



**Alfred
Research
Alliance**

New thinking.
Real impact.



Research Report
2019-2020



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Chair's report



Chair, Alfred Research Alliance
Prof Andrew Way

Welcome to the third Annual Research Report from the Alfred Research Alliance, and one which takes us into one of the most challenging and important periods of our history.

2019 was already a pivotal year for the Alliance as we benefited from interactions with our two new members and the ongoing investment in infrastructure upgrades and exciting new facilities.

As a research and education Alliance, we have always been unique in our proximity to each other at The Alfred precinct in Melbourne, in our cooperative and collaborative approach, and also in the complete translational research loop represented across this site.

These advantages have perhaps never been more important than they are today – not only to address COVID-19, which has presented us with such unique challenges over the past months, but also to ensure that the most vulnerable in our community continue to benefit from our research findings, and the consequent innovations and improvements in clinical care which flow from that research.

This year, again, the Alliance has continued to deliver across a diverse range of research areas including blood disease and cancer, cardiovascular disease, diabetes and obesity, infection and immunity, epidemiology and public health, mental health and neuroscience, nursing and allied health, and trauma, critical care and perioperative medicine.

While achievements across all areas have been notable, three stand out for special mention.

The first is neuroscience, which has increased across the precinct, including the opening at The Alfred of the only inpatient neuroscience clinical trials unit in the country, enabling patients to participate in trials from the safety of a specialist hospital ward.

The second, and related highlight, is our growing strength in clinical trials. Boosted by the admission of Nucleus Network, Australia's largest Phase 1 clinical research organisation, as a new Alliance member in 2019, and a new, government-funded joint initiative between Alfred Health and Monash University, The Australian Clinical Trials Network, the past year has seen a significant increase in our already strong capability in this area.

The third area of note, of course, is COVID-19 – an unanticipated and uniquely complex challenge which has abundantly demonstrated the agility, collaboration and commitment of our staff and students.

From caring for those who have been affected; to supporting government at the most senior levels with expertise and advice; to conducting research and trials into possible vaccines and treatments; and exploring the impact of the pandemic on other areas of health, health services and the wider community, the Alliance has truly been at the frontline in the COVID response. At the time of writing, more than 30 COVID-related research projects are underway across the precinct.

It has been a magnificent effort, and I want to take this opportunity to thank each and every member of our community for their valuable contribution.

We know that the challenges ahead are best addressed through collaboration and cooperation. At the Alfred Research Alliance, we will continue to share our knowledge and resources and foster new connections as we continue to focus on delivering better health outcomes for all.

“ These advantages have perhaps never been more important than they are today – not only to address COVID-19 ... but also to ensure that the most vulnerable in our community continue to benefit from our research findings... ”

Alfred Research Alliance

This Annual Research Report is a chance to reflect on the past year... and what a year it has been!



Executive Officer,
Alfred Research Alliance
Dr Renée Dutton

alfredresearchalliance.org.au

At the time of writing, COVID-19 dominates the narrative almost everywhere, but it is important for us to recognise all the extraordinary work done at the Alliance this year, across so many areas.

The year started with some membership milestones, when Nucleus Network and 360biolabs joined forces with Alliance members Alfred Health, Monash University, Baker Heart & Diabetes Institute, Burnet Institute, Deakin University and La Trobe University.

Monash University also established the new Sub-Faculty of Translational Medicine & Public Health – comprising Monash Public Health & Preventive Medicine and Monash Central Clinical School – under the triumvirate ‘powerhouse’ of Prof Steve Jane, Prof Sophia Zoungas and Prof Terry O’Brien respectively. The positive contribution of these entities has been very evident this year.

In June 2019, we celebrated Alfred Health Week with a display of research posters that filled the corridors of The Alfred, a keynote address from Prof Ricky Johnstone from the Peter MacCallum Cancer Centre, and the awarding of our Annual best research publication prizes.

The A+ Gender Equity group hosted Dr Franca Ronchese, a leading immunologist from Wellington’s Malaghan Institute of Medical Research, to join a panel of staff from across the Alliance at *The Care(er) Factor: Balancing Work & Family* in 2019. They also hosted Walkley award-winning journalist, Catherine Fox, for an International Women’s Day 2020 event exploring at how we can achieve real culture change in gender equity.

Dr Clare Fedele, cancer researcher turned communications specialist, held a session to coach researchers in the positive use of social media, knowing the importance of these tools for career building.

Across the year, Alliance leaders met regularly with Ministers and officials from both State and Federal government departments, to promote and advocate for the amazing work done at the precinct. We also had the great pleasure of hosting Australia’s Chief Scientist, Dr Alan Finkel AO FAA FTSE, for a tour and round-table discussion.

Work commenced on the redevelopment of the Education Centre and Library, and the Alliance also unveiled a new, illuminated sign on Commercial Road and ‘member’ signage at major entrances across the precinct – external messaging which reflects the shared commitment of all members to excellence, collaboration and joint endeavour.

With these values at the heart of everything we do – from the world-class health service at Alfred Health, to research spanning biodiscovery, public health, population health and clinical trials, as well as leading virology services, FIH clinical trials and education – it is no surprise that the Alliance proved well equipped to respond to the myriad and complex challenges presented by COVID-19.

Our researchers quickly brought their expertise, experience and innovative capacity to bear on the pandemic response – you can read more about this in our special feature on pages 14 and 15.

While the current situation is certainly unique, bringing together our diverse expertise, ideas, and commitment to solve the world’s most critical unmet clinical and public health needs has always been at the core of what we do.

This is what drives us: The ability to make a genuine, positive impact on the lives of real people, every day – in Melbourne, across Australia and around the world.

We hope you enjoy this snapshot of just some of the achievements of our Alliance colleagues this year.

“
This is what drives us:
The ability to make
a genuine, positive
impact on the lives of
real people, every day
”



1

Hospital



3

Universities



2

Medical research
institutes



2

Biomedical
SMEs



8,000+

Staff & students



1,500+

Researchers



1,100+

Postgraduate
students

What we do

Providing better health outcomes through research translation

Research is a priority for members of the Alfred Research Alliance. Importantly, our work covers everything from biomedical discovery in the laboratory to applied research, clinical research, and public health and health services research, ensuring that

discoveries are taken from bench to bedside.

Our scientists take a clinical unmet need and apply their skills to find a solution for improving the health of the community.

