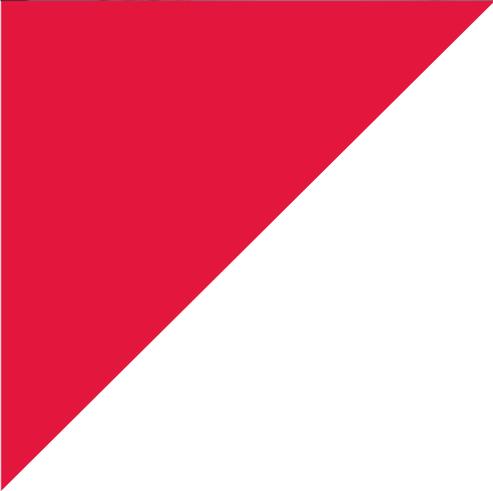




Health
Northern Sydney
Local Health District

RESEARCH ANNUAL REPORT 2020



Acknowledgement of Country

Northern Sydney Local Health District acknowledges the Traditional Custodians of the lands on which our health services have been built, the Gaimariagal, Guringai and Dharug peoples, and we honour and pay our respects to their ancestors.

We acknowledge and pay our respects to all Aboriginal and Torres Strait Islander peoples and to Elders past, present and emerging.

We acknowledge that past, current and future Aboriginal and Torres Strait Islander peoples are the continuing custodians of this country upon which we live, work and meet and that it is from their blood, courage, pride and dignity that we are able to continue to live, work and meet on this ancient and sacred country.

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MESSAGE FROM THE CHIEF EXECUTIVE AND BOARD CHAIR

Research is thriving at Northern Sydney Local Health District (NSLHD) and we are proud that, despite a year of many challenges, the commitment to improve health outcomes and experiences for our patients through translational research remained a priority.

While COVID-19 presented challenges to our healthcare system, it provided opportunities for our researchers to explore the virus and contribute to research on a global scale. Research plays such a vital role in health care and the health of patients, as we witnessed in the global race to find a vaccine.

NSLHD promptly set up the COVID-19 Research Group whose work has been vital in our understanding of the virus. Our researchers are participating in or leading 41 COVID-19 studies which will help provide vital evidence on how to treat and prevent COVID-19, as well as study the disease epidemiology and its impact on non-COVID 19 activities.

At the same time, our researchers continued to pursue other “bench to bed” clinical trials and research that will have long lasting effects on our community and beyond.



Despite the challenges that COVID brought, our district remained focussed on research. We have continued to build on the NSLHD Research Strategy 2019-2024, developed to support our research endeavours to continue to deliver excellent health research, as it adapts to emerging trends including genomics and precision medicine, convergence science and digital technologies.

The Kolling Institute Research Strategy, 2021-2025, was finalised, which identified three priority research areas (PRAs): musculoskeletal, neuroscience and pain, cardiovascular and renal. The priority research areas are supported by research enablers; clinical trials and translation; data and informatics; research infrastructure and support services; and recruitment and retention. We look forward to supporting the delivery of this strategy.

Cancer research goes from strength to strength, with the formulation of a Cancer Research Network. The Cancer Research Network will include a research manager specifically dedicated to the cancer group, a professorial level lead for the Bill Walsh Cancer Lab, and the addition of two exciting pieces of infrastructure to support cancer research, a total body PET scanner, and a dedicated multidisciplinary team meeting space.

To highlight the magnificent work our clinicians and researchers are doing to transform the care and treatment we provide for our patients, we launched NSLHD Northern Lights. The NSLHD Northern Lights events bring together leading clinicians and researchers, to enable them to describe their work in their own words, to our community, to raise awareness of their key activities and the latest advancements.

Our strong partnerships with the University of Sydney, Sydney Health Partners and the Kolling Institute are creating opportunities for our researchers to collaborate on projects while also interacting with patients.

These partnerships are set to flourish as the district looks towards the development of an education, health and research precinct, based at St Leonards. This will not only benefit our clinicians and researchers, but it will have a long lasting impact on our patients and the community.

Our patients and consumers currently play a vital role in our research, participating in clinical research, and in reviewing our studies. We look forward, in 2021 and beyond, to further develop and embed our engagement with our consumers and our community, to collaboratively develop life changing research.

This Research Annual Report is an overview of our some of our many significant research achievements in 2020. We thank our staff, research partners, community members and consumer representatives for their wonderful support of research and innovation in our district.

We look forward to building on the outstanding health research that is transforming patient care.

**Deb Willcox, Chief Executive
Northern Sydney Local Health District**

**Trevor Danos AM, Chair
Northern Sydney Local Health District Board**

MESSAGE FROM THE RESEARCH ADVISORY COMMITTEE

The Research Advisory Committee (RAC) is responsible for overseeing the implementation of the NSLHD Research Strategy 2019-2024. We are delighted to report that almost a third of the initiatives identified by our stakeholders in the development of the strategy have been delivered, and we are on target to deliver the remaining initiatives within the five-year timeframe.

The initiatives that have been delivered were predominately structural reviews and changes to the delivery of research support and infrastructure. Notable achievements to date include establishing a website presence for research, publishing an annual research highlights report, the development of a clinical trials reference group, maintaining ethics and governance review times within the Ministry of Health designated key performance metrics, and drafting a fundraising strategy, in conjunction with the NORTH Foundation. The initiatives that were not delivered are those that were halted or slowed due to the COVID-19 pandemic, such as hosting face to face research forums; these will be carried over to following years.

The inclusion of consumers in the strategy, from development to delivery, has been invaluable. In addition, with consumers sitting side-by-side with our researchers and clinicians to provide feedback on their own experiences, as well as taking part in our trials and studies, has ensured we remain focused on delivering outcomes from research that will benefit our community in years to come.

The district is now transitioning into delivery of the mid-term initiatives identified in the strategy; these are more strategic in nature and include, for example, the establishment of priority areas, the provision of support for early and mid-career researchers, and the further development of our district research culture. These initiatives are designed to embed research as a recognised and protected core business function, and to underpin our research as a strong and sustainable component of our core business.

The Research Advisory Committee looks forward to partnering with our staff, our patients and our community to continue delivering our strategy, and to support our research throughout the remainder of 2021 and into 2022.



**Rebeka Freckleton, Manager
Research Strategy and Partnerships**







RESEARCH ETHICS AND GOVERNANCE

Our research ethics and governance team had a productive year in 2020, approving a total of 357 applications for research (141 ethics applications and 216 governance applications). This indicates a steady increase in research activity over the year and early trends in 2021 suggest that research at NSLHD continues to grow.

The Ministry of Health key performance indicator (KPI) for ethics approval (45 days) was achieved for the whole of 2020. The KPI for governance authorisation (15 days) was negatively impacted in quarter one by staff turnover in 2019, which resulted in governance officers starting 2020 with a backlog.

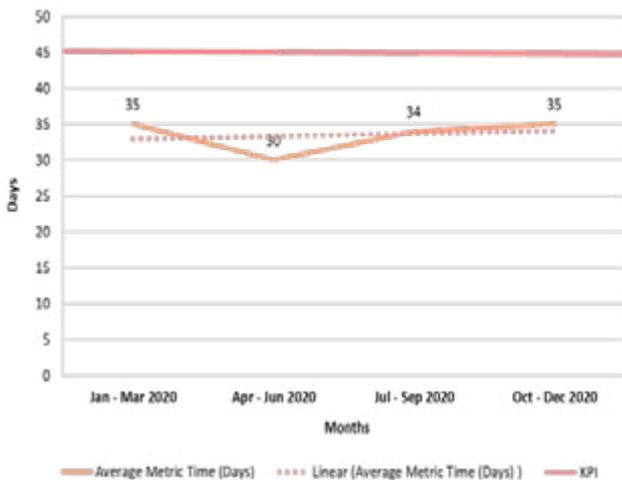
However successful recruitment to a full team and a determined attitude led to significant improvements throughout the year, resulting in governance authorisations being under 15 days by mid-2020.

Applications for COVID-19 research were reviewed with priority, and the team approved a total of 36 COVID-19 related projects. Twenty of these projects being conducted across NSLHD remained active at the end of 2020.

In 2020, the research ethics and governance team started regular communiques with researchers via email, webinars and in-service events, and contributed to a district research newsletter in an effort to build strong working relationships with key stakeholders. The year concluded on a high note with the Ministry of Health describing the ethics team as a “consistently strong performer throughout 2020” and commending the governance team for its “remarkable improvement” through the year.

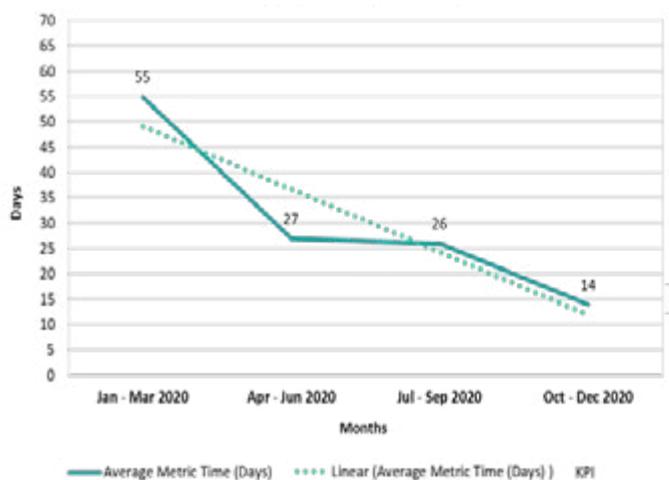
HUMAN RESEARCH ETHICS COMMITTEE

(average days to approval)



GOVERNANCE

Average Metric Time (Days)



SYDNEY HEALTH PARTNERS



NSLHD is one of five founding partners of Sydney Health Partners, along with Western Sydney and Sydney local health districts, Sydney Children's Hospital Network and the University of Sydney.

In 2019, Sydney Health Partners developed a three-year strategy, intensifying its commitment to translating research into better health outcomes. As part of the strategy, each of the founding partner members took leadership of a strategic platform of health and medical research translation. NSLHD is leading what is known as the "Platform Three" projects, a program of work designed to reduce the barriers to conducting research across the partner organisations. This has been an intensive program of work involving research support staff from across the different partner local health districts (LHDs).



The relationship between Sydney Health Partners and NSLHD is strong and positive, and we look forward to working together and further developing this relationship over the next year.

Key achievements to date include:

- The development of a combined ethics calendar, hosted on the Sydney Health Partners website, which enables researchers to search for the next available ethics meeting to submit their project for review
- The development of a streamlined governance review process, which ensures that all governance requirements are based on policy and are consistent across partner LHDs
- The development of a research passport that will allow researchers working in multiple LHDs to undergo the credentialling process just once in one LHD, and for that credentialling to be recognised across all partner LHDs
- The development of a research support map for each LHD, to assist researchers in identifying the available support

CLINICAL TRIALS

Clinical trials are an integral component of health care delivery at NSLHD.

Most existing medical interventions for diseases and conditions — including cancer, heart disease, hypertension and asthma — have been developed as a result of rigorous clinical trials, and ongoing support of trials is essential to the development of new interventions. Our commitment to clinical trials is highlighted by both the widespread distribution of trials across the district — trials occur at all our sites and facilities — and in the breadth of disciplines involved.

We established the Clinical Trials Reference Group, which reports to the Research Advisory Committee, to facilitate and grow the number of high quality clinical trials across NSLHD, to foster capacity and capability and to grow our visibility and participation in clinical trials.

In 2020, the Clinical Trials Reference Group, in conjunction with NSLHD research support staff, delivered a number of projects designed to support our trials, and reduce administrative delays and burden for participants and staff.

Proportion of clinical trials with governance approval within 15 days (Jul-Dec 2020)	100%
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Proportion of clinical trials receiving ethics approval within 45 days (Jul-Dec 2020)	100%
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A key initiative for 2021 will be the growth of consumers involved in clinical trials and the development of research. We are indebted to patients and their carers who take part in our trials and studies. To ensure more trials are available to the community, we are developing a clinical trials section on the NSLHD website.

Another focus will be the planning and delivery of a clinical trials management system, with the support of the Ministry of Health, which will further enable trials capacity across the district.



COVID-19 CLINICAL RESEARCH GROUP

Like our local and international research colleagues, our focus turned to COVID-19 in 2020, when the severity of the pandemic became evident.

The NSLHD COVID-19 Clinical Research Group, chaired by infectious disease specialist Dr Bernie Hudson, includes members from several disciplines who came together to coordinate our approach to COVID-19 research.

