep 1;75(9):2641-2649
- Laupland KB**, Leal JR. Defining microbial invasion of the bloodstream: a structured review. *Infect Dis (Lond)*. 2020 Jun;52(6):391-395
- Timsit JF, **Lipman J**, Bassetti M. Antimicrobial de-escalation is part of appropriate antibiotic usage in ICU. *Intensive Care Med*. 2020 May;46(5):1039-104
- Liu J, Neely M, **Lipman J**, Sime F, **Roberts JA**, Kiel PJ, Avedissian SN, Rhodes NJ, Scheetz MH. Development of Population and Bayesian Models for Applied Use in Patients Receiving Cefepime. *Clin Pharmacokinet*. 2020 Aug;59(8):1027-1036
- Holley A, Cohen J, Reade M, Laupland KB, Lipman J**. New guidelines for the management of severe thermal burns in the acute phase in adults and children: Is it time for a global surviving burn injury campaign (SBIC)? *Anaesth Crit Care Pain Med*. 2020 Apr;39(2):195-196

14. Warrillow S, Austin D, Cheung W, Close E, **Holley A**, Horgan B, Jansen M, Joynt G, Lister P, Moodie S, Nichol A, Nicholls M, Peake S, Skowronski G, Streat S, White B, Willmott L. ANZICS guiding principles for complex decision making during the COVID-19 pandemic. *Crit Care Resusc.* 2020 Apr 15;22(2):98-102
15. Litton E, Bucci T, Chavan S, Ho YY, **Holley A**, Howard G, Huckson S, Kwong P, Millar J, Nguyen N, Secombe P, Ziegenfuss M, Pilcher D. Surge capacity of intensive care units in case of acute increase in demand caused by COVID-19 in Australia. *Med J Aust.* 2020 Jun;212(10):463-467
16. **Holley AD, Reade MC, Lipman J, Cohen J.** There is no fire without smoke! Pathophysiology and treatment of inhalational injury in burns: A narrative review. *Anaesth Intensive Care.* 2020 Mar;48(2):114-122
17. Dhaese S, Heffernan A, Liu D, Abdul-Aziz MH, Stove V, Tam VH, **Lipman J, Roberts JA**, De Waele JJ. Prolonged Versus Intermittent Infusion of  $\beta$ -Lactam Antibiotics: A Systematic Review and Meta-Regression of Bacterial Killing in Preclinical Infection Models. *Clin Pharmacokinet.* 2020 Oct;59(10):1237-1250
18. Fujii M, Karumai T, Yamamoto R, Kobayashi E, Ogawa K, Tounai M, **Lipman J**, Hayashi Y. Pharmacokinetic and pharmacodynamic considerations in antimicrobial therapy for sepsis. *Expert Opin Drug Metab Toxicol.* 2020 May;16(5):415-430
19. Ling L, Joynt GM, **Lipman J**, Constantin JM, Joannes-Boyau O. COVID-19: A critical care perspective informed by lessons learnt from other viral epidemics. *Anaesth Crit Care Pain Med.* 2020 Apr;39(2):163-166
20. Ates HC, Roberts JA, **Lipman J**, Cass AEG, Urban GA, Dincer C. On-Site Therapeutic Drug Monitoring. *Trends Biotechnol.* 2020 Nov;38(11):1262-1277
21. Hamilton R, Kleinpell R, **Lipman J**, Davidson JE. International facilitators and barriers to family engagement in the ICU: Results of a qualitative analysis. *J Crit Care.* 2020 Aug;58:72-77
22. Eley VA, Christensen R, Ryan R, Jackson D, Parker SL, Smith M, van Zundert AA, Wallis SC, **Lipman J, Roberts JA.** Prophylactic Cefazolin Dosing in Women With Body Mass Index  $>35 \text{ kg} \cdot \text{m}^{-2}$  Undergoing Cesarean Delivery: A Pharmacokinetic Study of Plasma and Interstitial Fluid. *Anesth Analg.* 2020 Jul;131(1):199-207
23. Xie J, **Roberts JA, Lipman J**, Cai Y, Wang H, Zhao N, Xu X, Yang S, Li Y, Zhang K. Pharmacokinetic/pharmacodynamic adequacy of polymyxin B against extensively drug-resistant Gram-negative bacteria in critically ill, general ward and cystic fibrosis patient populations. *Int J Antimicrob Agents.* 2020 Jun;55(6):105943
24. **Buda G**, Lukoševičiūtė J, Šalčiūnaitė L, Šmigelskas K. Possible Effects of Social Media Use on Adolescent Health Behaviors and Perceptions. *Psychol Rep.* 2020 May;33294120922481
25. Heffernan AJ, Sime FB, Sun J, **Lipman J**, Kumar A, Andrews K, Ellwood D, Grimwood K, **Roberts J.**  $\beta$ -lactam antibiotic versus combined  $\beta$ -lactam antibiotics and single daily dosing regimens of aminoglycosides for treating serious infections: A meta-analysis. *Int J Antimicrob Agents.* 2020 Mar;55(3):105839
26. Wong G, Taccone F, Villois P, Scheetz MH, Rhodes NJ, Briscoe S, McWhinney B, Nunez-Nunez M, Ungerer J, **Lipman J, Roberts JA.**  $\beta$ -Lactam pharmacodynamics in Gram-negative bloodstream infections in the critically ill. *J Antimicrob Chemother.* 2020 Feb 1;75(2):429-433
27. **Roberts JA**, Joynt G, Lee A, Choi G, Bellomo R, Kanji S, Mudaliar MY, Peake SL, Stephens D, Taccone FS, Uildemolins M, Valkonen MM, Agbeve J, Baptista JP, Bekos V, Boidin C, Brinkmann A, Buizen L, Castro P, Cole CL, Creteur J, De Waele JJ, Deans R, Eastwood GM, Escobar L, Gomersall C, Gresham R, Jamal JA, Kluge S, König C, Koulouras VP, Lassig-Smith M, Laterre PF, Lei K, Leung P, Lefrant JY, Llauroadó-Serra M, Martin-Loeches I, Mat Nor MB, Ostermann M, Parker SL, Rello J, Roberts DM, Roberts MS, Richards B, Rodríguez A, Roehr AC, Roger C, Seoane L, Sinnollareddy M, Sousa E, Soy D, Spring A, Starr T, Thomas J, Turnidge J, Wallis SC, Williams T, Wittebole X, Zikou XT, Paul S, **Lipman J.** The effect of renal replacement therapy and antibiotic dose on antibiotic concentrations in critically ill patients: Data from the multinational SMARTT Study. *Clin Infect Dis.* 2020 Mar;(9):224
28. Broeker A, Vossen MG, Thalhammer F, Wallis SC, **Lipman J, Roberts JA**, Wicha SG. An Integrated Dialysis Pharmacometric (IDP) Model to Evaluate the Pharmacokinetics in Patients Undergoing Renal Replacement Therapy. *Pharm Res.* 2020 May 14;37(6):96