Together, our research provides a complete translational research loop on

one geographically distinct and unique interconnected precinct. The overarching aim of this research is to improve diagnosis, treatments, prevention and policy, creating better outcomes for the healthcare system and the wider community.

New Thinking, Real Impact

A complete, translational research loop, from bench to bedside...and back



Biomedical Discovery

Generation of new knowledge about health and disease through understanding fundamental biological mechanisms.

Applied Research

Development of new drugs, devices, diagnostics & treatments for clinical application.

Clinical Research

Advancement of medical knowledge by studying people, through direct interaction or response to interventions – includes clinical trials.

Public Health Research

Examination of health and prevalence of disease in communities and their associated factors, and the link between social, environmental and biological factors, to disease prevention, intervention and treatment.

Clinical Practice

Applying research findings, new drugs, diagnostics, treatments systems and practices in the clinical environment.

Health Services Research

Examination of methods of effective delivery, quality, cost, access to, and outcomes of health services.

Research strengths



Blood Diseases and Cancer



Diabetes and Obesity



Infection and Immunity



Nursing and Allied Health



Cardiovascular Disease



Epidemiology and Public Health



Mental Health and Neuroscience



Trauma, Critical Care and Perioperative Medicine

Additional research focus areas: 2019-20



Clinical Trials



COVID-19

Precinct Highlights

Chief Scientist Visits Alfred Research Alliance

On November 19, 2019, Australia's Chief Scientist, Dr Alan Finkel AO FAA FTSE, visited the Alfred Research Alliance to tour the world-leading facilities and meet with researchers and clinicians to discuss critical issues with the precinct's leaders.

The tour was organised by the Alfred Research Alliance to raise the profile of the precinct and showcase the unique translational research loop at the precinct.

Accompanied by a delegation of leaders from the eight member organisations of the Alliance, Dr Finkel toured the new clinical trials facility, visited Monash University's sequencing laboratory,

discussed work being undertaken in computational biology/informatics, and completed his tour at the state-of-the-art ARA-MBI Preclinical Imaging Facility.

The visit culminated in a round table discussion, addressing the pressing needs for medical research funding, issues like gender equity in science, and how the Alliance is managing research quality and integrity. The importance of translating discoveries into products, services, processes and policies for our state and nation was also a topic of discussion.

Alfred Health Week



Prof Ricky Johnstone from the Peter MacCallum Cancer Centre was the 2019 Research Day keynote speaker.

Alfred Health Week was celebrated in June, 2019, with a public display of research posters, a keynote address, and the presentation of the annual Alfred Research Alliance Research Prizes.

The poster showcase featured 126 projects in areas from allergies, asthma and immunity, to cardiovascular disease, diabetes, gastroenterology and haematology, public health, epidemiology and infectious diseases, mental health and neuroscience, trauma and emergency medicine, and health services and patient safety.

The 2019 keynote address was presented by Prof Ricky Johnstone from the Peter MacCallum Cancer Centre, who fascinated a packed lecture theatre with his presentation on The Evolution of CAR-T Cells – Biodiscovery to the Clinic.

Four awards for the best quality publications (highest impact factor) were presented – an Alliance record and testament to the high-quality research published at this precinct. See the Staff Achievements section on page 32 for details.



Pictured during the visit of the Australia's Chief Scientist to the Alliance are (from left): A/Prof André La Gerche, Prof Anne Holland, Prof Andrew Wei, Prof Steve Jane, Prof Jayashri Kulkarni, Dr Alan Finkel, Prof Tom Marwick, Prof James Beeson, Prof Terry O'Brien, Dr Renée Dutton and Dr Trisha Peel.



New Company Nirtek Formed to Commercialise Heart Attack Prevention Technology

Ischaemic heart disease (heart attack) is the leading cause of death worldwide. Unstable, vulnerable plaques have a high risk of rupture, causing clot formation, occlusion of coronary arteries and consequently heart attacks. It is these unstable plaques that are the major cause of heart attack and death.

A new company called Nirtek has been set up to commercialise technology to detect unstable coronary plaques, so they can be treated before they lead to heart attacks.

The technology was created through the pioneering work of Prof Karlheinz Peter and his colleagues at the Baker Institute.

Through NHMRC-funded research first published in *Nature Communications* in 2017, the team found a key factor behind recurrent heart attacks was that some potentially dangerous atherosclerotic plaques were being left untreated. With no current method to reliably detect them, Prof Peter's research determined a way to identify which plaques were stable and which were vulnerable to rupture.

His solution is a device that is fed into the artery through a catheter and directs a laser beam onto coronary plaques. Those which are unstable contain a compound that auto-fluoresces under near infrared light, identifying them for cardiologists who can then apply interventions like coronary stents or newer targeted drug therapies to prevent future heart attacks.

With some further product development and testing, it's hoped the locally engineered solution will soon be translated for clinical use, ultimately benefitting a huge number of patients worldwide.

www.nirtek.com.au



The Nirtek NIRAF Guidewire System

Alfred Launches Clinical Trials Hub

Australians will soon have greater access to potentially lifesaving treatments for rare cancers and other diseases, with the establishment of a clinical trials network led by Alfred Health and Monash University.

Funded by a \$24.6 million federal grant awarded in March, 2019, the Australian Clinical Trials Network's 'TrialHub' program will create partnerships with regional hospitals to allow people to participate in clinical trials close to home, thereby giving more Australians access to emerging therapies.

With hundreds of clinical trials underway at The Alfred including new drugs, devices and other treatments, TrialHub has plenty to offer regional areas and is expected to provide access to clinical trials to hundreds of thousands of Australians over the next ten years.



Federal Health Minister, Hon Greg Hunt MP, opened the new TrialHub.

New Innovation & Education Hub Underway

This year has seen significant work with the redesign and redevelopment of the former Education Centre and Ian Potter Library at the Alfred precinct, to create the new Betty & John Laidlaw AO Innovation & Education Hub.

The Alfred has had an on-site library since the 1940s, with additional facilities and resources added over the years to create the Alfred Medical Research & Education Precinct (AMREP) Education Centre. In 2012, a new lecture theatre was added, followed by new training rooms inside the library in 2014. In 2018, AMREP became the Alfred Research Alliance and the Centre was renamed the A+ Education Centre.

This latest project, initiated in 2019, addresses changes to the way libraries are used and to the way we educate and share information. The transformation of The Hub incorporates flexible spaces to promote the collaborative efforts that are the hallmark of this precinct.

The new Betty & John Laidlaw AO Innovation & Education Hub will be officially launched in late 2020.