Co-chaired by Associate Professor Rory Clifton-Bligh, the rapid evolution of the COVID-19 crisis led to innovative approaches to conceiving and conducting clinical trials involving both COVID-19 patients and healthcare workers.

By November 2020, NSLHD was participating in or leading 41 COVID-19 studies across six broad areas of focus:

- Emerging treatments for COVID-19
- Prevention (chemoprophylaxis) of COVID-19 in high risk groups (including healthcare workers)
- Biomarker research for diagnosis and prognosis (including biobanking)
- Epidemiology of disease outbreaks in NSLHD
- Health services data collection and research
- The impact on non-COVID-19 related activities (both in healthcare and in research)

Significant grants were awarded to NSLHD researchers to undertake a range of important COVID-19 related projects and these are continuing alongside our broader program of health and medical research.



Professor
Carol Pollock

Could a common medication reduce COVID-19 symptoms?

One exciting COVID study, involving researchers from across Australia and India, is investigating whether existing blood pressure medications can reduce the risk of severe COVID-19 disease, as well as the duration of severe symptoms.

Professor Carol Pollock is leading the RNSH arm of the CLARITY trial, which will involve up to 600 patients over the next year. The trial will investigate whether a class of drugs, called angiotensin receptor blockers, can improve outcomes for COVID-19 patients, by interrupting the virus' entry into the body's cells.

The trial received \$1.4 million from the Australian Government's Medical Research Future Fund. If the medications are found to be effective, it could represent a major breakthrough in the management of COVID-19 patients.

Publication highlights include:

- Abayasingam A, Balachandran H, Agapiou D, et al. Long-term persistence of RBD+ memory B cells encoding neutralizing antibodies in SARS-CoV-2 infection. *Cell Rep Med.* 2021;2(4):100228. doi:10.1016/j.xcrm.2021.100228, 10.1016/j.xcrm.2021.100228
- Girgis CM, Clifton-Bligh RJ. Osteoporosis in the age of COVID-19. *Osteoporos Int.* 2020;31(7):1189-1191. doi:10.1007/s00198-020-05413-0, 10.1007/s00198-020-05413-0
- Tsang VH, Gild M, Glover A, Clifton-Bligh R, Robinson BG. Thyroid cancer in the age of COVID-19. *Endocr Relat Cancer.* 2020 Aug 1:ERC-20-0279.R1

THE KOLLING INSTITUTE

The last 12 months was an important time for the Kolling Institute, with the development of the Kolling Institute's Research Strategy (2021-2025). The strategy provides a robust framework for the Kolling's work, while broadening opportunities to achieve high-quality, translational research.

Three priority research areas were identified in the strategy: musculoskeletal, neuroscience and pain, and cardiovascular and renal research. These areas of research investigate some of the biggest health challenges of our time, which result in significant health, personal and economic costs.

By focusing on these important areas, the Kolling is strengthening its ability to achieve game-changing research that will ultimately improve the health of our community. It will position the Kolling as a centre of translational research excellence, with globally recognised expertise and strong local, national and international collaborations.

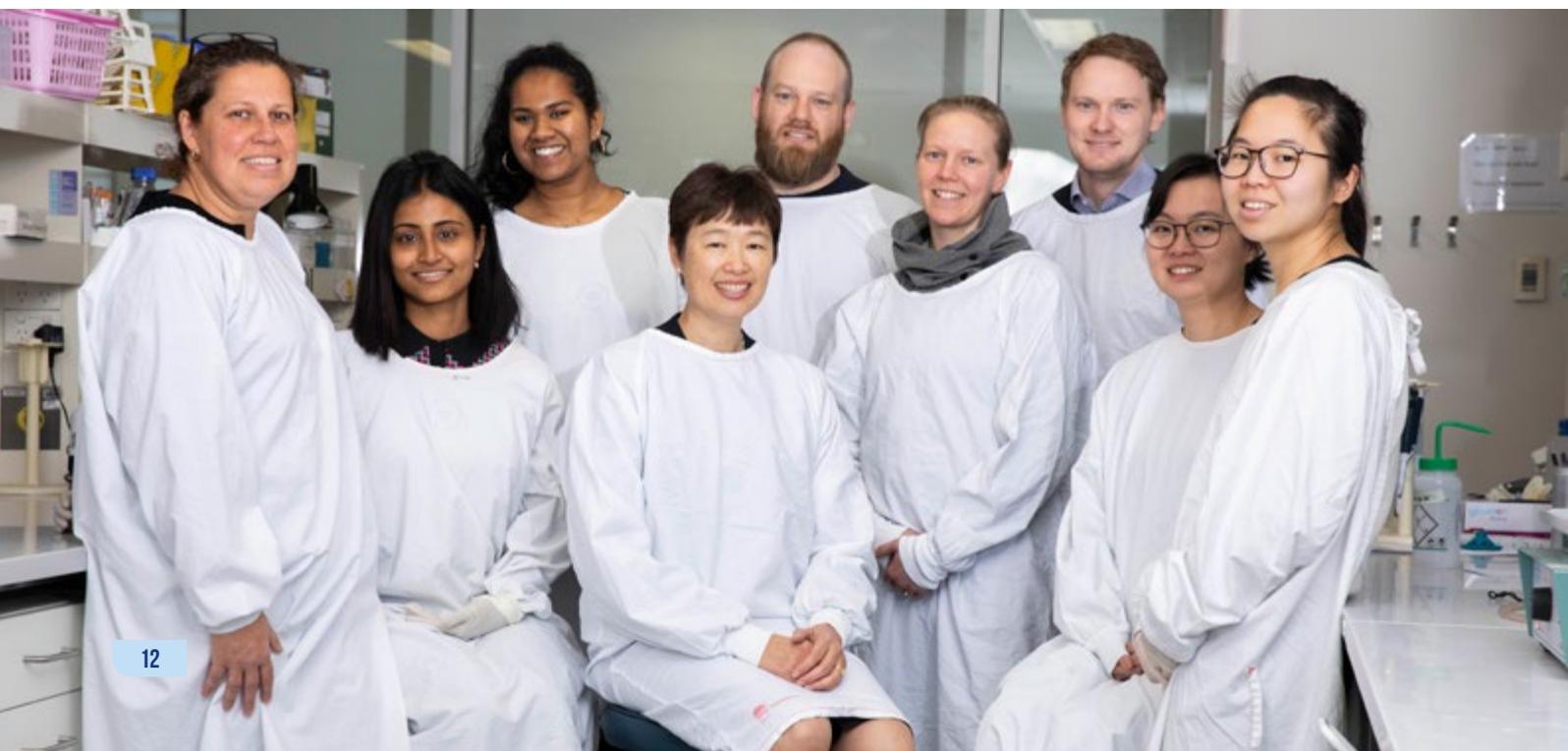
A key component of the new strategy is the identified research enablers. These enablers are four specific areas of the organisation that support research teams

in their quest. The four enablers focus on clinical trials and translation, data and informatics, research infrastructure and support services, and recruitment and retention.

A range of initiatives will deliver new opportunities for clinical trials and translational practice, building on existing strengths and expertise in this area. Kolling researchers work within NSLHD, with extensive access to patient groups and state-of-the-art facilities. This means researchers are embedded within a large health system, and directly able to incorporate scientific discoveries and evidenced-based improvements into patient care.

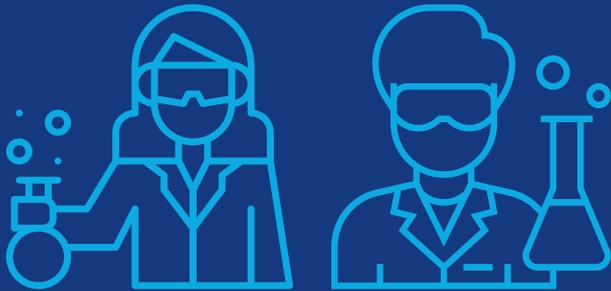
This model also paves the way for strong collaborations between researchers, clinical teams and patients, and efficiently delivers improvements to patient care, patient experience and long term health outcomes. The last 12 months has already seen an increase in collaborative research efforts, a trend that is set to continue.

The measures incorporated in the new Kolling Institute Research Strategy aim to assist teams to increase the impact of their research. They will deliver new opportunities, greater assistance, access to high quality facilities and new partnerships within and outside the organisation. The initiatives will help bolster research efforts within the Kolling and across NSLHD, ultimately improving the health of the broader community.



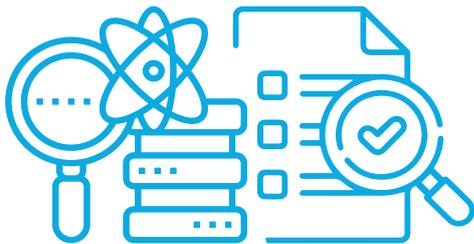
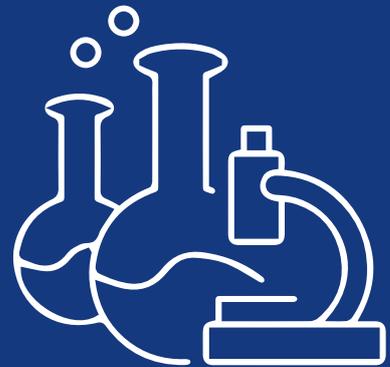
2020 KEY RESEARCH STATISTICS AT A GLANCE

632 active research staff across NSLHD



435

active clinical trials



1395

matters reviewed by research ethics and governance

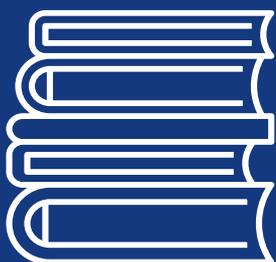
221

governance applications



49

committee meetings across human, animal and institutional biosafety



1332

peer reviewed papers

NURSING AND MIDWIFERY

The Nursing and Midwifery Directorate and the Nursing and Midwifery Research Centre work together to support the research activities of nurses and midwives across the district. In their pursuit of excellence in practice, our nurses and midwives continue to demonstrate improved outcomes for patients and the research the team undertakes is used to inform and shape clinical practice, education, research and healthcare policy.

Nursing and midwifery is a multidisciplinary network that collaborates with many health professionals on targeted research priority areas. Together with medical colleagues, allied health and industry partners, nurses and midwives continue to showcase their leadership, expertise and contribution to applied healthcare research which is changing our workplace and narrowing the clinician-researcher theory-practice gap.

Nursing and midwifery has partnerships with local universities that bring rigour, creativity and innovation to the health space and also helps to create meaningful practice change and support clinical innovation, integration and translation.

Major grants (Greater than \$200,000)

- ▶ Chappell L, Woodward M, Norton R, Hammond N, et al. Understanding the sex and gender dimensions on women's health and wellbeing (\$210,313.00). University of NSW COVID-19 Rapid Response Research Initiative; 2020
- ▶ Curtis K, Fry M, Considine J, Murphy M, Shaban R. Implementing evidence to improve access, equity and quality of emergency and trauma care and maximise patient and health service outcomes (\$358,091.00). Thyne Reid Foundation; 2020
- ▶ Hammond N. Delineating the role of fludrocortisone and hydrocortisone in the management of patients with septic shock (\$553,664.00). NHMRC Investigator Grant; 2020

Ongoing research studies led by NSLHD nurses and midwives include:

- ▶ Oli™ pilot study – ensuring the Oli™ technology is developed to work best for all users in pregnancy and labour monitoring
- ▶ Strengthening the safety culture of acute mental health in-patient units in NSW
- ▶ Incorporating clinical informatics to describe the electronic prescribing practices of nurse practitioners in NSLHD to enhance patient safety and quality of care

NURSING AND MIDWIFERY 2020 RESEARCH HIGHLIGHTS

\$1.5M

in grant funding
(27 applications)

74 PAPERS

published in
peer-reviewed journals

25

research education
sessions provided by the
Nursing and Midwifery
Research Centre



OLI GIVES NEW INSIGHTS IN PREGNANCY

A landmark study into maternal and fetal monitoring is underway at Royal North Shore Hospital and has the potential to help change the way monitoring occurs for the first time in 55 years.

As part of the Oli study, 120 pregnant women will be recruited to use new wireless monitoring that offers new measures, which it is hoped, if successful, could replace current invasive monitoring that can restrict the mother's movements during labour.

The Oli is a wireless patch that monitors key measures impacting mother and baby during pregnancy and labour. Providing details surrounding the quality of uterine activity, maternal and fetal wellbeing, movements and exertion, Oli is being developed to be used before birth, providing information on how a labour is presenting and progressing.