29. **Dhanani JA, Lipman J, Pincus J, Townsend S, Livermore A**, Wallis SC, Pandey S, Abdul-Aziz MH, Roberts JA. Pharmacokinetics of Sulfamethoxazole and Trimethoprim During Venovenous Extracorporeal Membrane Oxygenation: A Case Report. *Pharmacotherapy*. 2020 Jul;40(7):713-717
30. Dagasso G, Conley J, Steele L, Parfitt EEC, Pasquill K, **Laupland KB**. Risk of bloodstream infection in patients with renal dysfunction: a population-based cohort study. *Epidemiol Infect*. 2020 May 18;148:e105
31. Nethathe GD, **Cohen J, Lipman J**, Anderson R, Feldman C. Mineralocorticoid Dysfunction during Critical Illness: A Review of the Evidence. *Anesthesiology*. 2020 Aug;133(2):439-457
32. Billington EO, Phang SH, Gregson DB, Pitout JD, Ross T, Church DL, **Laupland KB**, Parkins MD. Incidence, risk factors, and outcomes for Enterococcus spp. blood stream infections: a population-based study. *Int J Infect Dis*. 2014 Sep;26:76-8
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34. Dhondt L, Croubels S, De Paepe P, Wallis SC, Pandey S, **Roberts JA, Lipman J**, De Cock P, Devreese M. Conventional Pig as Animal Model for Human Renal Drug Excretion Processes: Unravelling the Porcine Renal Function by Use of a Cocktail of Exogenous Markers. *Front Pharmacol*. 2020 Jun 12;11:883
35. Tabah A, Ramanan M, **Laupland KB**, Buetti N, Cortegiani A, Mellinghoff J, Conway Morris A, Camporota L, Zappella N, Elhadi M, Povoia P, Amrein K, Vidal G, Derde L, Bassetti M, Francois G, Ssi Yan Kai N, De Waele JJ; PPE-SAFE contributors. Personal protective equipment and intensive care unit healthcare worker safety in the COVID-19 era (PPE-SAFE): An international survey. *J Crit Care*. 2020 Oct;59:70-75
36. Sumi CD, Heffernan AJ, Naicker S, Islam K, Cottrell K, Wallis SC, **Lipman J**, Harris PNA, Sime FB, **Roberts JA**. Pharmacodynamic evaluation of intermittent versus extended and continuous infusions of piperacillin/tazobactam in a hollow-fibre infection model against Klebsiella pneumoniae. *J Antimicrob Chemother*. 2020 Sep 1;75(9):2633-2640
37. Parfitt E, **Laupland KB**, Schwartz I. Putting the cart before the horse: Development of a de novo clinical infectious diseases service. *JAMMI* 2020 Feb
38. Munday J, Higgins N, Mathew S, Dalglish L, **Batterbury AS**, Burgess L, Campbell J, Delaney LJ, Griffin BR, Hughes JA, Ingleman J, Keogh S, Coyer F. Nurse-Led Randomized Controlled Trials in the Perioperative Setting: A Scoping Review. 21 July 2020 Volume 2020:13
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40. Barakat-Johnson M, Carey R, Coleman K, Hocking K, Leong T, **Levido A**, Counter K, **Coyer F**. Pressure injury prevention for COVID-19 patients in a prone position. *Wound Practice and Research*. 2020;28(2):50-57
41. **Coyer F**, Cook J-L, Brown W, Vann A, Doubrovsky A. Securement to prevent device-related pressure injuries in the intensive care unit: A randomised controlled feasibility study. *International Wound Journal*. 28 June 2020
42. **Coyer F**, Campbell J, Doubrovsky A. Efficacy of an incontinence-associated dermatitis intervention for critically ill patients in intensive care; an open label pilot randomised control trial. *Adv Skin & Wound Care*. 2020;33(7):375-382
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44. Gefen A, Alves P, Ciprandi G, **Coyer F**, Milne CT, Ousey K, Ohura N, Waters N, Worsley P, Black J, Barakat-Johnson M, Beeckman D, Fletcher J, Kirkland-Kyhn H, Lahmann NA, Moore Z, Payan Y, Schliuer A-B. Device-related pressure-ulcers: SECURE prevention. *Journal of Wound Care*. 2020;29(Sup2b):S1-S52
45. Dalglish L, Campbell J, Finlayson K, **Coyer F**. Acute skin failure in the critically ill adult population: A systematic review. *Adv Skin & Wound Care*. 2020;33:76-83