Research performance

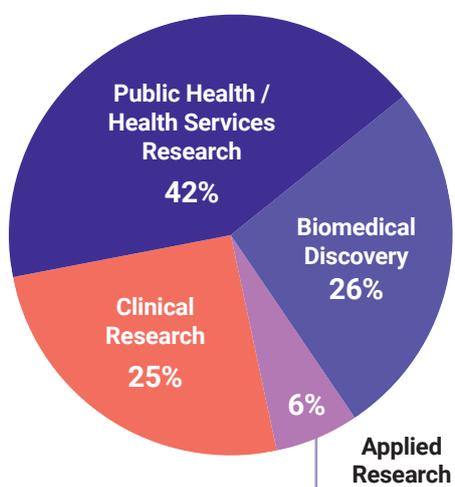
External research funding by source – 2019

Australian competitive grants	\$75.8M
Other public sector research income.....	\$17.3M
Other competitive research grants	\$21.3M
Industry income	\$13.3M
Other research income	\$5.3M
Total	\$ 133M

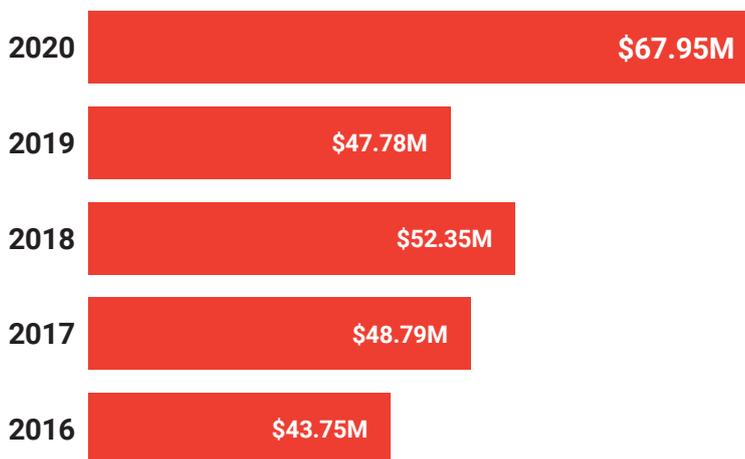


\$133M
in external research funding

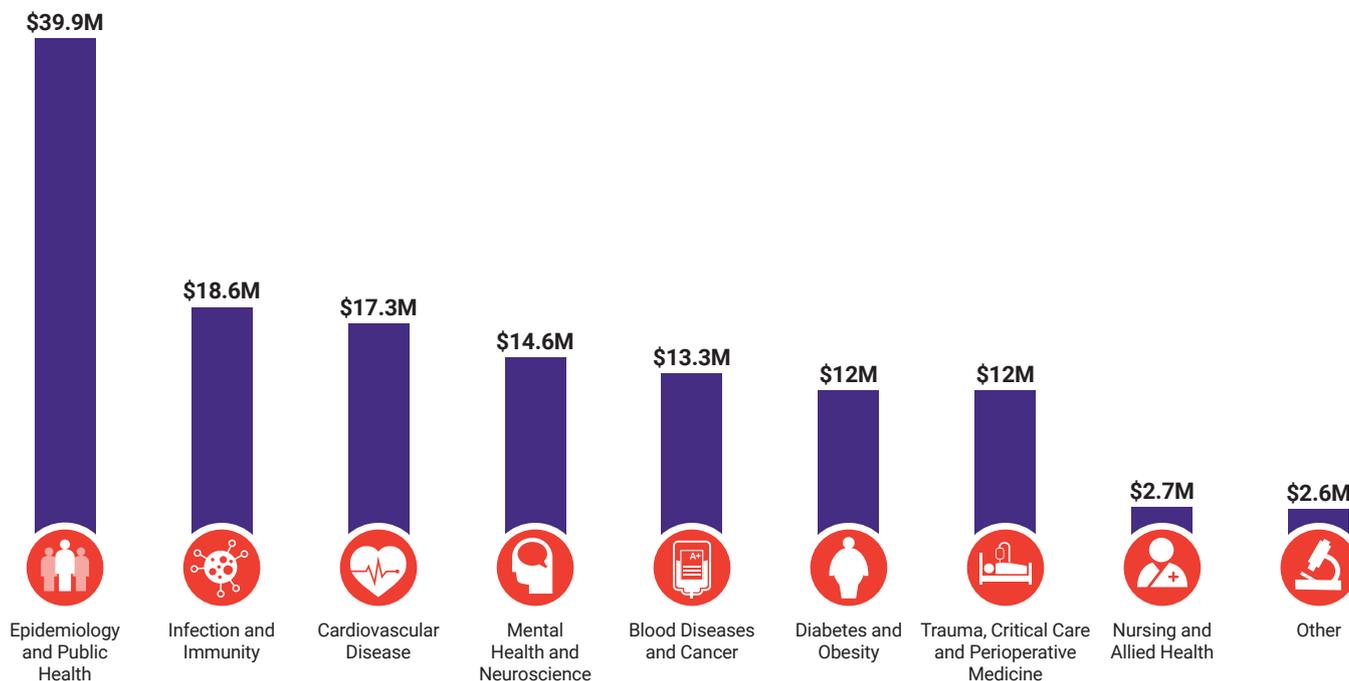
External research funding by research theme – 2019



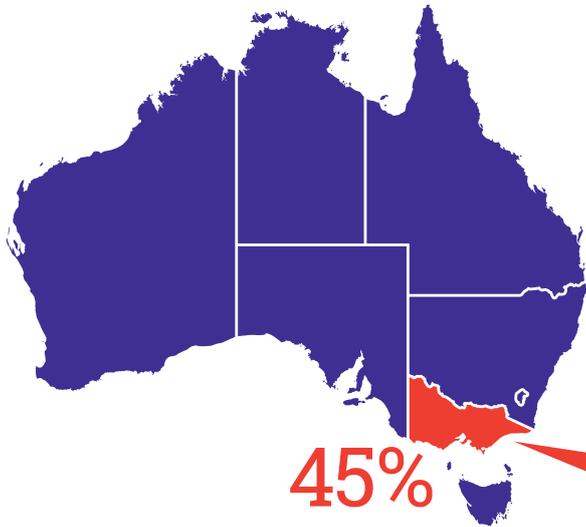
NHMRC Funding Commitments directly administered by Alliance Members