Designed by Baymatob, a company founded by engineer and mother-of-three Dr Sarah McDonald after her second birth, the device is now entering its second human clinical study, where midwives at RNSH hope the data collected will shine a light on mother and baby monitoring.

Michelle de Vroome, Network Manager Midwifery Practice, NSLHD, said the current cardiotocography (CTG) monitoring really hadn't changed since 1965, measuring the same parameters.

Women in labour are currently monitored via two devices strapped to thick bands wrapped around their torsos, one with a fetal heart rate sensor, the other to track the frequency of contractions. These are then either connected directly to a CTG machine, limiting movement, or wirelessly over a short distance to the CTG machine.

The Oli has the potential to help cut the rates of unnecessary interventions, and where needed, intervene earlier to avoid complications.

Following the results, a larger clinical trial across the state is expected to be conducted.

Publication highlights include:

- Elliott R, Fry M. Psychological capital, well-being, and patient safety attitudes of nurses and midwives: A cross-sectional survey. *Nurs Health Sci.* 2020 Dec 31. doi: 10.1111/nhs.12808
- Fitzgerald E, Hammond N, Tian DH, Bradford C, Flower O, Harbor K, et al.. Functional outcomes at 12 months for patients with traumatic brain injury, intracerebral haemorrhage and subarachnoid haemorrhage treated in an Australian neurocritical care unit: A prospective cohort study. *Aust Crit Care.* 2020 33(6):497-503. doi: 10.1016/j.aucc.2020.03.006
- McKechnie D, Fisher MJ, Pryor J, McKechnie R. Predictors of unplanned readmission to acute care from inpatient brain injury rehabilitation. *Journal of Clinical Nursing.* 2020;29(3-4):593-601. Doi: 10.1111/jocn.15118
- Tinker M, Elliott R, Roach V. Save our skin: A pressure injury reduction project targeting pressure injuries acquired in the intensive care unit. *Wound Pract Res.* 2020;28(3):106-14. doi: 10.33235/wpr.28.3.106-114
- Yarad E, O'Connor A, Meyer J, Tinker M, Knowles S, Li Y, et al. Prevalence of pressure injuries and the management of support surfaces (mattresses) in adult intensive care patients: A multicentre point prevalence study in Australia and New Zealand. *Aus Crit Care.* 2020 34(1): 60-66. doi:10.1016/j.aucc.2020.04.153

ALLIED HEALTH

The Allied Health Network includes research within, across, and beyond NSLHD, focusing on the role of allied health professionals in patient care, from assessment and diagnosis to the informed and effective management of patients across the life-span. The NSLHD Allied Health Research team works to encourage the participation of allied health clinicians in research activities.

The Allied Health Research Committee (AHRC) assists in building research and promotes evidence-based practice and research within allied health disciplines. In 2020, the committee brought together key allied health clinicians, managers and research leaders from across the district to develop an allied health research action plan. Together the committee and research team will work with key partners to implement the research action plan.

Our allied health team at NSLHD has important partnerships with Sydney Musculoskeletal, Bone and Joint Health Alliance (Sydney MSK), University of Sydney, CSIRO, Sydney Health Partners, the Kolling Institute and the NSW Health Agency for Clinical Innovation, as well as many important industry partners. Our early stage research is supported by Allied Health Kickstarter Research Grants, funded by NSLHD and the University of Sydney.

Key 2020 Allied Health Research Projects include:

- Neuromuscular mechanisms underlying poor recovery from whiplash injuries
- Supervised machine learning methods in the field of deep learning artificial intelligence, to solve complex clinical pattern recognition problems
- A stress-diathesis model of chronic musculoskeletal conditions as a new framework to drive prevention and rehabilitation forward
- MRI and machine learning to improve early prognosis and clinical management after spinal cord injury
- Can changes in oropharyngeal morphometry explain self-reported dysphagia and dysphonia in patient with whiplash associated disorder?
- What influences eating behaviours of consumers with chronic schizophrenia?
- Diagnostic lung ultrasound in critical care: evaluation of the short-term effectiveness of physiotherapy treatment
- Experiences of stigma and discrimination experienced by people from a culturally and linguistically diverse background while accessing mental health services and seeking care for musculoskeletal conditions
- Mobile health technology solutions to expand pulmonary rehabilitation services for chronic obstructive pulmonary disease: The m-PR™ Implementation Project

Professor
James Elliott



CASE STUDY

Treatment of whiplash injuries could be modified following research which found even minor motor vehicle accidents can cause a long-term spinal cord injury.

Researchers from the Northern Sydney Local Health District/University of Sydney along with scientists from Northwestern University, Stanford University and the University of Oklahoma conducted the longitudinal study involving participants who had been involved in a relatively simple motor vehicle collision.

Using advanced MRI imaging, the research team identified profound changes in the health and integrity of spinal cord pathways of female participants who were still experiencing health issues one year after their crash.

NSLHD Professor of Allied Health James Elliott said researchers believed the changes represent a more severe injury than what might be expected from a typical low speed car crash, and would not normally be detected with conventional imaging scans.

The research indicated these patients may have experienced an incomplete spinal cord injury, which was linked to a range of associated health issues.

“Whiplash-associated-disorders are the most common outcome for the 2.6 million Australians and four million Americans involved in a non-catastrophic motor vehicle collision every year,” he said.

“Half of those injured recover rapidly, but the other half continue to experience long-term health issues, with neck pain the most common symptom.

“Whiplash-associated-disorders are a leading cause of disability worldwide. They represent a considerable financial burden, costing the Australian economy around \$1 billion a year, and the American economy more than \$USD100 billion per annum.”

Selected publications

- ▶ Elliott, J. M., Parrish, T. B., Walton, D. M., Vassallo, A. J., Fundaun, J., Wasielewski, M., & Courtney, D. M. (2020). Does overall cervical spine pathology relate to the clinical heterogeneity of chronic whiplash?. *The American journal of emergency medicine*, 38(5), 869-873. DOI: 10.1016/j.ajem.2019.06.052
- ▶ Kessler, R. C., Ressler, K. J., House, S. L., Beaudoin, F. L., An, X., Stevens, J. S., ... & McLean, S. A. (2020). Socio-demographic and trauma-related predictors of PTSD within 8 weeks of a motor vehicle collision in the AURORA study. *Molecular psychiatry*, 1-14. DOI: 10.1038/s41380-020-00911-3
- ▶ Milne, S. C., Corben, L. A., Roberts, M., Szmulewicz, D., Burns, J., Grobler, A. C., ... & Delatycki, M. B. (2020). Rehabilitation for ataxia study: protocol for a randomised controlled trial of an outpatient and supported home-based physiotherapy programme for people with hereditary cerebellar ataxia. *BMJ open*, 10(12), e040230. DOI: 10.1136/bmjopen-2020-040230
- ▶ Pagano, L., McKeough, Z., Wootton, S., Crone, S., Pallavicini, D., Chan, A. S., ... & Dennis, S. (2020). The feasibility of an innovative GP-physiotherapist partnership to identify and manage chronic obstructive pulmonary disease (INTEGRATED): study protocol. *Pilot and feasibility studies*, 6(1), 1-10. DOI: 10.1186/s40814-020-00680-4
- ▶ Sinn, F. S., Charters, E., Stone, D., Janabi, M., & Bogaardt, H. (2020). Responsiveness of the EAT-10 to Clinical Change in Head and Neck Cancer Patients with Dysphagia. *International journal of speech-language pathology*, 22(1), 78-85. DOI: 10.1080/17549507.2019.1596312

MENTAL HEALTH, DRUG AND ALCOHOL

MENTAL HEALTH

In psychiatry, research is integrated into clinical practice and involves a number of academic and clinical psychiatry groups. It spans mood disorders, consultation liaison psychiatry and drug and alcohol services.



The CADE Clinic

A good example of how we integrate mental health research into clinical practice is the CADE Clinic, which is embedded within the Royal North Shore Hospital Department of Academic Psychiatry. The clinic is a statewide specialist service that acts as a hub for clinical education research and education for NSLHD, the University of Sydney and the Kolling Institute.

The CADE team has developed strong national and international collaborations involving world-renowned experts. In addition to contributing directly to research, these international networks have been key in the development of national guidelines for the management of mood disorders – impacting policy-making nationally and internationally via the World Health Organization.

CADE Clinic Publication highlights include:

- Malhi GS, Bell E, Bassett D, et al. The 2020 Royal Australian and New Zealand College of Psychiatrists clinical practice guidelines for mood disorders. *Aust N Z J Psychiatry*. Jan 2021;55(1):7-117. doi:10.1177/0004867420979353
- Malhi GS, Bell E, Boyce P, et al. The 2020 Royal Australian and New Zealand College of psychiatrists clinical practice guidelines for mood disorders: Bipolar disorder summary. *Bipolar Disord*. Dec 2020;22(8):805-821. doi:10.1111/bdi.13036
- Malhi GS, Bell E, Singh AB, et al. The 2020 Royal Australian and New Zealand College of Psychiatrists clinical practice guidelines for mood disorders: Major depression summary. *Bipolar Disord*. Dec 2020;22(8):788-804. doi:10.1111/bdi.13035
- Malhi GS, Das P, Outhred T, Bryant RA, Calhoun V. Role of self-focussed reappraisal of negative emotion in emergence of emotional symptoms in adolescent girls. *Br J Psychiatry*. Jul 2020;217(1):383-389. doi:10.1192/bjp.2019.255
- McIntyre RS, Berk M, Brietzke E, et al. Bipolar disorders. *The Lancet*. 2020/12/05/2020;396(10265):1841-1856. doi:https://doi.org/10.1016/S0140-6736(20)31544-0

DRUG AND ALCOHOL

The NSLHD Drug and Alcohol service has a strong focus on research. In 2020, the group delivered its first research strategy, which is aligned with the NSLHD Research Strategy 2019-2024, and demonstrates the value the group puts on supporting research. In the last three years, the number of research projects grew from one to 20 projects. The drug and alcohol group was also invited to join the NSW Ministry of Health-sponsored Drug and Alcohol Clinical Research and Improvement Network.

Key 2020 drug and alcohol research projects include:

- Pilot study of an internet-based, simulated teachable moment for smoking cessation
- Defining the clinical role of topiramate in the treatment of alcohol dependence in Australia
- Real world efficacy of antiviral therapy in chronic hepatitis C (REACH-C)
- An open-label, multicentre, single-arm trial of monthly injections of extended release buprenorphine in people with opioid dependence (CoLAB Extension Study)
- Examining clinical outcomes and quality indicators for clients attending NSW AOD treatment services Amphetamine Type Substances (ATS) group (Clinical Outcomes and Quality Indicators Cohort Study)
- Obtaining normative substance use data for clients attending NSW public drug and alcohol treatment services (Clinical Outcomes and Quality Indicators Cohort Study).
- NSW dried blood spot self-sampling HIV and hepatitis C testing pilot program
- Australian longitudinal study of heroin dependence

Publication highlights include:

- Grebely J, Read P, Cunningham EB, et al. Elbasvir and grazoprevir for hepatitis C virus genotype 1 infection in people with recent injecting drug use (DARLO-C): An open-label, single-arm, phase 4, multicentre trial. *Health Sci Rep.* Jun 2020;3(2):e151. doi:10.1002/hsr2.151
- Kloft L, Otgaar H, Blokland A, et al. Cannabis increases susceptibility to false memory. *Proc Natl Acad Sci U S A.* Mar 3 2020;117(9):4585-4589. doi:10.1073/pnas.1920162117
- Lintzeris N, Monds LA, Bravo M, et al. Designing, implementing and evaluating the overdose response with take-home naloxone model of care: An evaluation of client outcomes and perspectives. *Drug Alcohol Rev.* Jan 2020;39(1):55-65. doi:10.1111/dar.13015
- Mills L, Lintzeris N, Bruno R, et al. Validation of the Australian Treatment Outcomes Profile for use in clients with cannabis dependence. *Drug Alcohol Rev.* May 2020;39(4):356-364. doi:10.1111/dar.13050
- Valerio H, Alavi M, Silk D, et al. Progress towards elimination of hepatitis C infection among people who inject drugs in Australia: The ETHOS Engage Study. *Clin Infect Dis.* May 18 2020;doi:10.1093/cid/ciaa571

ACUTE AND CRITICAL CARE

EMERGENCY MEDICINE RESEARCH

The emergency department (ED) at RNSH is one of the busiest EDs in NSW, seeing over 90,000 patients per year. The RNSH ED research unit has the task of undertaking medical research on the wide spectrum of patients who walk through its doors.