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  49. Tayyib N, **Coyer F**. Effectiveness of Pressure Ulcer Prevention Strategies for Adult Patients in Intensive Care Units: A Systematic Review. *Worldviews Evid Based Nurs*. 2016 Dec;13(6):432-444

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  50. Whitmore KA, **Townsend SC, Laupland KB**. Management of tracheostomies in the intensive care unit: a scoping review. *BMJ Open Respir Res*. 2020 Jul;7(1):e000651

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  51. Rello J, Tejada S, Xu E, Solé-Lleonart C, Campogiani L, Koulenti D, Ferreira-Coimbra J, **Lipman J**. Quality of evidence supporting Surviving Sepsis Campaign Recommendations. *Anaesth Crit Care Pain Med*. 2020 Aug;39(4):497-502

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  52. Economou CJP, Ordoñez J, Wallis SC, Richards B, McWhinney B, **Lipman J, Roberts JA**. Ticarcillin and piperacillin adsorption on to polyethersulfone haemodiafilter membranes in an ex-vivo circuit. *Int J Antimicrob Agents*. 2020 Sep;56(3):106058

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  53. Sin JCK, King L, Ballard E, Llewellyn S, **Laupland KB**, Tabah A. Hypophosphatemia and Outcomes in ICU: A Systematic Review and Meta-Analysis. *J Intensive Care Med*. 2020 Aug 12:885066620940274