External research funding by research area – 2019



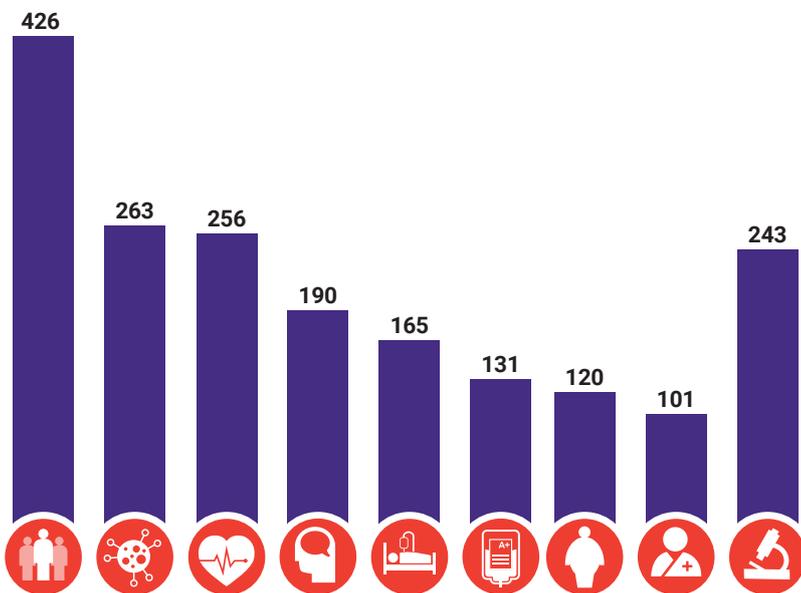
Victoria secured 45% (\$393M) of total new NHMRC commitments commencing in 2020



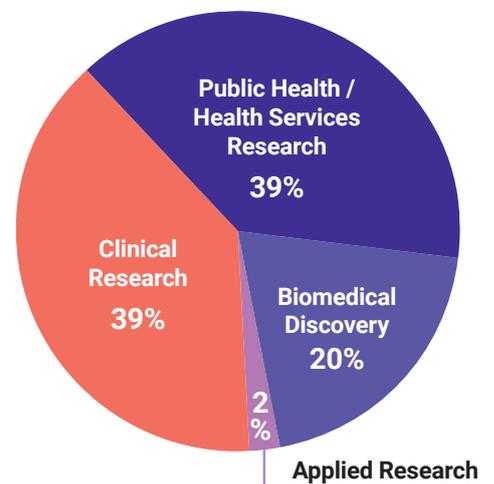
NHMRC Field of Research	Alliance % of Victorian NHMRC funding
Anaesthesiology	100%
Haematology	87%
Cardiology	81%
Medical and Health Sciences *	59%
Epidemiology	51%
Public Health & Health Services*	40%
Haematological Tumours	38%
Infectious Diseases	32%
Neurology & Neuromuscular Diseases	32%
Cellular Immunology	20%

* not elsewhere classified

Original research publications by research area – 2019



Original research publications by research theme – 2019



Students 2019



1,226 Postgraduate degree students

213 Masters student completions

57 PhD / doctoral student completions

Commercial impact



14 provisional patent applications

8 PCT patent applications

37 National phase entry

3 Patents granted

Our members

The Alfred Research Alliance brings together eight independent and diverse organisations to create a community of excellence for medical research and education.

AlfredHealth

Alfred Health is a state-wide health service comprising The Alfred, Caulfield and Sandringham Hospitals, along with a large network of community programs and 14 services across Victoria.

The Alfred is one of Australia's busiest hospitals, providing the most comprehensive range of adult specialist medical and surgical services in Victoria. The hospital is also a major tertiary referral teaching hospital with a commitment to research excellence and training for medical, nursing and allied health staff.

The Alfred sits at the epicentre of the Alfred Research Alliance, keeping our work patient-centred and outcome driven. Colocation on this site, together with close and cooperative relationships with other members, provides the opportunity for vital collaboration within the Alliance, between Alfred Health's health practitioners and clinical researchers and our partner universities and medical research institutes.



Monash Medicine, Nursing and Health Sciences is a research-focused faculty within one of the world's top universities. It is a leading provider of education for doctors, nurses and allied health professionals in Australia.

Two of the university's largest schools are located at the Alfred precinct within the recently formed Sub-Faculty of Translational Medicine and Public Health. Monash Central Clinical School is a major centre for clinical and biomedical research and education, with a focus on translational research including pre-clinical studies and early phase clinical trials of new treatments for human diseases. Monash Public Health and Preventive Medicine is a world leader in public health, clinical and applied research and education, including large scale late phase clinical trials, clinical registries, population studies and health services research.

Our membership of the Alfred Research Alliance aligns with our objective of research translation through collaboration with fellow researchers and clinical partners. As part of the Alliance, we can seamlessly integrate our research expertise with that of the other members, promoting excellence in healthcare.



The Baker Heart and Diabetes Institute is an independent, not-for-profit medical research facility with a proud history of discovery dating back to 1926.

The Institute's research is focused on the prevention, diagnosis and treatment of cardiovascular disease, diabetes and other related health disorders. This includes addressing the profound health disadvantage experienced by Aboriginal Australians, with a research facility in Alice Springs.

The Baker Institute's work extends from the laboratory to widescale community studies and intervention programs. The Institute also runs a range of specialist clinics, including cardiovascular and diabetes clinics.

The breadth of clinical and research expertise ensures that the Institute is well placed to advance understanding of the genetic and environmental determinants of disease, and to translate scientific findings into new approaches to prevention, treatment and care.

Our values of excellence, integrity and innovation are strengthened through collaboration with our fellow members of the Alfred Research Alliance.



Burnet Institute is an independent, not-for-profit medical research and public health organisation that believes in equity through better health.

By linking discovery-oriented and implementation research with public health action, Burnet makes a tangible and sustainable impact on health in both developed and developing countries.

The Institute's major thematic programs – Maternal, Child and Adolescent Health, Disease Elimination, Behaviours and Health Risks, and Health Security – underpin innovative multidisciplinary responses to diseases of global significance and solving complex health issues. Burnet has particular expertise in HIV and AIDS, hepatitis viruses, malaria, tuberculosis, influenza and emerging infectious diseases including COVID-19.

Our membership of the Alfred Research Alliance is aligned with our mission: to achieve better health for vulnerable people in Australia and internationally by accelerating the translation of research, discovery and evidence into sustainable health solutions.



Deakin University's School of Nursing and Midwifery and Alfred Health Nursing Services have a long-established research and education partnership.