In 2020, the research team included a project support officer, 20 research volunteers and doctors, nurses, medical students, PhD students from the ED and many other disciplines at RNSH, as well as researchers from other hospitals, interstate and overseas.

The ED is an area of medicine that demands high quality medical research so we can provide better treatment for patients, however it is a difficult area of the hospital in which to perform research due to the large patient numbers and their high medical acuity, and the need for research funding.

Currently, the RNSH ED is conducting more than 20 research projects in areas including bicycle injuries; musculoskeletal injuries including back, neck and knee pain; pain relief in fractures and the use of diagnostic ultrasound in EDs. In the past three years, the research group has published more than 20 scientific journal papers.



BICYCLE INJURIES STUDY

RNSH Emergency Department is undertaking one of the largest research projects on bicycle-related injuries. The study has been ongoing for the past two years and has already recruited over 400 participants.

The study aims to provide an overview of the patterns of injuries to bicycle riders and look at associations of these injuries that may suggest changes to riding patterns, equipment and roadways which may help to improve health outcomes.



Key 2020 ED research projects include:

- The creation of an Emergency Department Airway Registry: a multicentre observational trial into the procedure of ED intubation. This ongoing data collection into its sixth year and is now the world's largest airway database
- Use of High-Risk Influenza Stratification Test (HIST) in patients with suspected influenza infection: a multi-centre study that utilises a blood-based test to stratify patients with suspected influenza into low- and high-risk groups for developing severe disease
- Nurse Initiated Fascial Iliacus Block (FIB) Study: is a prospective randomised control trial reviewing the implementation, timeliness and efficacy of early Nurse Initiated FIB compared to standard medically instigated FIB
- Hypertensive emergencies: a systematic review that will generate an NSLHD guideline for hypertensive crises
- A systematic review of emergency physician limited point compression ultrasound to diagnose proximal deep venous thrombosis
- The PACE Study: an NHMRC-funded study reviewing the impact of an intensive multi-modal intervention program for patients presenting to ED with lower back, knee and neck pain

INTENSIVE CARE UNIT (ICU) RESEARCH

ICU research at NSLHD includes investigator-initiated, collaborative group, and industry-sponsored studies. Our ICU researchers have strong partnerships with many leading Australian and international research institutions, including The George Institute for Global Health (UNSW, Sydney), ANZCIS Research Centre (Monash University), Brain and Mind Centre (University of Sydney), Macquarie University, and the Canadian Critical Care Trials Group.

The RNSH ICU research group has a strong history of supporting staff through higher degree research programs; several staff have been awarded research degrees by thesis as an extension of registrar research projects, and the group is currently supporting seven PhD candidates.

At RNSH, ICU research is supported via a research education program with regular registrar teaching on evidence-based medicine, a monthly journal club, and the provision of a clinical research course. This provides an excellent support structure for trainees completing their professional college projects.

Publication highlights include:

- Groves CP, Butland BK, Atkinson RW, Delaney AP, Pilcher DV. Intensive care admissions and outcomes associated with short-term exposure to ambient air pollution: a time series analysis. *Intensive Care Med.* Jun 2020;46(6):1213-1221. doi:10.1007/s00134-020-06052-z
- Litton E, Bass F, Dickson C, et al. Prophylactic Intra-Aortic Balloon Counterpulsation in High Risk Cardiac Surgery: The PINBALL Pilot Multicentre, Registry-Linked, Randomised, Controlled Feasibility Trial. *Heart Lung Circ.* May 2020;29(5):710-718. doi:10.1016/j.hlc.2019.04.006
- Luethi N, Bailey M, Higgins A, et al. Gender differences in mortality and quality of life after septic shock: A post-hoc analysis of the ARISE study. *J Crit Care.* Feb 2020;55:177-183. doi:10.1016/j.jcrc.2019.11.002
- Mackle D, Bellomo R, Bailey M, et al. Conservative Oxygen Therapy during Mechanical Ventilation in the ICU. *N Engl J Med.* Mar 12 2020;382(11):989-998. doi:10.1056/NEJMoa1903297
- Narayan SW, Castelino R, Hammond N, Patanwala AE. Effect of mannitol plus hypertonic saline combination versus hypertonic saline monotherapy on acute kidney injury after traumatic brain injury. *J Crit Care.* Jun 2020;57:220-224. doi:10.1016/j.jcrc.2020.03.006

CANCER

CANCER RESEARCH

For our broad cancer research program at NSLHD, 2020 presented an opportunity to rethink our research efforts, with the COVID-19 pandemic resulting in enforced changes on interactions, realigned priorities, and limits on many routine research activities such as experimental laboratory-based research.

In response to these challenges, clinical and scientist cancer researchers developed a clinically focused, patient-centric theme for data generation, to implement real-time data capture and mining, and increase the available information, for example, from genome sequencing of biological samples.

As well, NSLHD researchers played a leading role in providing national and global advice around COVID-19.

Sydney Vital, a translational cancer research centre based at NSLHD, continued its translational and capacity-building activities in the district and was among the earliest research bodies to hold a face-to-face research symposium in November 2020 following the COVID-19 pandemic.

In November 2020, Royal North Shore Hospital was announced as the preferred site for the National Imaging Facility's "Total Body PET" (Positron Emission Tomography) scanner project. This is a \$15 million collaboration between the Australian Government, University of Sydney and NSLHD, which will greatly enhance imaging access for cancer researchers in particular, as well as in a number of other areas such as cardiovascular, immunology, neurosciences and musculoskeletal disorders.



Key 2020 drug and alcohol research projects include:

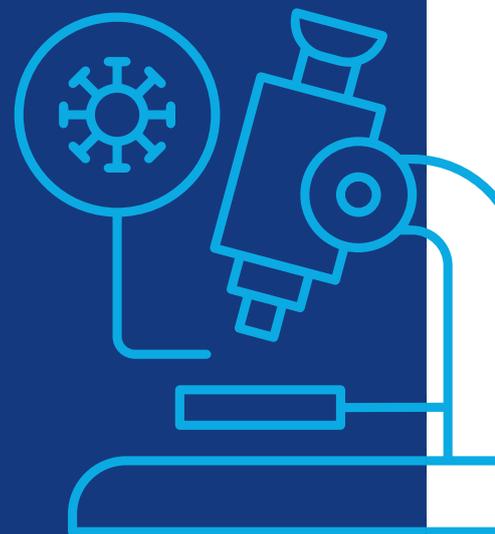
- 227 peer-reviewed publications for 2020, up 46 per cent on the previous year and a 30 per cent increase over the last five years
- \$5 million in funding from diverse sources, including NHMRC, Mark Hughes Foundation and Tour de Cure.
- NSW Premier's Outstanding Cancer Clinical Trials Unit 2019 award
- Over 50 clinical cancer trials active in 2020
- The Bill Walsh Cancer Research Laboratory continued its work in investigating the relationship between the cancer microenvironment and inflammation and added a series of experimental radiobiological studies to try to understand how radionuclides can be better used to treat a range of cancers



Our research program is also providing opportunities for early career researchers to grow and advance their careers.

Some examples include:

- › Dr David Chan, NHMRC emerging leader grant
- › Dr Wei Deng, CINSW Career Development grant and NHMRC ideas grant
- › Dr Yaser Gholami, University of Sydney Physics Grand Challenge award
- › Dr Angela Chou, a pathologist and cancer researcher at RNSH, was the winner of the 2020 NSW Premier's Award for Outstanding Cancer Research Fellow - Early Career Fellow for her insights into pancreatic cancer in collaboration with the Australian Pancreatic Genome Initiative (APGI) at the Garvan Institute



RADIATION ONCOLOGY

The radiation oncology multidisciplinary team is actively involved in cancer research and looks to improve patient outcomes through sophisticated radiotherapy. Translational research is a core focus of the group, and initiatives that were previously part of research projects conducted at NSLHD have been incorporated into standard care for patients.

We strive to be patient-centric focus on individualised treatment pathways which is reflected in publications and research themes, and radiation oncology has strong collaborations with medical oncology, surgical oncology, allied health and nursing across NSLHD.

Clinical trials are an important component of the radiation oncology research portfolio, and the group steers multiple phase I and II clinical trials for innovative treatment; for brain cancer, pancreas cancer and prostate cancer. This enables our patients to be involved in potentially life-saving treatment and access to treatments they may otherwise not have had. Our patients benefit directly through our research and involvement with clinical trials.

A key example of how radiation oncology research leads to better patient outcomes was the development of a streamlined palliative care pathway which removed the need for a simulation computed tomography (sCT) scan, meaning more prompt treatment delivery and fewer attendances for the patient.

The radiotherapy unit is a collaborative research partner with Varian Medical Systems, participating an international consortium for adaptive radiotherapy and leading development for risk assessment, adaptive cervix radiotherapy, adaptive rectal cancer radiotherapy and simulation-free palliative radiotherapy.

The district's radiotherapy unit is a reference site for US-based radiation dosimetry software company, Sun Nuclear Corporation, and for Canadian-based 3D printing software company Adaptiv. We have strong links with the University of Sydney, as a teaching and research partner.

Publications:

- Back M, Jayamanne D, Brazier D, Newey A, Bailey D, Schembri G, Hsiao E, Khasraw M, Wong M, Kastelan M, Brown C, Wheeler H. Pattern of failure in anaplastic glioma patients with an IDH1/2 mutation. *Strahlenther Onkol.* 2020 Jan;196(1):31-39. English. doi: 10.1007/s00066-019-01467-0. Epub 2019 Apr 26. PMID: 31028406
- Booth J, Caillet V, Briggs A, et al. MLC tracking for lung SABR is feasible, efficient and delivers high-precision target dose and lower normal tissue dose. *Radiother Oncol.* Feb 2021;155:131-137. doi:10.1016/j.radonc.2020.10.036
- Horsley PJ, Back M, Lamoury G, Porter B, Booth J, Eade TN. Radiation oncology during COVID-19: Strategies to avoid compromised care. *Asia Pac J Clin Oncol.* Feb 2021;17(1):24-28. doi:10.1111/ajco.13456
- Itchins M, Chua TC, Arena J, et al. Evaluation of Fluorodeoxyglucose Positron Emission Tomography Scanning in the Neoadjuvant Therapy Paradigm in Pancreatic Ductal Adenocarcinoma. *Pancreas.* Feb 2020;49(2):224-229. doi:10.1097/mpa.0000000000001472
- Oar A, Lee M, Le H, et al. Australasian Gastrointestinal Trials Group (AGITG) and Trans-Tasman Radiation Oncology Group (TROG) Guidelines for Pancreatic Stereotactic Body Radiation Therapy (SBRT). *Pract Radiat Oncol.* May-Jun 2020;10(3):e136-e146. doi:10.1016/j.prro.2019.07.018

2020 RADIATION ONCOLOGY RESEARCH HIGHLIGHTS INCLUDE:

11 clinical trials in recruitment

13 publications

19 invitations for conference presentations



CHILDREN AND YOUNG PEOPLE

The Children and Young People Clinical Network brings together multidisciplinary clinician-researchers from across NSLHD, including the acute and community health care services related to infants, children, young people and their families.

Research across the network focuses on improving the health and wellbeing of children and families; improving models of care to deliver the highest quality care; understanding and responding to workforce needs; best practice in respond to emerging health needs; COVID-19; the First 2000 days policy framework; and paediatric endocrinology and diabetes.

The network has important research partnerships with the University of Sydney, University of Technology Sydney, Children's Inpatient Research Collaboration of Australia and New Zealand (CIRCAN), University of Newcastle, NSW Ministry of Health, Sydney Children's Hospitals Network (SCHN) and many other industry and academic groups.

A key project for the network in 2020 was the Focus on New Fathers pilot, a study conducted in conjunction with Murrumbidgee, Western Sydney and Northern NSW local health districts.

Other key 2020 research projects included:

- › Simulation use in paediatric emergency nursing skills education (SUSPENSE)
- › Children's Inpatient Research Collaboration of Australia and New Zealand (CIRCAN) study of the impact of the COVID-19 pandemic on general paediatric admissions in Australia
- › Impact of the immunomodulator OM85 on wheeze-associated hospitalisation in pre-schoolers: a multi-centre, randomised, double-blind, placebo-controlled trial

Participation in these projects will continue into 2021.