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  54. Martin-Loeches I, Dickson R, Torres A, Hanberger H, **Lipman J**, Antonelli M, de Pascale G, Bozza F, Vincent JL, Murthy S, Bauer M, Marshall J, Cilloniz C, Bos LD. The importance of airway and lung microbiome in the critically ill. *Crit Care*. 2020 Aug 31;24(1):537

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  55. Lee J, Eley VA, Wyssusek KH, Kimble RMN, Way M, **Cohen J**, van Zundert AA. The influence of obesity on coagulation in healthy term pregnancy as assessed by rotational thromboelastometry. *Aust N Z J Obstet Gynaecol*. 2020 Oct;60(5):714-719

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  56. Thompson KJ, Taylor CB, Venkatesh B, **Cohen J**, Hammond NE, Jan S, Li Q, Myburgh J, Rajbhandari D, Saxena M, Kumar A, Finfer SR; The ADRENAL Management Committee and Investigators and the ANZICS Clinical Trials Group. The cost-effectiveness of adjunctive corticosteroids for patients with septic shock. *Crit Care Resusc*. 2020 Sep;22(3):191-199

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  57. **Cohen J**, Bellomo R, Billot L, Burrell LM, Evans DM, Finfer S, Hammond NE, Li Q, Liu D, McArthur C, McWhinney B, Moore J, Myburgh J, Peake S, Pretorius C, Rajbhandari D, Rhodes A, Saxena M, Ungerer JPJ, Young MJ, Venkatesh B. Plasma Cortisol, Aldosterone, and Ascorbic Acid Concentrations in Patients with Septic Shock Do Not Predict Treatment Effect of Hydrocortisone on Mortality. A Nested Cohort Study. *Am J Respir Crit Care Med*. 2020 Sep 1;202(5):700-707

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  58. Hammond NE, Finfer SR, Li Q, Taylor C, **Cohen J**, Arabi Y, Bellomo R, Billot L, Harward M, Joyce C, McArthur C, Myburgh J, Perner A, Rajbhandari D, Rhodes A, Thompson K, Webb S, Venkatesh B; ADRENAL Trial Investigators and the Australian and New Zealand Intensive Care Society Clinical Trials Group. Health-related quality of life in survivors of septic shock: 6-month follow-up from the ADRENAL trial. *Intensive Care Med*. 2020 Sep;46(9):1696-1706
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## Book Chapters / Letters

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1. Mahoney AJ & **Reade MC**. Evaluating quality in trauma systems. *Annual Update in Intensive Care and Emergency Medicine 2020*. Berlin: Springer-Verlag, 2020; 397-412
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## Conference Presentations – Invited Speaker, Oral and Poster

### Invited Speaker

1. **Reade MC.** Two decades of armed conflict driving medical innovation: focus on trauma systems, haemorrhage and traumatic brain injury. *Medical Technology Association of Australia Annual Meeting, Sydney (virtual conference), 2020*
2. **Reade MC.** Cryopreserved Platelets in Post-Surgical Bleeding: CLIP II Trial. *Transfusion United: Connected through Collaboration Australian Lifeblood conference, Sydney (virtual conference), 2020*
3. **Reade MC.** Fibrinogen concentrate and lyophilised plasma. What more do we need to know? *UK Armed Forces Triservice Emergency Medicine Conference, London (virtual conference), 2020*
4. **Reade MC.** Can we agree on the management of burns? *40<sup>th</sup> International Symposium on Intensive Care and Emergency Medicine, Brussels (virtual conference), 2020*
5. **Reade MC.** Traumatic brain injury – are biomarkers of any use? *40<sup>th</sup> International Symposium on Intensive Care and Emergency Medicine, Brussels (virtual conference), 2020*
6. **Reade MC.** COVID-19: We could deploy a military hospital! *40<sup>th</sup> International Symposium on Intensive Care and Emergency Medicine, Brussels (virtual conference), 2020*
7. **Reade MC.** Hospital leadership in challenging circumstances. *Haematology Society of Australia and New Zealand / Australian Leukaemia and Lymphoma Group Annual Scientific Meeting, virtual congress, 2020*
8. **Reade MC.** Pathophysiology of trauma. *International Society of Blood Transfusion International Congress, Barcelona (online conference), 2020*
9. **Holley A.** Bleeding and procoagulation in Critical Care. *Perioperative Patient blood Management Symposium. February 2020*