Through that partnership, staff at the Deakin Centre for Quality and Patient Safety Research are able to conduct high-quality research programs in the areas of patient safety, health services evaluation and knowledge translation.

This allows us to make a substantive contribution to scientific knowledge, clinical nursing practice and the quality of patient care. As well as research training, Deakin undergraduate and postgraduate students also complete clinical placements here for their nursing, allied health and health science degrees.

Our membership of the Alfred Research Alliance supports our objectives of improving patient and organisational outcomes through high quality research, strengthening research training and support for nursing staff, and facilitating the integration of research evidence into clinical practice.



The La Trobe University Clinical School at The Alfred integrates research, teaching and clinical practice in allied health and nursing.

The broad objectives of the School are to provide national and international research leadership, conduct clinical research that makes a difference to patient outcomes, promote interdisciplinary and inter-institutional collaboration in healthcare delivery and research, provide a centre of excellence for education in nursing and allied health, and lead the translation of best evidence into clinical practice.

It is these objectives which underpin our membership of the Alfred Research Alliance, allowing us to collaborate closely with our partners on this site and contribute academic leadership in nursing and allied health research and education.



Nucleus Network is Australia's largest Phase 1 clinical research organisation and the only Phase 1 specialist globally with facilities in the USA and Australia. Since our establishment in 2004, Nucleus Network has conducted well over 1000 Phase 1 clinical trials for Biotechnology and Pharmaceutical Companies from across the globe, including China, Europe, Japan, South Korea, Taiwan and the USA.

Our Australian Phase 1 facilities are in Melbourne and Brisbane, and our USA Phase 1 facility is in Minneapolis. Combined, our clinics offer over 200 beds. All three clinics are strategically co-located within leading medical, research and biotech precincts; the Alfred Hospital in Melbourne, the Royal Brisbane and Women's Hospital in Brisbane, and Medical Alley in Minnesota.

These precincts provide Nucleus Network with unique access to highly specialised ancillary services for the conduct of complex Phase 1 clinical trials. From specialist pharmacodynamic equipment for first-in-human studies in Melbourne, purpose-built infrastructure for high volume biosimilar studies in Brisbane, and onsite dialysis capabilities for complicated renal studies in Minneapolis, Nucleus Network has the experience to conduct the most complex early phase clinical trials.

Together with our clients, we are fulfilling our purpose of "Advancing medicine, improving lives."



360biolabs is Australia's most comprehensive speciality laboratory services organisation for therapeutic, vaccine and diagnostics development.

The company develops and conducts pharmacokinetic (PK) and pharmacodynamic (PD) assays across a wide variety of therapeutic areas, and provide extensive support services to ensure the success of preclinical studies and clinical trials.

The team at 360biolabs are driven by quality with internationally recognised GLP and ISO and accreditation, attracting biotech and pharmaceutical companies from around the globe.



Clinical Trials

“ The Alfred Research Alliance is one of Australia’s pre-eminent clinical trials precincts, where you can commence your clinical trial quickly and progress with minimal interruptions to deliver better results, sooner. ”

One of Australia’s pre-eminent clinical trials precincts

Australia, and Victoria more specifically, has a strong reputation for excellence in clinical trials. Based in the heart of Melbourne, with unique capabilities, depth and breadth of expertise, there is no better place to conduct clinical trials than at the Alfred Research Alliance.

Capability & Capacity

Clinical trials are fundamental to the development of new practices, medicines and devices to treat and prevent illness. At the Alfred Research Alliance, our significant capabilities in the conduct of Phase I to Phase IV clinical trials, rapid ethics and governance approval, and a remarkable depth and breadth of expertise, affords us the ability to efficiently translate discoveries into new interventions, improving health outcomes for our community.

Each of the Alliance members has a rich history in conducting clinical trials, and our centralisation around one of Australia’s busiest hospitals, The Alfred, provides all of our members with access with to the clinical experts, environment and patients to conduct those trials. Using the Dimensions Database, an analysis of the most active clinical trial sites in Victoria between 2014-2018 showed that The Alfred had the greatest number of active registered clinical trials in Victoria and ranked second in Australia, firmly anchoring this precinct’s expertise in clinical trials.

Breadth & Depth of Expertise

Between us: a health service, three universities, two independent medical research institutes, a phase I clinical trial specialist company and a speciality laboratory services organisation for therapeutic, vaccine and diagnostics development, our capability is extensive.

Our strength in clinical trials is greatly enhanced by the breadth of disciplines represented on this site, the depth of our people’s knowledge and experience, and the abundant opportunity for the intersection of ideas, which creates a rich and multi-faceted environment for innovation.

In 2019 alone, researchers and clinicians at the Alfred precinct sought and secured ethics approval for 163 new clinical trials and continued the implementation of an incredible 508 clinical trials.

Our scientists, clinicians and public health professionals work together in world-class facilities to advance the effects of new treatments and provide cutting-edge solutions and health care. Underpinned by cutting-edge technology platforms, effective ethics approvals and efficient contracting, this makes the Alfred Research Alliance a genuine ‘one-stop-shop’, where you can commence your clinical trial more quickly, and progress with minimal interruptions, to deliver better results, sooner.

Translational research is the key to success

During 2019/20, more than 670 clinical trials were underway at the Alfred Research Alliance – across the phases of clinical trials.

CLINICAL TRIAL PHASE / TYPE	TRIALS @ A+
FTIH drug	75
FTIH device	1
Phase I (other than FTIH)	117
Phase II	134
Phase III	209
Phase IV	43
Device (other than FTIH)	64
Other	28
Total	671

46% of trials were investigator-initiated, supporting the research-intensive focus of the precinct. The remaining 54% of clinical trials were industry sponsored, cementing the capacity of this precinct as an excellent location for the biotechnology and pharmaceutical industries to undertake trials.

Active clinical trials at the Alliance in 2019



The location of the Alliance in the heart of Melbourne gives us unrivalled access to a growing and complex population while our co-location with The Alfred hospital provides a unique focus on real-life health issues, providing a diverse recruitment base.

CLINICAL TRIAL AREAS OF EXPERTISE				
Cardiology	Cardiothoracic Surgery	Critical Care	Endocrinology	Gastroenterology
Haematology	Imaging	Indigenous Health	Infectious Disease	Intensive Care
Medical oncology	Nephrology	Neurology	Nursing	Physical Activity
Psychiatry	Public Health	Rehabilitation	Respiratory medicine	Sexual Health
Trauma				



The newly funded \$25 million TrialHub at The Alfred is enabling rural and regional communities unprecedented access to clinical trials, and teletrials are also supporting wider ongoing participation in clinical trials. In addition, Nucleus Network - Australia's leading CRO in first-in-human and phase 1 clinical trials - is headquartered at The Alfred precinct.