Publication highlights include:

- › Johnston R, Sunners J, Murphy E. Child and family health nursing: A workforce profile. *J Nurs Manag.* Apr 2020;28(3):532-539. doi:10.1111/jonm.12953
- › Jones, C., Randall, S., & Fraser, J. (2020). Evaluation of nurse training using kirkpatrick's model: A mixed-methods approach. In *SAGE Research Methods Cases*. <https://www.doi.org/10.4135/9781529709681>

Funding highlights include:

- › Translational Research Grants Scheme (TRGS) funded research with NSLHD, South Eastern Sydney and South Western Sydney local health districts: 'First 2000 days care connect (FDCC) – a holistic first 2000 days model of care for migrant and refugee populations' research to improve early childhood development and health
- › Grant funded research: 'Improving emergency department safety through more consistent early detection and assessment of patient deterioration'

PAEDIATRIC ENDOCRINOLOGY AND DIABETES

Paediatric endocrinology and diabetes research is focused on diabetes technologies including continuous glucose monitors and insulin pumps, and their impact on patients, families and on service delivery. The group is a multi-disciplinary network that cares for a variety of complex chronic disorders at a tertiary level.

Key partnerships include Sydney Children's Hospital Randwick (SCH), with cross-appointed staff, and the University of Sydney. There is also a strong collaboration with adult diabetes and endocrine services at RNSH.



Focus on rare inherited form of diabetes

A current research collaboration that involves Sydney Children's Hospital and adult endocrinology is a project that assesses glycaemic abnormalities in patients with mature onset diabetes of the young, type 2 (MODY-2). This rare inherited form of diabetes leads to life-long mild hyperglycaemia but without the microvascular damage to eyes and kidneys that usually accompany diabetes. In this research collaboration, the team is assessing continuous glucose monitoring results in these patients. The project may determine safe glycaemic thresholds that could form targets for use in other forms of diabetes, as current targets are based on healthy individuals and attempting to target these levels often results in unacceptable hypoglycaemia in patients with diabetes.

Research into new diabetes technology

As an example of the translation of the work done by the paediatric endocrinology and diabetes research team, the SENSORS project was a timely assessment of the impact of the introduction of a national subsidy for continuous glucose monitoring on patient health, satisfaction and departmental resources. These important data were presented at the prestigious Advanced Diabetes Technology and Therapeutics Meeting in Berlin and later published in the journal of the *Royal Australasian College of Physicians Paediatrics Division* (JPCH).

The project demonstrated that patient and family expectation of sensor technology was high (as were satisfaction levels in the short term), and that there was an improvement in patients' glycaemic control, but that the technology required considerable staff resources from the endocrinology department. This project led to the launch of major ongoing diabetes technology research within the department, which will attempt to ensure these technologies deliver optimal outcomes to patients and families.

CHRONIC AND COMPLEX MEDICINE

The Chronic and Complex Medicine Network is a multidisciplinary network that includes diabetes and endocrinology, renal medicine, pain management and more recently chronic pulmonary disease and cardiac failure.

These groups comprise lab based and clinical research. Across the network, the groups continue to produce high quality basic research that has led to publications in high impact journals and led to the securing of patents for original discovery.

Important network partnerships include that with the Karolinska Institute and Massachusetts General Hospital, Stanford Pain Group, Monash Health, Melbourne Health, Baker Institute, Kings College, Walter and Eliza Hall Institute of Medical Research, JDRF Australia, National Institutes of Health, Peter McCallum Cancer Centre, UTS and NHMRC Clinical Trial Centre, the Endocrine Surgical Group, NSW Pathology and Macquarie University.

The network research committee promotes the concept of “value in research” generally, providing an atmosphere in which those not schooled in research have a forum to become involved. The importance of embedding research into daily clinical practice is a focus.

ENDOCRINOLOGY

The RNSH department of endocrinology was involved in more than 30 clinical trials and other research projects in 2020 in areas including diabetes, thyroid cancer, adrenal disease, osteoporosis, spinal cord injury and rare metabolic bone disease.

Key research projects include:

- Diabetes research: EXPECT, CREDENCE and CANVAS studies
- Thyroid cancer: LIBRETTO-001 and COSMIC studies
- Adrenal diseases: PROSALDO study
- Rare metabolic bone diseases: PVO

In 2020, the endocrinology department was also involved in conducting several COVID-19-related research projects, including the COVID-SHIELD trial, the ASCOT trial and the SMELLY study.



CASE STUDY

For many people with COVID-19, the first sign they had the virus was a loss in their sense of smell.

A team from the Kolling Institute and Royal North Shore Hospital investigated the correlation between the virus and early symptoms.

Study lead Associate Professor Rory Clifton-Bligh said a loss of smell had emerged as a common symptom of COVID-19 infection, but the current data is relying on subjective, self-reported information.

“This study will objectively assess loss of smell with people who have tested positive to COVID-19,” Associate Professor Clifton-Bligh said.

“We will be using a validated test kit for smell identification. Depending upon our findings, it may then be possible to develop a rapid screening test.

“It’s really pleasing to be involved in such an important study, and we hope it will assist early diagnosis of the virus and future treatment options.

“We hope it will potentially help a large number of people across Australia.”

RNSH Head of Neurogenetics and Executive Director of the Kolling Institute Professor Carolyn Sue said the smell test had been

used before to assess patients with other medical conditions and found it easy to do and interpret.

“This new application of the smell test is an exciting way to combine our past expertise with new research collaborations to help solve COVID-19 related health problems for our patients and the general community,” she said.

The study team recruited patients who tested positive to COVID-19 and were monitored through the Royal North Shore Virtual Hospital or had been admitted to RNSH with mild-moderate COVID-19 illness.



Rory Clifton Bligh

Publication highlights include:

- Fuchs TL, Nassour AJ, Glover A, Sywak MS, Sidhu SB, Delbridge LW, Clifton-Bligh RJ, Gild ML, Tsang V, Robinson BG, Clarkson A, Sheen A, Sioson L, Chou A, Gill AJ. A Proposed Grading Scheme for Medullary Thyroid Carcinoma Based on Proliferative Activity (Ki-67 and Mitotic Count) and Coagulative Necrosis. *Am J Surg Pathol*. 2020 Oct;44(10):1419-1428. doi: 10.1097/PAS.0000000000001505. PMID: 32452872; PMCID: PMC7641183
- Gild ML, Bullock M, Luxford C, Field M, Clifton-Bligh RJ. Congenital Hypoparathyroidism Associated With Elevated Circulating Nonfunctional Parathyroid Hormone Due to Novel PTH Mutation. *J Clin Endocrinol Metab*. 2020 Jul 1;105(7):dgaa279. doi: 10.1210/clinem/dgaa279. PMID: 32421798
- Glastras SJ, Cohen N, Dover T, Kilov G, MacIsaac RJ, McGill M, Fulcher GR. The Clinical Role of Insulin Degludec/Insulin Aspart in Type 2 Diabetes: An Empirical Perspective from Experience in Australia. *J Clin Med*. 2020 Apr 11;9(4):1091. doi: 10.3390/jcm9041091. PMID: 32290465; PMCID: PMC7230791
- Scott ES, Januszewski AS, O’Connell R, Fulcher G, Scott R, Kesaniemi A, Wu L, Colagiuri S, Keech A, Jenkins AJ. Long-Term Glycemic Variability and Vascular Complications in Type 2 Diabetes: Post Hoc Analysis of the FIELD Study. *J Clin Endocrinol Metab*. 2020 Oct 1;105(10):dgaa361. doi: 10.1210/clinem/dgaa361. PMID: 32766757
- Wirth LJ, Sherman E, Robinson B, Solomon B, Kang H, Lorch J, Worden F, Brose M, Patel J, Lebourneux S, Godbert Y, Barlesi F, Morris JC, Owonikoko TK, Tan DSW, Gautschi O, Weiss J, de la Fouchardièrre C, Burkard ME, Laskin J, Taylor MH, Kroiss M, Medioni J, Goldman JW, Bauer TM, Levy B, Zhu VW, Lakhani N, Moreno V, Ebata K, Nguyen M, Heirich D, Zhu EY, Huang X, Yang L, Kherani J, Rothenberg SM, Drilon A, Subbiah V, Shah MH, Cabanillas ME. Efficacy of Selpercatinib in RET-Altered Thyroid Cancers. *N Engl J Med*. 2020 Aug 27;383(9):825-835. doi: 10.1056/NEJMoa2005651. PMID: 32846061

CANCER GENETICS LABORATORY

The cancer genetics laboratory, based at RNSH, focuses on hereditary endocrine tumour syndromes. The diagnostic laboratory is NATA-accredited for genetic testing and is a main referral laboratory for multiple endocrine neoplasia syndromes.

In 2020, five PhD students worked with the laboratory, on the projects including:

- Prevalence and penetrance of SDHB disease
- New treatments for metastatic pheochromocytoma
- FOXE1 and TERT – developmental origins of thyroid cancer
- Thyroid toxicity from immunotherapies
- Improving radioactive iodine choices in thyroid cancer

The other ongoing research projects included the study of telomerase regulation in thyroid cancer, molecular mechanisms of SDH (succinate dehydrogenase) deficiency in pheochromocytomas, and the Australasian SDH Consortium study.

Key research projects include:

- Dr Chris Muir and Dr Ayanthi Wijewardene were recognised as finalists for Bryan Hudson Prize Session, hosted by the Endocrine Society of Australia 2020
- Associate Professor Rory Clifton-Bligh was invited as a speaker at the Asia Oceania Congress of Endocrinology (AOCE-SICEM), Seoul, Korea (virtual) in October 2020
- Dr Trish Dwight was awarded a Perpetual IMPACT Philanthropy Program grant for a project to help uncover genetic drivers for rare neuroendocrine tumours, the 'Discovery of new genes in pheochromocytoma and paraganglioma'

Publication highlights include:

- Dahia PLM, Clifton-Bligh R, Gimenez-Roqueplo AP, Robledo M, Jimenez C. HEREDITARY ENDOCRINE TUMOURS: CURRENT STATE-OF-THE-ART AND RESEARCH OPPORTUNITIES: Metastatic pheochromocytomas and paragangliomas: proceedings of the MEN2019 workshop. *Endocr Relat Cancer*. 2020 Aug;27(8):T41-T52. doi: 10.1530/ERC-19-0435. PMID: 32069214; PMCID: PMC7334096
- Dwight T, Kim E, Bastard K, Benn DE, Eisenhofer G, Richter S, Mannelli M, Rapizzi E, Prejbisz A, Pęczkowska M, Pacak K, Clifton-Bligh R. Functional significance of germline EPAS1 variants. *Endocr Relat Cancer*. 2021 Feb;28(2):97-109. doi: 10.1530/ERC-20-0280. PMID: 33300499; PMCID: PMC7989857
- Seabrook AJ, Harris JE, Velosa SB, Kim E, McInerney-Leo AM, Dwight T, Hockings JI, Hockings NG, Kirk J, Leo PJ, Love AJ, Luxford C, Marshall M, Mete O, Pennisi DJ, Brown MA, Gill AJ, Hockings GI, Clifton-Bligh RJ, Duncan EL. Multiple Endocrine Tumors Associated with Germline MAX Mutations: Multiple Endocrine Neoplasia Type 5? *J Clin Endocrinol Metab*. 2021 Mar 25;106(4):1163-1182. doi: 10.1210/clinem/dgaa957. PMID: 33367756
- Thompson LDR, Gill AJ, Asa SL, Clifton-Bligh RJ, de Krijger RR, Kimura N, Komminoth P, Lack EE, Lenders JWM, Lloyd RV, Papanthomas TG, Sadow PM, Tischler AS. Data set for the reporting of pheochromocytoma and paraganglioma: explanations and recommendations of the guidelines from the International Collaboration on Cancer Reporting. *Hum Pathol*. 2021 Apr;110:83-97. doi: 10.1016/j.humpath.2020.04.012. Epub 2020 May 11. PMID: 32407815; PMCID: PMC7655677

DIABETES RESEARCH

The diabetes research group includes basic and clinical research activities.

Basic research is led by Associate Professor Sarah Glastras, who has a major interest in maternal factors that influence pregnancy outcomes; her expertise in this field has led to the publication of reviews and guidelines.

Lab-based research involves epigenetic changes (how behaviours and environment can cause changes that the way genes work) while clinical research has focused on diabetes complications, obesity and the impact of diabetes on both pregnancy and resultant offspring.

Diabetes education unit is currently planning audits of a novel way to optimise insulin management; and a new approach to integrated care for diabetes management.