### Oral Presentations

1. Pollard C, **Reade MC**, Midwinter M, Phillips J, Redmond M, Rudd M, Walker D, Williams J. Providing specialist support to a deployed force using augmented reality. *Journal of Military and Veterans Health, 2020, 28(4): 93-94*
2. Adamson S, **Reade MC.** Are CBRN Masks Appropriate PPE for Civilians Treating SARS-CoV-2 Patients? *Journal of Military and Veterans Health, 2020, 28(4): 71-72*
3. Wiebe J, Lipman J, **Reade MC.** Challenging Informed Consent: A Study of Off-Label Medication Use in an Australian Adult ICU. *Critical Care Medicine, in press, accepted October 2020*
4. Parr J, **Reade MC.** Associations of sedatives, analgesics and anti-delirium medications in ventilated ICU patients. *Critical Care Medicine, in press, accepted October 2020*
5. **Reade MC.** Pathophysiology of Trauma. *Vox Sanguis, 2020, 115 (Suppl. S1), 6*
6. Simonova G, Johnson L, **Reade M**, Dean M, Tung JP. Sheep provide a clinically relevant model for evaluating mechanism of improved efficacy of cryopreserved platelet transfusion. *Vox Sanguis, 2020, 115 (Suppl. S1), P-261*
7. Simonova G, Dean M, **Reade M**, Tung JP. Modulation of immune responses following exposure to platelet concentrates in sheep in vitro models of transfusion. *Vox Sanguis, 2020, 115(Suppl. S1), P-761*
8. Wong A, Fedyshin M, Smith P, Fraser G, Saggar R, Hodges T, Ardiles T, **Reade MC**, Buckley MS, Gill SL. Dexmedetomidine for facilitating extubation in difficult-to-wean ICU patients: a systematic review and meta-analysis. *Critical Care Medicine, 2020, 48(1): 543*
9. Desselle MR, **Kirrane M, Sullivan C.** “I would wear that”: fit testing and simulation for the prototyping of a reusable N95 respirator mask during COVID19. *Herston Health Precinct Symposium, 2020*

## Professor Tess Cramond Multidisciplinary Pain Centre

Publications by our research team guide clinical practice with development of a patient phone app to self-manage their activity and pain flare-ups, comparison of rehabilitation for persistent anterior knee pain, understanding of factors that limit compression garment use after burns injury, and holistic evaluation of paediatric persistent pain. In addition to these, research activity in 2020 has examined our models of care, improved research capacity and efficiency for the coming years.

In response to COVID-19, phone survey of videoconference vs onsite pain education and facilitation of self-management showed that the ease of access with online delivery suits 2/3 of people, but 1/3 still feel that the benefits of onsite attendance outweigh the costs.

Audit of our pre-appointment Intro to Persistent Pain Management workshop showed that only 35% of people attended. Given the low attendance and the demands on administrative and clinical time to run the workshop each month, it will be discontinued in 2021. Use of iEMR to capture these data demonstrated the limitations of that system to evaluate patient attendance and impact of clinical interventions.

Survey of tobacco use at the Pain Centre showed that under 25% of our patients are currently smokers, but that this cohort have substantial use of opioids. Although this rate does not support smoking cessation programmes at the Pain Centre, these data evidence the need for individual patient advice and exploration of the relationship with opioid use.

A great leap forward in our research capacity and efficiency has been achieved in 2020 with approval for patients to enter outcome data (ePPOC) via smart phone. Clinical implementation of this with the move to STARS, with administration and clinical staff sending links to patients via email or via QR code in the waiting room, will provide a new level of tracking patient profile, response to interventions, efficient data collection for clinical trials and a pipeline for research output.

In addition to patient reported outcome measures with ePPOC, our capacity to measure nervous system function was progressed with procurement of a TSA-2 thermotest device in collaboration with the Occupational Therapy Dept. Staff training in quantitative sensory testing was also undertaken (thermal detection, pain and pressure pain), coordinated with RECOVER Injury Research Centre. This enables research projects to evaluate the profile of patients referred for specific interventions and their responses.

Our team of Andrew Claus, Nicole Andrews, Paul Gray and Jenny Strong have been highly active with research grant applications. A series of internal (RBWH Foundation Project and Program, RBWH Postgraduate Scholarship) and external (NHMRC Ideas) applications were developed. Feedback from the NHMRC achieved a score of 5 for the Ideas grant where the threshold for success was 5.6.