Of course, our members also work with external GP clinics and health services to broaden that participant base. With the largest concentration of clinical registries in Australia, the Alliance also provides access to enormous amounts of data and potential patients for recruitment.

Collaboration, Cooperation & Care

Our members work closely with The Alfred clinicians to bring advanced research for testing in clinical trials, and provide a rich opportunity to educate the scientists and research clinicians of tomorrow.

Joint appointments across the membership with The Alfred supports this environment, creating important connections between biomedical discovery research and translational research in a uniquely collaborative environment. Our CROs also work together and with others to add value to the health outcomes for the community.

Together, we collaborate to solve the unsolvable, and remain committed to delivering new modes of care that are safer and more effective. The ability to bring advanced research for testing in clinical trials, right here at the Alfred precinct, is a cornerstone of that commitment.

Snapshot of trials

The Alfred Research Alliance conducts trials across a wide range of disease groups and many different trial types. A snapshot of some of notable trials from 2019 are outlined below.



STAREE – STATins in Reducing Events in the Elderly

This large-scale, randomised clinical trial is a world-first study into the impacts of statin therapy on healthy ageing, and now involves well over 4000 participants.

SPICE-III -Early Sedation with Dexmedetomidine in Critically Ill Patients

This landmark international study evaluates the use of dexmedetomidine as a sedative in ventilated ICU patients, to see if it improves mortality compared with usual sedative agents.



Nucleus Network's clinical trials were brought into the public spotlight in May 2020, as dosing commenced for the Phase 1 study of Novavax's COVID-19 vaccine candidate. Interest from media, politicians and the public helped improve participant recruitment, while also highlighting the medical research sector as a whole. This was the first of several COVID-19 vaccine trials which have now been undertaken by Nucleus Network.



Nucleus Network has been running Phase 1 clinical trials for COVID-19 vaccine candidates. Image: Patrick Rocca, ABC



Pro@Heart

Assessing the long-term health effects of endurance exercise training.

PREDICT study

A trial to help us understand more about type 2 diabetes and its complications.

EDCAD-PMS study

Can coronary artery disease be detected early by including a polygenic (genetic) risk assessment?

OPTIMISE trial

Activity intervention to improve blood glucose control for those with diabetes.



360biolabs has developed Pharmacokinetic (PK) assays using LC-MS/MS, ELISA or molecular biology technologies to establish circulating drug concentrations for over 90 studies during the past year. In conjunction with Pharmacodynamic (PD) assays involving cytokine analysis, flow cytometry, ex-vivo stimulation, microneutralisation and anti-drug antibody testing, 360biolabs has proven the efficacy of therapeutics in a diverse range of therapeutic areas including oncology, cardiovascular, infectious diseases and neurological disease.



COVID-19

Responding to the Pandemic

Alfred Research Alliance members have been on the front-line of the response to COVID-19. It has been both an enormous challenge and a great privilege to bring our unique mix of knowledge, experience, talent and capacity to bear on the most significant health challenge of our time.

Health services have adapted to make sure they can meet demand for treating highly infectious COVID patients while ensuring all others can be treated safely and efficiently, regardless of their reason for presenting.

At Alfred Health, wards have been restructured to minimise the risk of transmission, provide surge capacity and provide a safe and efficient workplace. Innovations like telehealth services, virtual consultations and contract tracing technologies including temperature scanners and Bluetooth tracking systems, have all been implemented at the precinct.

Alongside these Herculean efforts, research at the precinct has continued unabated, and pivoted in response to the crisis.

COVID-19 research at the Alfred Research Alliance

Individually, and with colleagues locally and globally, we are conducting over 30 COVID-related projects at the precinct at the time of going to press. A full list is available at <https://www.alfredresearchalliance.org.au/covid-19-research-at-the-alliance/>

The research covers everything from diagnosis, testing and lab work, to emergency response, health care and critical care, the structure, behaviour and transmission of the virus, vaccines, antivirals and potential treatments, phase 1 and 2 clinical trials, and research into the mental health and the impact of the pandemic on healthcare professionals and the wider community.



The virology team at 360biolabs has a wealth of industry experience.

New tests, new medicines and new uses for existing medicines

Work continues to find safe and effective diagnostics, medicines and treatments.

Burnet Institute has developed a prototype point-of-care COVID-19 diagnostic test and is in the process of partnering commercially to produce it, while Monash Central Clinical School is working on adapting a rapid diagnostic assay for the virus which may return results in under an hour.

A team at the Baker Institute in conjunction with colleagues at the Bio21 Institute and University of Melbourne, has developed the 'COVID-3D' tool to monitor mutations that make it difficult to develop SARS-CoV-2 vaccines and drugs, while the effectiveness of infra-red thermometers to detect people with fever-like symptoms is being evaluated by Deakin University and The Alfred.

A novel testing regime developed by Alfred Health and Deakin University has enabled people self-isolating with COVID-19 to have their health monitored from afar. Participants are equipped to track their heart rate, blood oxygen level and body temperature. These are logged daily with the CovidCare hospital-monitored software system which provides intelligent decision-support, helping specialist nurses and COVID experts accurately predict and flag those who may need greater medical assistance.

Phase 1 and 2 clinical trials are underway at Nucleus Network for vaccine candidates including Novavax and the University of Queensland candidates, while 360biolabs has developed a range of assays to assess the immunological response of vaccine candidates. As Australia's only GLP & ISO accredited laboratory with Physical

Containment 2 (PC2) and PC3 labs, 360biolabs is currently supporting three of the ten CEPI funded COVID-19 vaccines.

As well as new drugs, both Burnet Institute and Alfred Health are looking at repurposing existing drugs, including Remdesivir, to treat COVID-19. 360biolabs' R&D team conducted anti-viral testing of SPL7013 – the active component in Starpharma's range of marketed VivaGel® products, with confirmation of significant activity against SARS-CoV-2 paving the way for the development of a nasal spray for COVID-19.

360biolabs has also been working as part of a global team to provide *in vitro* and mechanism of action data on tafenoquine, an FDA-approved antimalarial. Initial tests show more potent and differentiated antiviral activity against SARS-CoV-2 than hydroxychloroquine, at FDA-approved doses; a promising step towards treatment.