The NSLHD Diabetes Network has also focused on new therapies, diabetes complications, obesity and the impact of diabetes on both pregnancy and the resultant offspring. Integrated care for patients with diabetes and renal disease as co-existing conditions has been the focus of several important collaborations.

The COVID-19 pandemic has also driven research projects in both renal medicine and diabetes and the activities of the clinical trial group in diabetes has been associated with recent publications.

Publication highlights include:

- Brendon L. Neuen, Toshiaki Ohkuma, Bruce Neal, David R. Matthews, Dick de Zeeuw, Kenneth W. Mahaffey, Greg Fulcher, Jaime Blais, Qiang Li, Meg J. Jardine, Vlado Perkovic, David C. Wheeler, Relative and Absolute Risk Reductions in Cardiovascular and Kidney Outcomes With Canagliflozin Across -KDIGO Risk Categories: Findings From the CANVAS Program. *Am J Kidney Disease* 2020
- Glastras SJ, Cohen N, Dover T, Kilov G, Macisaac RJ, McGill M, Fulcher GR. The Clinical Role of Insulin Degludec/Insulin Aspart in Type 2 Diabetes: An Empirical Perspective from Experience in Australia. *J Clin Med.* 2020 Apr 11;9(4):1091. doi: 10.3390/jcm9041091
- Mehta R, Chen R, Hirose T, Matthew J, Kok A, Lehmann R, Unnikrishnan AG, Yavuz DG, Fulcher G. Practical use of insulin degludec/insulin aspart in a multinational setting: Beyond the guidelines. *Diabetes Obes Metab.* 2020; 1-15
- Natassia Rodrigo, Sarah J. Glastras. Pathophysiology Underpinning Gestational Diabetes Mellitus and the Role of Biomarkers for its Prediction. *EMJ.* 2020; DOI/10.33590/emj/19-00150
- Victoria L. Rudland, Sarah A.L. Price, Ruth Hughes, Helen L. Barrett, Janet Lagstrom, Cynthia Porter, Fiona L. Britten, Sarah Glastras, Ian Fulcher, Peter Wein, David Simmons, H. David McIntyre. Leonie Callaway. ADIPS 2020 guideline for pre-existing diabetes and pregnancy. *Aust N Z J Obstet Gynaecol* 2020; 60: E18-E52



RENAL MEDICINE

The renal medicine group continued to produce high quality basic research that led to publications in high impact journals and the securing of two patents for original discovery.

The renal laboratory studies the role of epigenetics in renal disease, the impact of maternal factors on the health of the offspring and the factors that are associated with renal fibrosis.

Importantly, the mechanisms, and factors leading to the progression of chronic kidney disease has been studied at both a basic and clinical level. The group has secured more than \$10 million in research grants and philanthropic funds since 2018 and has 24 active clinical trials (as of December 2020). The renal leads, Professor Carol Pollock and Dr Muh Geot Wong, are frequently invited speakers at national and international conferences, and are recognised as leaders in their field.

The renal clinical trial unit has a track record of participating in several phase II to phase IV clinical research over the past 21 years. The unit covers renal trials that include but are not limited to chronic kidney disease, diabetic kidney disease, cardiovascular health, glomerular disease, dialysis and its related complications, transplantation, hypertension, renal supportive care, and pregnancy related outcomes.

The unit has successfully contributed to evidence generation and translation medicine and has made significant impact on clinical care.

FUNDING HIGHLIGHTS FOR THE RENAL GROUP INCLUDE:

\$2.6M Medical Research Future Fund (MRFF) grant, to trial metformin therapy to ease the decline of kidney function in polycystic kidney disease (PKD).

\$5.5M NHMRC project grant, to trial the treatment of cardiovascular disease with low dose rivaroxaban in advanced chronic kidney disease (CKD).

\$1.4M MRFF grant, to trial repurposing existing medications to reduce severe acute respiratory distress in COVID patients.

Publication highlights include:

- Cannon CP, Perkovic V, Agarwal R, Baldassarre J, Bakris G, Charytan DM, de Zeeuw D, Edwards R, Greene T, Heerspink HJL, Jardine MJ, Levin A, Li JW, Neal B, Pollock C, Wheeler DC, Zhang H, Zinman B, Mahaffey KW. Evaluating the Effects of Canagliflozin on Cardiovascular and Renal Events in Patients With Type 2 Diabetes Mellitus and Chronic Kidney Disease According to Baseline HbA1c, Including Those With HbA1c <7%: Results From the CREDENCE Trial. *Circulation*. 2020 Feb 4;141(5):407-410. doi: 10.1161/CIRCULATIONAHA.119.044359. Epub 2019 Nov 11. PMID: 31707795
- Habibalahi A, Moghari MD, Campbell JM, Anwer AG, Mahbub SB, Gosnell M, Saad S, Pollock C, Goldys EM. Non-invasive real-time imaging of reactive oxygen species (ROS) using auto-fluorescence multispectral imaging technique: A novel tool for redox biology. *Redox Biol*. 2020 Jul;34:101561. doi: 10.1016/j.redox.2020.101561. Epub 2020 May 12. PMID: 32526699; PMCID: PMC7287272
- Panchapakesan U, Pollock C. Organ protection beyond glycaemic control with SGLT2 inhibitors. *Nat Rev Nephrol*. 2021 Apr;17(4):223-224. doi: 10.1038/s41581-020-00373-4. PMID: 33159190
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- Wong MY, Saad S, Wong MG, Stangenberg S, Jarolimek W, Schilter H, Zaky A, Gill A, Pollock C. Semicarbazide-sensitive amine oxidase inhibition ameliorates albuminuria and glomerulosclerosis but does not improve tubulointerstitial fibrosis in diabetic nephropathy. *PLoS One*. 2020 Jun 18;15(6):e0234617. doi: 10.1371/journal.pone.0234617. PMID: 32555665; PMCID: PMC7302447



PAIN MANAGEMENT

The Pain Management Research Institute (PMRI) is a recognised research centre and clinical facility of NSLHD and the Faculty of Medicine and Health at the University of Sydney.

The PMRI includes 38 academic and 11 professional staff who focus on research and education, with research led by more than a dozen staff members. Our pain department, via the PMRI, conducts a wide range of clinical trial activity and other research projects, with a focus on chronic pain that has both a biological (neuroscientific) and aversive (emotional) experience. Research streams include pain pathways, cancer survivor pain, trials of new therapies, brain behaviour and society, and social aspects of pain.

FUNDING HIGHLIGHTS FOR THE RENAL GROUP INCLUDE:

\$1.6M NHMRC grant to determine whether neuromodulation of brain rhythms can relieve chronic pain.

\$1.0M Australian Department of Health grant for pain education for health professionals: enhancing knowledge and competency in community-based pain management.

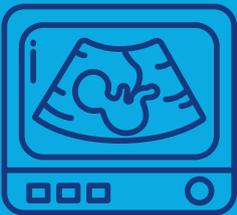
\$2.99M \$2.99m NHMRC grant to determine the role of neural and non-neural factors in preventing the transition from acute to chronic pain.

Publication highlights include:

- Karos Kai, McParland J L Bunzli S, Devan, H, Hirsh A, Kapos F, Heogh W, Moore D, Tracy L, Ashton James C. The Social threats of COVID19 for people with Chronic Pain. *Pain* 2020;161(10):2229-35
- Konen, L.M., Winters BL, Vaughan C. Opioid presynaptic disinhibition of the midbrain periaqueductal grey descending analgesic pathway. *British Journal of Pharmacology*. 2020;177:2320-32
- Konen, L.M., Vaughan, C. A new mouse line with reduced GluA2 Q/R site RNA editing exhibits loss of dendritic spines, hippocampal CA1-neuron loss, learning and memory impairments and NMDA receptor-independent seizure vulnerability. *Molecular Brain*. 2020;13:27
- Sharpe, L. Emma Jones, Claire Ashton-James, Nicholas M K, Katheryn Refshauge. Necessary components of psychological treatment in pain management programs: A Delphi study. *European Journal of Pain*. 2020;24:1160-8
- Tauben DJ, Langford DJ, Sturgeon JA, Rundell SD, Towle C, Bockman C, Nicholas M. Optimizing telehealth pain care after COVID-19. *Pain*. 2020 Nov;161(11):2437-2445. doi: 10.1097/j.pain.0000000000002048. PMID: 32826752; PMCID: PMC7566302

MATERNAL, NEONATAL & WOMEN'S HEALTH

The Maternal, Neonatal & Women's Health Network includes the Women and Babies Research team, a collaboration between NSLHD, the University of Sydney and the Kolling Institute. The group's focus is the cause, prevention and management of pregnancy complications, to improve outcomes for pregnant women and their babies.



Research translation highlights include:

'Every Week Counts', a NSW Health Translational Research Grant Scheme and Medical Research Futures Fund translation project, highlighted the importance of the final weeks of pregnancy for baby's development, amid a growing trend of birth before 39 weeks' gestation. This program continues to be implemented by hospitals in 2020 in NSW, Queensland, South Australia and Western Australia, and has been adopted by safer Care Victoria, the Australian Preterm Birth Prevention Alliance and the Australian Safer Baby Bundle.

The research goals of the group are to improve health outcomes and health service provision for women and babies by ensuring:

- All babies have the best chance of a healthy start to life
- All women have the safest pregnancy and birth experience
- Our health services have access to high quality information so that maternity care can be provided to meet the needs of women and their families
- That women can enjoy good health throughout their lifespan

The multidisciplinary team includes obstetricians, midwives, neonatologists, neonatal intensive care nurses, epidemiologists, biostatisticians, marketers and social scientists.

The group has important research partnerships with LifeBlood, the Australian Preterm Birth Prevention Alliance (APBPA), the Centre of Research Excellence in Stillbirth with the Australian Safer Baby Bundle, NHMRC Clinical Trials Centre, NSW Bureau of Health Information, NSW Centre for Big Data Research in Health, NSW Centre for Health Record Linkage, NSW Clinical Excellence Commission, NSW Ministry of Health, Perinatal Society of Australia and New Zealand (PSANZ), Sydney Health Partners, WA Women and Infants Research Foundation (WIRF) and Women's Healthcare Australasia.



Jonathan Morris



CASE STUDY

Study finds over two-thirds of twins born via C-section, almost 50 percent born prematurely and infant health declining

The rate of premature twin births in New South Wales has been steadily rising and is a concerning trend, warned Professor of Obstetrics and Gynaecology at The University of Sydney and Kolling Institute Director of Women and Babies Research Dr Jonathan Morris.

Professor Morris and his team at the Kolling Institute's Women and Babies Research group at Royal North Shore Hospital analysed over 14,000 twin pregnancies between 2003 and 2014. The research found 49 per cent of twins were born before 37 weeks and 69 per cent of all births were planned either by pre-labour caesarean or induction of labour.

During this period, there was a two per cent increase in the proportion of twin births occurring at 30 to 34 weeks, an eight per cent increase at 35 to 36 weeks and conversely a five per cent drop in the proportion of twin births at 37 to 38 weeks and a four per cent drop at 39-plus weeks gestation.

"Previous research has shown early births placed an infant at increased risk of long-term developmental problems such as poorer school performance," Professor Morris said.

"In the short-term, babies born early were more likely to need help with their breathing, be admitted to a neonatal intensive care unit, have jaundice, and spend longer in hospital."

Couples are waiting longer to start families and the use of fertility treatments and obesity has also gone up over time, raising the likelihood of twin pregnancies.

While some preterm multiple births happen spontaneously, the trend toward earlier planned births may be driven by concerns about the risk of stillbirth and increasing trends in maternal risk factors for stillbirth such as advancing age and obesity.

"Consistent with a number of studies, we found that as gestational age at birth increases, rates of neonatal morbidity decreases, and the trend toward earlier gestation at delivery in our study was concurrent with a significant increase in neonatal morbidity rates," Professor Morris said.

"We need to carefully evaluate the interventions that we undertake and make sure they're in the best interest of mums and babies."

Twins are known to be smaller than singleton babies, and the management of their growth poses some unique challenges as the wellbeing of both twins has to be considered at all times.

MUSCULOSKELETAL HEALTH, INTEGUMENTARY AND TRAUMA

MUSCULOSKELETAL

The osteoarthritis and back pain clinical research groups at NSLHD are interdisciplinary teams that focus on musculoskeletal health. The group achieved great success in 2020, with highlights detailed below.