Research through 2020 has resulted in six accepted presentations for the Australian Pain Society Conference in 2021, with the aim to convert these to publications. Building on the foundation work in 2020, the Clinical Yarning project (communication with ATSI people), a sponsored trial (SALIENT) and apps for social support in self-management of pain will progress to fruition in 2021.

### Research highlights

Emphasising the focus on research, the name of the Pain Centre is changing from the Professor Tess Cramond Multidisciplinary Pain Centre to the *Tess Cramond Pain and Research Centre*. Publications achieved provided new insight into exacerbation of pain through over-activity, efficacy of rehabilitation for persistent anterior knee pain, understanding of factors limiting compression garment use after burns injury and holistic evaluation of paediatric persistent pain. Through 2020 the staff

- Developed a series of internal (RBWH Foundation Project and Program, RBWH Postgraduate Scholarship) and external (NHMRC Ideas) grant applications,
- Procured a TSA-2 thermotest device in collaboration with the Occupational Therapy Dept and trained staff in the use of quantitative sensory testing (thermal detection, pain and pressure pain),
- Received approval for patients to enter their outcome measures digitally via the Electronic Persistent Pain Outcomes Collaboration,
- Continued data collection for the Pain ROADMAP application, to facilitate effective pacing of activities in the self-management of pain, OMED Assist project for online patient education about opioids,

- Surveyed tobacco use and willingness to quit smoking amongst patients referred to the pain centre, patient perspectives of telehealth as well as an audit to evaluate the impact and efficacy of a multidisciplinary workshop.
- Contributed to the development of content, learning resources and outcome measures for the Clinical Yarning project, to improve culturally aware communication in the assessment and management of people with Aboriginal and Torres Strait Islander heritage and
- Progressed towards commencing the first sponsored trial at the Pain Centre (SALIENT trial funded by SpineThera)

The research teams gathered for these grant applications will continue to pursue projects aimed at managing opioid use, improving patient education and models of care for persistent pain in the years ahead. Advances with equipment and training build our capacity for new insight into the function of small nerve fibres, central processing of pain and for efficient collection of patient outcomes pre and post interventions. Data collected through 2020 have resulted in presentations being accepted for the Australian Pain Society Conference in 2021 (2020 conference was cancelled) and will progress to publication.

## Research Grants Awarded in 2020

Investigator Names (RBWH staff in bold)	RBWH Departments / Research Groups	Research Project Title	Granting Body	Total Awarded	Year/s
Atiyeh Vaezipour, <b>Nicole Andrews</b> , Mark Horswill, Oscar Oviedo-Trespalacios, Venerina Johnston	Tess Cramond Pain and Research Centre	Improving the management of driving behaviour in people with chronic pain – perspective of people with chronic pain and health professionals	RACV Safety Research Fund	\$66 175	2019-2020
<b>Nicole Andrews</b> , David Ireland and Marlien Varnfield	Tess Cramond Pain and Research Centre	An evaluation of the usability of a paediatric version of the Pain ROADMAP app	Australian Pain Society/Australian Pain Relief Association/Cops for Kids	\$30 000	2019-2020
<b>Nicole Andrews</b>	Tess Cramond Pain and Research Centre		Advancing Queensland Women's Research Assistance Program	\$16 000	2020-2021
<b>Andrew Claus</b> , <b>Megan Murdoch</b> , <b>Caroline Morton</b>	Tess Cramond Pain and Research Centre	How far must you walk to improve persistent pain?: Identifying cohort-specific repeatability and clinically important difference in the 6-minute walk test	RBWH Physiotherapy Project Grant	\$10,000	2020
<b>Erin Crofton</b>	Occupational Therapy Service	Is Sensory Sensitivity a Factor in non-adherence with compression garments post burn?	RBWH Foundation	\$38871.43	2020