Other existing treatments being evaluated for their potential effectiveness and safety in treating COVID-19 patients include convalescent plasma, which is being evaluated by Monash SPHPM researchers for its efficacy in speeding recovery. The School is also leading the REMAP-CAP trial, which studies the effectiveness of multiple treatments for patients admitted to ICU. It recently found that intravenous hydrocortisone improves recovery and survival for critically ill COVID-19 patients. An evaluation of ECMO life support by researchers from La Trobe University, which showed no adverse effect from hyperoxia as had been feared, is also highly relevant.

Statement of Support

The Alfred Research Alliance supports the important work of the Federal Chief Medical Officers, and of the State Chief Health Officers, their staff and their advisors, in providing vital advice and guidance to government and the community of Australia as we continue to

respond to the COVID-19 pandemic.

We value the knowledge, transparency and commitment of these usually unseen health experts, and stand in solidarity with them, knowing that it is only with scientifically validated facts and expert guidance that the world can win the battle

against the novel coronavirus.

Further, we commend government on its foresight in funding research that seeks to contribute to the pandemic response at every level and also examines the ongoing effects of COVID-19 on healthcare workers and the wider community.

The long game

Longer-term public health issues related to the pandemic have also been a focus. The Baker Institute has expanded its PREDICT study to explore the mental and physical impacts of lockdown restrictions on people living with diabetes, while Deakin University researchers are looking into the impacts of restricted family visiting in ICUs.

Monash SPHPM is investigating the effects of job losses and impact of lockdown measures on wellbeing, and Burnet Institute is looking at the effects of isolation and government policy on the community and, in particular, at-risk populations. A team from Monash SPHPM and Alfred Health has also been awarded a grant from DHHS to study the long-term effects of the pandemic on healthcare workers.

Our clinical databases and biological samples bank of COVID-positive patients, and information resources like Burnet's Know-C19 Hub, will also provide invaluable resources for future research.

“ The Alfred Research Alliance is committed to contributing our expertise, experience and collaborative advantages as we meet the ongoing challenges presented by the COVID-19 pandemic ”



Alfred Health was called on to help limit the spread of COVID-19 in residential aged care facilities.

Expert advice to guide policy

Alliance experts from Burnet Institute, Alfred Health and Monash SPHPM have played important roles in helping shape the public health response by providing advice on epidemiology, infection and public health to Federal and state government.

Alliance experts are also participating in committees that provide expert advice to decision makers, including the National COVID-19 Clinical Evidence Taskforce, the National COVID-19 Health & Research Advisory Committee and the office of the Chief Health Officer. Senior staff have been seconded to DHHS and the office of the Chief Health Officer to provide expert advice. Victoria's Chief Health Officer and Deputy Chief Health Officer are both Professors at Monash University, and the Deputy CHO also has an appointment with Alfred Health.

The Alfred has been a key point of coordination for the COVID response the South-East region, and has taken a

lead in the hotel furloughing for medical staff, testing travellers and supporting the wellbeing of health care professionals.

Alfred Health was also called on in response to outbreaks in residential aged care facilities, to help contain the virus and ensure residents received optimal care in their familiar environment. The Mobile Assessment and Treatment nursing service (MATs) was scaled up and broadened to include registrars and GPs, to provide their usual services as well as a 24/7 response to referrals, telehealth monitoring of COVID-positive residents, patient triage and clinical management, and support for palliative care services.

Research will continue to play a vital role in ensuring the health, safety and wellbeing of the community and informing evidence-based decision-making during the COVID-19 pandemic. .





Blood Diseases and Cancer

SMARTI could unlock skin cancer breakthrough



Alfred Health is progressing an innovative device which supports clinical management of skin cancer, following the completion of the lead-in phase of the Improving Skin Cancer Management with **ARTificial Intelligence (SMARTI)** trial in 2020.

SMARTI is applied to images of lesions to complement the evidence-based clinical decisions made by treating doctors. It is set to be one of the first medical AI systems to produce robust validation data derived from a registered study in a clinical setting.

It is hoped this new technology will not only improve early detection of melanoma, but also prevent unnecessary biopsies of benign lesions, improving healthcare resourcing and expenditure without compromising patient outcomes. It could

also improve melanoma detection and management for people in rural and remote areas of Australia.

SMARTI was developed by Monash University's eResearch Team led by Dr Zongyuan Ge in conjunction with MoleMap Australia. The trial, which evaluated SMARTI's diagnostic accuracy and safety, was funded by the DHHS Victorian Medical Research Acceleration Fund and MoleMap Australia, and was led by A/Prof Victoria Mar, Director of The Alfred's Victorian Melanoma Service and Adjunct A/Prof at Monash Public Health & Preventive Medicine.

The cutting-edge technology is already showing great promise, and further validation testing will be conducted in the SMARTI Trial Active Phase which commences recruitment in August 2020.

Practice changing research outcomes for patients with acute myeloid leukaemia



Acute Myeloid Leukaemia (AML) is a highly-aggressive blood cancer which mainly affects older people. While the genomic revolution has led to enormous advances in knowledge in recent decades, effective treatments remain limited.

Clinical trials conducted at The Alfred's Haematology Clinical Research Unit (CRU) have delivered important findings which will greatly improve treatment options for patients with AML.

In two major trials led by Prof Andrew Wei, the BLC-2 inhibitor venetoclax was combined with either low-dose chemotherapy, or the epigenetic modulator azacytidine, leading to an almost three-fold increase in response rates and improvements in overall survival in older patients who were not fit for intensive chemotherapy.

Two clinical fellows in the CRU contributed important complementary findings. Dr Ing-Soo Tiong's work examined the mechanisms driving drug resistance to venetoclax, leading to a new NHMRC-supported randomised trial to assess how newly-designed agents may be used to circumvent that resistance. Dr Chyn Chua led the first study combining venetoclax with intensive chemotherapy translating these clinical benefits to younger adults with AML.

Prof Wei was also the primary investigator for an international clinical trial using the oral epigenetic modulator drug CC-486, which was shown to improve overall survival for patients in remission after intensive chemotherapy.

These results will lead to global changes in clinical practice and much-needed new drug approvals for patients with AML.



A/Prof Victoria Mar led the SMARTI trial at Alfred Health.

Exercise helps diagnose and treat heart disease in breast cancer survivors



A trial underway by the Baker Institute's Sport's Cardiology team could help breast cancer patients maintain good cardiovascular health during chemotherapy – and help medical professionals identify those whose treatment may place them at risk of heart failure.