Staff Achievements:

- › The University of Sydney Higher Degree by Research supervisor award – Professor David Hunter
- › Three Minute Thesis Finalist – Ms Emma Ho (Back Pain Group)
- › CRE infographics prize - Ms Vicky Duong (Osteoarthritis Group)
- › Three PhD awards
- › Three PhD submissions
- › Two new PhD enrolments (Osteoarthritis Group)
- › One new Honours student (Back Pain Group)



In 2020, the group released 64 publications including:

- › 10 Early Career Researcher first author publications
- › 11 PhD student first author publications
- › 5 *Lancet* publications (Impact Factor [IF]: 59.102)
- › 1 *New England Journal of Medicine* publication (IF:76.70)
- › 1 *Nature Reviews Rheumatology* publication (IF:18.545)
- › 1 *BMJ* publication (IF:30.223)



THE OSTEOARTHRITIS AND BACK PAIN CLINICAL RESEARCH GROUPS SECURED MORE THAN \$2 MILLION IN FUNDING IN 2020.



Some of the grants and fellowships received include:

- › NHMRC Partnership Grant
- › NIH
- › China Studies Centre
- › RACGP fellowship
- › Investigator Grant
- › ACI seed funding
- › APA seeding grant
- › Lincoln Grant
- › Pfizer education grant
- › NSLHD research support
- › NIHR/HTA stage 1 approval
- › Philanthropy funding (Brennan Family Foundation)
- › Department of Health – Arthritis Education



Key publications include:

- Beard D, Campbell M, Blazeby J, Carr A, Weijer C, Cuthbertson B, Buchbinder R, Pinkney T, Bishop F, Pugh J, Cousins S, Harris I, Lohmander S, Blencowe N, Gillies K, Probst P, Brennan C, Cook A, Farrah-Hockley D, Savulescu J, Huxtable R, Rangan A, Tracey I, Brocklehurst P, Ferreira ML, Nicholl J, Reeves B, Hamdy F, Rowley S, Cook J (2020) Considerations and Methods for Placebo Controls in Surgical Trials: State of the Art Review and ASPIRE Guidance. *The Lancet*; 395:828-838
- Bowden J, Hunter D, Miranda Alle Deveza L, Duong V, Dziedzic K, Allen K, Chan P, Eyles J. (2020). Core and adjunctive interventions for osteoarthritis: efficacy and models for implementation. *Nature Reviews Rheumatology*, 16(8), 434-447
- Fritsch C, Ferreira PH, Prior J, McLachlan A, Ferreira ML (2020) The effects of using text message interventions for the management of musculoskeletal pain: a systematic review. *Pain*; 161(11):2462-2475
- Safiri S, Kolahi A, Hoy D, Buchbinder R, Mansournia M, Bettampadi D, Ashrafi-Asgarabad A, Almasi-Hashiani A, Smith E, Sepidarkish M, Cross M, Qorbani M, Moradi-Lakeh M, Woolf A, March L, Collins G, Ferreira ML (2020) Global, regional, and national burden of neck pain in the general population 1990-2017: a systematic analysis of the Global Burden of Disease Study 2017. *BMJ*; 368:m791
- Vesentini G, Prior J, Ferreira PH, Hodges PW, Rudge M, Ferreira ML (2020) Pelvic floor muscle exercises for women with lumbopelvic pain: a systematic review and meta-analysis. *European Journal of Pain*. 24:1865:79, 2020

DERMATOLOGY

The dermatology service includes research in inflammatory skin disease, including atopic dermatitis, psoriasis, lichen sclerosus, lichen planus, and hidradenitis suppurativa.

Through active participation in research, the dermatology team is able to offer patients immediate access to the latest and most advanced medicines providing relief for conditions including adult and paediatric psoriasis, adult and paediatric atopic dermatitis and hidradenitis suppurativa.

Selected current studies include:

- M16-047 – a phase III clinical trial investigating efficacy of upadacitinib in combination with topical corticosteroids in adolescent and adult subjects with moderate to severe atopic dermatitis
- PROTOSTAR – a phase III clinical trial evaluating the efficacy and safety of guselkumab for chronic plaque psoriasis in paediatric patients
- HS0004 – a phase III clinical trials testing the efficacy of bimekizumab in adult subjects with moderate to severe hidradenitis suppurativa
- B7451050 – a phase III clinical trial evaluating the efficacy and safety of abrocitinib and dupilumab in adult subjects with moderate to severe atopic dermatitis
- LAAVA-2 – a phase I investigator-led clinical trial investigating the efficacy of fractional ablative CO2 laser for genitourinary symptoms of menopause

HAND SURGERY

The department of hand surgery and peripheral nerve surgery, based at RNSH, is involved in numerous research projects, including surgical outcome reviews, surgical technique developments (animal models), multi-centre international trials and publishing of case reports.

The department receives Australian and international fellows each year and each actively pursues a research project during their term. In addition, hand surgery registrars from the Australian orthopaedic and plastic surgery training schemes join the department each year and are encouraged to undertake research, as are resident medical officers and medical students.

Anatomical, mechanical and clinical studies completed within the department offer guidance on the best surgical options and outcomes for patients and regularly influence the practices of surgeons and hand therapists at NSLHD, but also at state, national and international levels. For example, a recent study on the care of spasticity patients after comprehensive one-stage upper limb surgery demonstrated a significant improvement through multidisciplinary care, which is now delivered in our multidisciplinary spasticity clinic.

Our research is often run in collaboration with important partners, including the Children's Hospital Westmead, RNSH's department of orthopaedics, tetraplegia unit, multidisciplinary spasticity clinic, and the department of physiotherapy; The Kolling Institute's Maxwell Murray Biomechanics Research Laboratory and Sutton Laboratories; The University of Sydney; international hospitals and universities (e.g. ERASMUS Medical Centre in Rotterdam, Netherlands; Loma Linda University, California, USA); and pharmaceutical companies and external groups with a hand surgery interest.

Publication highlights include:

- Haines M, Baba M, Stewart DA. Iatrogenic femur fracture following medial femoral condyle flap harvest. J Hand Surg Am. 2020;S0363-5023(19)31532-1
- Ledgard JP, Gschwind CR. New developments in reconstructive upper limb surgery for tetraplegia: evidence for their efficacy. J Hand Surg Eur Vol. 2020;45(1):43-50
- Mende K, Watson A, Stewart DA. Surgical treatment and outcomes of syndactyly: A systematic review. J Hand Surg Asian Pac Vol. 2020;25(1):1-12
- Vanhees M, Cardillo ND, Hile MS. The effect of knot position in Adelaide flexor tendon repair. J Hand Surg Eur Vol. J Hand Surg Eur Vol. 2020;45(3):303-304



NEUROSCIENCES

NEUROLOGY

The neurology team at NSLHD has interest in a broad range of research, ranging from the laboratory to clinical research.

The neurogenetics team has a proven track record of successful NHMRC grants, with research ranging from mitochondrial disorders to Parkinson's disease. The unit has recently commenced a world-first placebo controlled drug trial in dominant optic atrophy, which is looking into a potential therapy for patients. If successful, the study has the potential to prevent visual loss and neurological signs such as deafness.

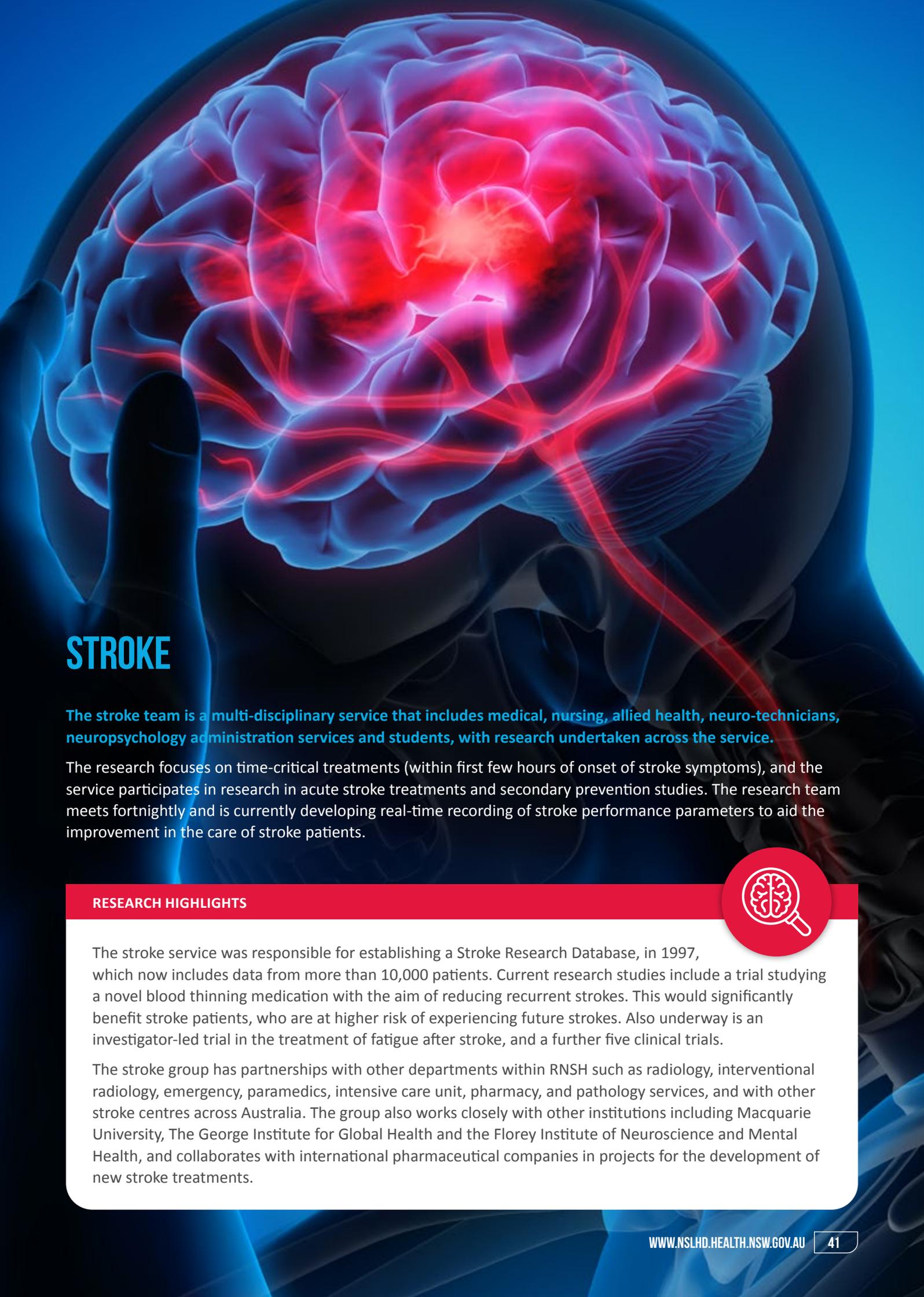
The team's stroke research is world class, with studies on clot busting and clot retrieval therapies. Our neurophysiology research has led to multiple prizes from academic institutes and includes some novel techniques not available elsewhere in the country. Migraine has recently become a major research interest, with novel international trials commencing at NSLHD.

At NSLHD, the referral clinics for Parkinson's disease and mitochondrial diseases are the largest in New South Wales and the multiple sclerosis clinic has one of the largest databases in Sydney. These clinics provide an opportunity to integrate research with clinical care by our teams of neurologists, trainees, nurses and allied health staff. This is of huge benefit to our patients who can receive world class care while provided the opportunity to take part in global studies.

Key partners in this research include the University of Sydney, Macquarie University, NHMRC, MITO Foundation and many other colleagues, industry groups and supporters.