## Current RBWH Department / Research Group Led Research Activity

Lead Investigator Name (RBWH staff in bold)	Other Study Investigators (RBWH staff in bold)	Research Project Title	Number of Patients Recruited in 2020	Total number of Patients Recruited
<b>Andrew Claus</b>	Neil Raffelt, Cameron Edwards, <b>Mark Daghli</b> .	Adequacy of smoking cessation interventions and current motivation to change in patients attending a chronic pain outpatients clinic	150	150
<b>Andrew Claus</b>	Tylor Branzen, Rowland Briese, Caleb Snyder, Noach Spence	Pain education is more effective than self-management and tissue focused education in altering some pain behaviours in chronic pain patients: A restricted systematic review	review	review
<b>Andrew Claus</b>	<b>Genesta Nicolson, Megan Murdoch</b>	Evaluation of the Introduction to Persistent Pain Management program.	audit	audit
<b>Nicole Andrews</b>	<b>Olivia Zheng</b> (Trauma Service), <b>Jodie Ross</b> (Trauma Service), Venerina Johnston (UQ), Elise Gane (UQ), Esther Smits (UQ), Charlotte Brakenridge (UQ), <b>Paul Gray</b> , (TCPRC), <b>Michael Rudd</b> (Trauma Service)	An investigation of the prevalence, impact, and management of chronic pain post trauma at a tertiary public hospital	audit	audit
<b>Nicole Andrews</b>	David Ireland (CSIRO), Marlien Varnfield (CSIRO), Cate Sinclair (Pain Specialists Australia), Michael Deen (MSHHS), Kathleen Cooke (St Vincents), Helen Rowe (The Therapy Space), Atiyeh Vaezipour (UQ), Esther Smits (UQ)	Is app gamification effective in increasing consumer engagement and satisfaction? An evaluation of gamification for a chronic pain monitoring app	24	24

## Collaborative Research Activity Involving RBWH Department / Research Group

Lead Investigator Name (RBWH staff in bold)	Other Study Investigators (RBWH staff in bold)	Research Project Title	Number of Patients Recruited in 2020	Total number of Patients Recruited
Greg Pratt	Christina Bernardes, <b>Paul Gray, Andrew Claus</b> , Joe Kluver, Stuart Ekberg, Renata Meuter, Matthew Bryant, Ivan Lin, Jermaine Isua.	Clinical Yarning: Improving communication and health outcomes for Aboriginal and Torres Strait Islander people living with chronic pain	30	30
Rachel Elphinston	Michele Sterling, Janni Leung, <b>Paul Gray</b> , Simone Requena, Jason Connor	Brief psychological interventions for reducing prescription opioid use, related harm and pain intensity in patients with chronic pain: a systematic review and assessment of patient interest	review	review
<b>Kerstin Wyssusek</b>	<b>Christine Woods, Paul Gray, Sandra Blamey, Andre van Zundert</b>	A cross-sectional study of the relationship between iron deficiency anaemia and chronic pain in patients presenting to a multidisciplinary pain centre in a tertiary referral teaching hospital	82	82
Atiyeh Vaezipour (UQ)	<b>Nicole Andrews</b> , Mark Horswill (UQ), Oscar-Oviedo Trespalacios (CARRS-Q), Venerina Johnston (UQ), Patricia Delhomme (IFSTAR)	Improving the management of driving behaviour in individuals with chronic pain	130	130

Lead Investigator Name (RBWH staff in bold)	Other Study Investigators (RBWH staff in bold)	Research Project Title	Number of Patients Recruited in 2020	Total number of Patients Recruited
Charlotte Brakenridge (UQ)	Venerina Johnston (UQ), Esther Smits (UQ), Elise Gane (UQ) <b>Nicole Andrews</b>	Impact of interventions on work-related outcomes for individuals with musculoskeletal injuries after road traffic crash: a systematic review protocol	Review	Review
Erin Crofton	<b>Jennifer Strong</b> , Pamela Meredith & <b>Paul Gray</b>	Is Sensory Sensitivity a Factor in non-adherence with compression garments post burn?	0	0

## Research Activity With a Specific Focus on First Nations People

Lead Investigator Name (RBWH staff in bold)	Other Study Investigators (RBWH staff in bold)	Research Project Title	Number of Patients Recruited in 2020	Total number of Patients Recruited
Greg Pratt	Christina Bernardes, <b>Paul Gray</b> , <b>Andrew Claus</b> , Joe Kluver, Stuart Ekberg, Renata Meuter, Matthew Bryant, Ivan Lin, Jermaine Isua	Clinical Yarning: Improving communication and health outcomes for Aboriginal and Torres Strait Islander people living with chronic pain	30	30