Key achievements to date include:

- › Lubomski, M., Davis, R.L. & Sue, C.M. Gastrointestinal dysfunction in Parkinson's disease. *J Neurol* **267**, 1377–1388 (2020). <https://doi.org/10.1007/s00415-020-09723-5>
- › Lubomski, M., Tan, A.H., Lim, SY. et al. Parkinson's disease and the gastrointestinal microbiome. *J Neurol* **267**, 2507–2523 (2020). <https://doi.org/10.1007/s00415-019-09320-1>
- › Wali G, Liyanage E, Blair NF, Sutharsan R, Park JS, Mackay-Sim A, Sue CM. Oxidative Stress-Induced Axon Fragmentation Is a Consequence of Reduced Axonal Transport in Hereditary Spastic Paraplegia *SPAST* Patient Neurons. *Front Neurosci.* 2020 May 7;14:401. doi: 10.3389/fnins.2020.00401. PMID: 32457567; PMCID: PMC7221066
- › Wali G, Kumar KR, Liyanage E, Davis RL, Mackay-Sim A, Sue CM. Mitochondrial Function in Hereditary Spastic Paraplegia: Deficits in *SPG7* but Not *SPAST* Patient-Derived Stem Cells. *Front Neurosci.* 2020 Aug 20;14:820. doi: 10.3389/fnins.2020.00820. PMID: 32973427; PMCID: PMC7469654
- › Whiten DR, Brownjohn PW, Moore S, De S, Strano A, Zuo Y, Haneklaus M, Klenerman D, Livesey FJ. Tumour necrosis factor induces increased production of extracellular amyloid- β - and α -synuclein-containing aggregates by human Alzheimer's disease neurons. *Brain Commun.* 2020 Sep 15;2(2):fcaa146. doi: 10.1093/braincomms/fcaa146. PMID: 33543132; PMCID: PMC7850285



STROKE

The stroke team is a multi-disciplinary service that includes medical, nursing, allied health, neuro-technicians, neuropsychology administration services and students, with research undertaken across the service.

The research focuses on time-critical treatments (within first few hours of onset of stroke symptoms), and the service participates in research in acute stroke treatments and secondary prevention studies. The research team meets fortnightly and is currently developing real-time recording of stroke performance parameters to aid the improvement in the care of stroke patients.

RESEARCH HIGHLIGHTS



The stroke service was responsible for establishing a Stroke Research Database, in 1997, which now includes data from more than 10,000 patients. Current research studies include a trial studying a novel blood thinning medication with the aim of reducing recurrent strokes. This would significantly benefit stroke patients, who are at higher risk of experiencing future strokes. Also underway is an investigator-led trial in the treatment of fatigue after stroke, and a further five clinical trials.

The stroke group has partnerships with other departments within RNSH such as radiology, interventional radiology, emergency, paramedics, intensive care unit, pharmacy, and pathology services, and with other stroke centres across Australia. The group also works closely with other institutions including Macquarie University, The George Institute for Global Health and the Florey Institute of Neuroscience and Mental Health, and collaborates with international pharmaceutical companies in projects for the development of new stroke treatments.

REHABILITATION AND AGED CARE

JOHN WALSH CENTRE FOR REHABILITATION RESEARCH

The John Walsh Centre for Rehabilitation Research focuses on research and education in rehabilitation and injury-related disability, aiming to generate new knowledge to improve health outcomes of people with injury-related disability; promote links with the research community, partner organisations, patient advocacy groups and non-governmental organisations to ensure effective transfer of research outcomes into health policy; and improve clinical care for people with injury-related disability and translate research outcomes into clinical practice.

Current projects include:

- › Understanding recovery after motor vehicle crashes
- › Assisting recovery after spinal cord injury, by providing exercises for people with injuries and disabilities generally
- › Assisting recovery after severe traumatic brain injury

Publication highlights include:

- › Crotty M, Gnanamanickam ES, Cameron I, Agar M, Ratcliffe J, Laver K. Are people in residential care entitled to receive rehabilitation services following hip fracture? Views of the public from a citizens' jury. *BMC Geriatr.* 2020;20(1):172
- › Pozzato I, Kifley A, Craig A, et al. Effects of seeking compensation on the psychological health and recovery of injured patients: the role of stress vulnerability and injury-related disability [published online ahead of print, 2020 Jun 9]. *Psychol Med.* 2020;1-12
- › Tate RL, Lane-Brown AT, Myles BM, Cameron ID. A longitudinal study of support needs after severe traumatic brain injury. *Brain Inj.* 2020;34(8):991-1000

THE CENTRE RECEIVED ABOUT \$9M IN GRANTS IN 2020, INCLUDING FROM THE NHMRC AND THE NSW MINISTRY OF HEALTH.



Bob Kegg and
Lisa Harvey

THE TEAM RECEIVED
ABOUT \$2 MILLION
IN RESEARCH
FUNDING IN 2020.

CURRAN AGEING RESEARCH UNIT



The Curran Ageing Research Unit at Hornsby Ku-ring-gai Hospital went from strength to strength in 2020. One of the Unit's research highlights was beginning work on a randomised trial of the frailty translational study, the NHMRC-funded Frailty Screening and Management Study (FORTRESS). This involved working with the Northern Sydney Primary Health Network to develop intervention and links with primary healthcare services.

The group also continued participation in dementia clinical drug trials with further trials to commence in late 2020 or early 2021. The group also began work on intergenerational care program of research looking at barriers and enablers to play group participation in residential aged care facilities. This last project was courtesy of generous philanthropic funding received by the unit.

Publication highlights include:

- › Nguyen TA, Pham T, Dang TH, Hinton WL, Nguyen AT, Pham TL, Crotty M, Kurrle S, Bui QT, Nguyen H, Roughead EE. Towards the development of Vietnam's national dementia plan-the first step of action. *Australas J Ageing* 2020 Jun; 39(2): 137-141
- › Walker P, Kifley A, Kurrle S, Cameron ID. Increasing the uptake of vitamin D supplement use in Australian residential aged care facilities: results from the vitamin D implementation (ViDAus) study. *BMC Geriatr.* 2020 Oct 6;20(1):383

PENNEY AGEING RESEARCH UNIT



The Penney Ageing Research Unit at RNSH supports a number of PhD students and academics. In recent years, the group has focused on optimising medication management in frail older patients. In particular, it has developed validated tools for medication review based on the Drug Burden Index, which are now available in routine clinical care.

With an interest in optimising medication review for older people in the community, the group has developed a system called Goal-directed Medication review Electronic Decision Support System (G-MEDSS)[®] which helps to provide clinical decision support for healthcare practitioners conducting medical reviews for older patients, to tailor care to meet their goals and preferences. Finally, the group has an interest in understanding the causation and mechanisms of relationships between high Drug Burden Index, frailty and functional impairment.

Publication highlights include:

- › Lo SY, Zhang M, Hubbard RE, Gnjjidic D, Redston MR, Hilmer SN. Development and validation of a frailty index based on data routinely collected across multiple domains in NSW hospitals. *Australas J Ageing.* 2021 Jun;40(2):184-194. doi: 10.1111/ajag.12888. Epub 2020 Dec 19. PMID: 33340206
- › Mach J, Gemikonakli G, Logan C, Vander Wyk B, Allore H, Ekambareshwar S, Kane AE, Howlett SE, de Cabo R, Le Couteur DG, Hilmer SN. Chronic Polypharmacy with Increasing Drug Burden Index Exacerbates Frailty and Impairs Physical Function, with Effects Attenuated by Deprescribing, in Aged Mice. *J Gerontol A Biol Sci Med Sci.* 2021 May 22;76(6):1010-1018. doi: 10.1093/gerona/glaa060. PMID: 32147704; PMCID: PMC8140051

SUPPORTIVE AND PALLIATIVE CARE

PALLIATIVE CARE

The NSLHD Palliative Care Network consists of specialist palliative care clinicians, nurses and allied health providers who engage in research across the spectrum of specialties to provide the best care for our patients, their families and carers.

Key 2020 palliative care research projects included:

- The NHMRC-funded phase III randomised controlled trial for opioid unresponsive cancer-related neuropathic pain
- A systematic review to inform five evidence-based recommendations in conjunction the national Choosing Wisely program, with the aim of reducing low value health care at the end of life
- A project to translate current best evidence that supports screening for distress in cancer patients in the Northern Sydney Cancer Centre

Publication highlights include:

- Clark K, Byrne PG, Hunt J, Brown L, Rowett D, Watts G, Lovell M, Currow DC. Pharmacovigilance in Hospice/Palliative Care: De-Prescribing Combination Controlled Release Oxycodone-Naloxone. *J Palliat Med.* 2020 May;23(5):656-661. doi: 10.1089/jpm.2019.0226. Epub 2020 Jan 3. PMID: 31904310
- Currow D, Louw S, McCloud P On behalf of the Australian National Palliative Care Clinical Studies Collaborative (PaCCSC), et al Regular, sustained-release morphine for chronic breathlessness: a multicentre, double-blind, randomised, placebo-controlled trial *Thorax* 2020;75:50-56
- McCaffrey N, Asser T, Fazekas B, Muircroft W, Agar M, Clark K, Eckermann S, Lee J, Joshi R, Allcroft P, Sheehan C, Currow DC. Health-related quality of life in patients with inoperable malignant bowel obstruction: secondary outcome from a double-blind, parallel, placebo-controlled randomised trial of octreotide. *BMC Cancer.* 2020 Oct 31;20(1):1050. doi: 10.1186/s12885-020-07549-y. PMID: 33129304; PMCID: PMC7603764
- Mohamudally A, Clark K. Levetiracetam at the End of Life: A Case Report and Discussion. *J Palliat Med.* 2020 Jul;23(7):995-997. doi: 10.1089/jpm.2019.0347. Epub 2019 Oct 11. PMID: 31603723
- Shepherd J, Waller A, Sanson-Fisher R, Clark K, Ball J. Where would acute care nurses prefer to receive end-of-life care? a cross-sectional survey. *Int J Nurs Stud.* 2020 Sep;109:103683. doi: 10.1016/j.ijnurstu.2020.103683. Epub 2020 Jun 12. PMID: 32663704



SURGERY AND ANAESTHETICS



The Tom Reeve
**Academic
Surgical Clinic**

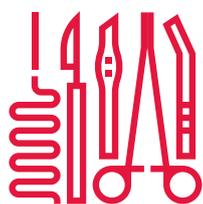
Part of the Surgical Education, Research and Training Institute

SURGICAL EDUCATION, RESEARCH AND TRAINING (SERT) INSTITUTE

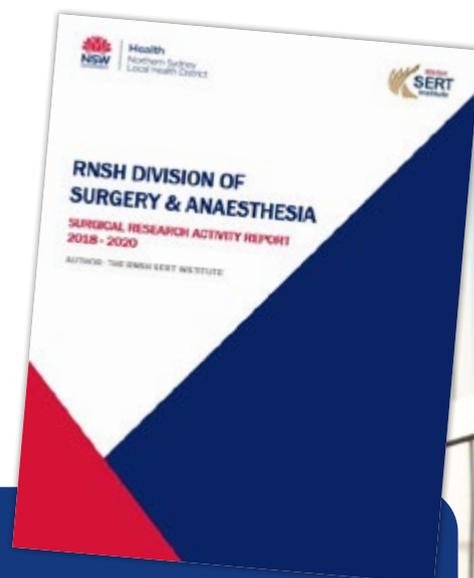
The Surgical Education, Research and Training (SERT) Institute was established at RNSH in 2017.

An initiative of the RNSH's department of surgery and anaesthesia, the Northern Clinical School of the University of Sydney and the senior surgical staff at the hospital, the objectives of the SERT Institute are to support surgeons in pursuing evidence-based practice, promote surgical research, training and education in all surgical departments and create new academic career opportunities for surgeons.

Improving the surgical care and achieving the best outcomes for patients is a high priority for all surgeons. Our surgical research typically includes investigations and assessments of new surgical approaches and techniques, collaborative translational research, and improving current practices through data analysis and clinical audit.



The SERT Institute continues to grow with a strong commitment to clinical and translational research, the teaching of today and tomorrow's surgeons and improvements in patient care.



NEW RESEARCH ACTIVITY REPORT

In 2020 the RNSH SERT Institute led an initiative to produce the inaugural Surgical Research Activity Report, a collation of research conducted and published across the RNSH departments of surgery from January 2018–December 2020. The full report can be located on the SERT Institute Website (<https://surgery.rnsh.org/the-surgical-research-activity-report-2018-2020/>).

This report highlights the large volume of research activity and peer-reviewed publications conducted across all of surgery at RNSH. A combined total of 187 peer-reviewed publications were produced by RNSH surgeons in 2020 alone, with all 14 RNSH surgery departments contributing to this evidence output.

Several surgery departments continue strong collaborations with universities, various external research institutes, as well as numerous NGO and industry partners to support current surgical research activity. These partners include the University of Sydney, UTS, UNSW Sydney, Medtronic, Engeneic, Biotronik, Cancer Council NSW and the Garvan Institute.



The Tom Reeve
Academic Surgical Clinic

**Emeritus Professor Tom
Reeve**

Professor Gill Walter

Professor Thomas

UNIVERSITY

Hospital



Health
Northern Sydney
Local Health District



nthsydhealth
RoyalNorthShore
MonaValeHospitalNSW
HornsbyHospital
RydeHospital
NSLHD.MHDA



northern-sydney-local-health-district



NthSydHealth



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