## Research Publications

### Journal Articles

- Dewar, Rosalee; Tucker, Kylie; **Claus, Andrew**; van den Hoorn, Wolbert; Ware, Robert; Johnston, Leanne. (2020) Evaluating validity of the Kids-Balance Evaluation Systems Test (Kids-BESTest) *Clinical Test of Sensory Integration of Balance (CTSIB) criteria to categorise stance postural control of ambulant children with Cerebral Palsy*. Disability and Rehabilitation. *in press*
- Matthews, Mark, Rathleff, Michael Skovdal, **Claus, Andrew**, McPoil, Tom, Nee, Robert, Crossley, Kay M, Kasza, Jessica and Vicenzino, Bill T. (2020). *Infographic. Does foot mobility affect the outcome in the management of patellofemoral pain with foot orthoses versus hip exercises? A randomised clinical trial*. British Journal of Sports Medicine, bjsports-2020. doi: 10.1136/bjsports-2020-103081
- Scheer, R., **Crofton, Erin and Andrews, Nicole**. (2020). *The effect of limb position on the reliability of leg circumference measurements in patients diagnosed with lower limb lymphoedema*. Supportive Care in Cancer. doi: 10.1007/s00520-020-05835-w
- Crofton, Erin**, Meredith, P.J., **Gray, Paul, Strong, J.**, (2020) Compression garment wear post-burn: measurement of how I "feel" through quantitative and self-report sensory variables impacts upon wear, a single-site study. *Burns* in press [doi.org/10.1016/j.burns.2020.06.004](https://doi.org/10.1016/j.burns.2020.06.004)
- Sinclair, Cate, Meredith, Pamela and **Strong, Jenny** (2020) Pediatric persistent pain: associations among sensory modulation, attachment, functional disability, and quality of life. *American Journal of Occupational Therapy*, 74 2: 7402205040p1-7402205040p11. doi:10.5014/ajot.2020.033308
- Crofton, Erin**, Meredith, P., **Gray, Paul**, O'Reilly, S. and **Strong, Jenny** (2020) Non-adherence with compression garment wear in adult burns patients: a systematic review and meta-ethnography. *Burns*, 46 2: 472-482. [doi:10.1016/j.burns.2019.08.011](https://doi.org/10.1016/j.burns.2019.08.011)

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7. Matthews, Mark, Rathleff, Michael S., **Claus, Andrew P.**, McPoil, T, Nee, Robert, Crossley Kay M., Kasza, Jessica, Vicenzino, Bill T., Does Foot Mobility Affect the Outcome in the Management of Patellofemoral Pain With Foot Orthoses Versus Hip Exercises? A Randomised Clinical Trial. Br J Sports Med. DOI: [10.1136/bjsports-2019-100935](https://doi.org/10.1136/bjsports-2019-100935)

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  8. Hasenbring, Monika I., **Andrews, Nicole E.** and Ebenbichler, Gerold (2020) Overactivity in chronic pain, the role of pain related endurance and neuromuscular activity - an interdisciplinary, narrative review. *Clinical Journal of Pain*, 36 3: 162-171. [doi:10.1097/AJP.0000000000000785](https://doi.org/10.1097/AJP.0000000000000785)

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  9. Smits, Esther J., Gane, Elise M., Brakenridge, Charlotte L., **Andrews, Nicole E.** and Johnston, Venerina (2020). Expert consensus and perspectives on recovery following road traffic crashes: a Delphi study. *Disability and Rehabilitation*, 1-10. doi: 10.1080/09638288.2020.1855677

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  10. **Andrews, Nicole E.**, Chien, Chi-Wen, Ireland, David and Varnfield, Marlien (2020). Overactivity assessment in chronic pain: The development and psychometric evaluation of a multifaceted self-report assessment. *European Journal of Pain*, 25 (1) ejp.1664, 225-242. doi: 10.1002/ejp.1664
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## Conference Presentations – Invited Speaker, Oral and Poster

### Invited Speaker

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1. Australian Pain Society Conference 2020 was cancelled due to COVID-19. **Nicole Andrews** was an invited speaker
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### Poster Presentations

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1. **Andrews, Nicole E., Chien, C.W., Varnfield, M., Ireland, D.** Overactivity assessment in chronic pain: the development and psychometric evaluation of a multifaceted self-report assessment. Australian Pain Society 40th Annual Scientific Meeting. Hobart, Australia, April, 2020. (Digital Online Poster Presentation)
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