Chemotherapy medications are vital in successfully treating people with breast cancer, but a potential side-effect is that these drugs can negatively affect heart function.

While tools are available to assess heart function during, and after, breast cancer treatment, they are limited in their ability to accurately predict which patients may go on to develop heart problems. What we do know is that aerobic fitness is an important predictor of health outcomes

in people with certain forms of heart disease. In particular, low levels of aerobic fitness appear to be very closely linked with the risk of heart failure.

This randomised trial, led by A/Prof Andre la Gerche and Dr Erin Howden, will explore how chemotherapy affects exercise capacity and heart function, and see whether a 12-month exercise training program, during and following treatment, could mitigate any negative effects and help patients reduce their risk of cardiovascular disease.

The study is expected to help inform future exercise recommendations for breast cancer patients and contribute to guidelines to identify those at risk of developing heart failure as a result of their treatment.



A new study will help inform exercise recommendations for breast cancer patients.

Award-winning proposal to improve stewardship of blood supplies and patient outcomes



Prof Erica Wood

A proposal by Prof Erica Wood from Monash Public Health & Preventive Medicine is not only set to improve the stewardship of precious national blood supplies and achieve better outcomes for patients, but has received the 2019 NHMRC Fiona Stanley Synergy Grant Award.

Prof Wood is head of the Transfusion Research Unit at Monash Public Health & Preventive Medicine, and is a consultant haematologist at Monash Health. She is president-elect of the International Society of Blood Transfusion and serves on the WHO Expert Advisory Panel in Transfusion Medicine and WHO Anaemia Guideline Development Group.

Prof Wood's team will use clinical registries, coupled with observational and interventional studies, to describe how blood is used in Australia, and how its use can be improved to achieve better outcomes for patients.

In particular, they will focus on the management of major hemorrhage from trauma, surgery and obstetric emergencies; transfusions in intensive care; and transfusions to support people with blood cancer, including the use of immunoglobulins made from donated plasma.



Cardiovascular Disease

Promising signs for heart failure treatment

AlfredHealth

There have been encouraging results from Alfred Health-led research studying which studied the use of a new, extended-release milrinone to safely and effectively treat an increasingly prevalent form of heart failure: heart failure with preserved ejection fraction, or HFpEF.

Researchers led by Dr Shane Nanayakkara and Prof David Kaye from The Alfred Department of Cardiology and the Baker Institute, conducted a pilot randomised controlled trial of 23 patients at The Alfred, to see if the novel oral formulation of milrinone might have a positive effect on the condition by relaxing the heart muscle, widening blood vessels and lowering blood pressure in the lungs – downstream consequences of HFpEF.

This study assessed a number of indicators of HFpEF and found that quality of life improved as measured by better six-minute walk distances and higher scores on the Kansas City Cardiomyopathy Questionnaire.

A single laboratory assessment of natriuretic peptides (high levels of which are a marker of the heart failure) and a transthoracic echocardiogram to examine the heart and its vessels, showed that heart rate, systolic blood pressure, early filling velocity and early mitral annular velocity did not change in participants taking the medication compared to placebo.

Further research will be required to determine if improvements can be sustained and find out whether there will be an impact on end-points like hospitalisation for heart failure.



Cardiologists Prof David Kaye (left) and Dr Shane Nanayakkara

Reducing alcohol consumption improves heart health

AlfredHealth



New research led by The Alfred Hospital and Baker Heart and Diabetes Institute has found that abstaining from alcohol can reduce the recurrence of dangerous heart arrhythmia in regular drinkers with atrial fibrillation, an abnormal heart rhythm which causes the heart to work inefficiently.

Irregular blood flow in this condition can lead to the formation of blood clots, which increases the risk of stroke and heart failure. Previous research identified alcohol as a common trigger for atrial fibrillation and a potential cause of heart inflammation, damage and functional impairment.

This project, led by Prof Peter Kistler and Dr Alex Voskoboinik from the Heart Centre at The Alfred and the Baker Institute, was conducted across six Australian hospitals. It divided a group of affected adults who consumed 10 or more standard drinks per week into two groups – a control group, who continued their usual consumption, and another group which abstained from alcohol altogether.

The study found that atrial fibrillation recurred in 53% of patients in the abstinence group, and 73% of those in the control group. Hospital admissions for the condition were also reduced in the abstinence group, with just six compared with 14 in the control group.

Further analysis confirmed these positive effects, paving the way for new guidelines to help prevent the incidence of this deadly condition.

Multiple pregnancies can increase women's severity of heart failure

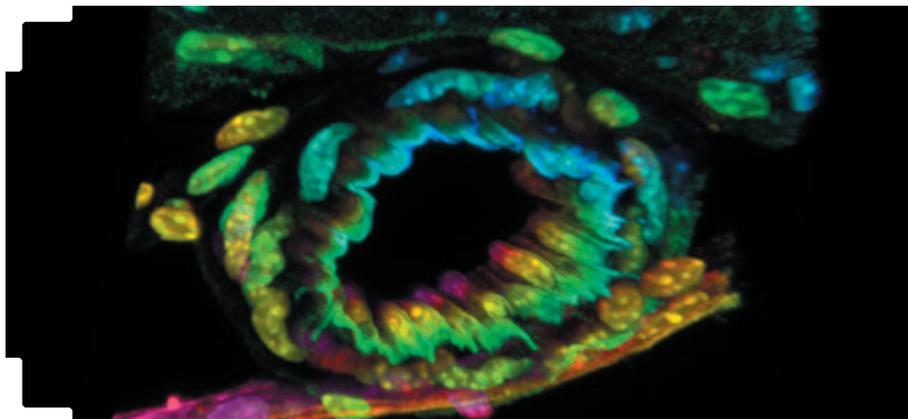


Research led by Dr Anna Beale, Cardiology Trainee and PhD candidate at the Baker Institute, The Alfred and Monash University, has found that women who have been pregnant at least three times have more severe features of heart failure than women with fewer children.

The team set out to discover why twice as many women have heart failure with preserved ejection fraction – or 'stiff heart syndrome' – where stiffening of the heart muscle, along with other changes in the body, causes significant limitation to exercise due to shortness of breath.

By measuring the heart pressure of 58 Victorian women in their 60s and 70s, they found that women who had at least three children were not able to exercise for as long as those who had fewer pregnancies, the pressure in their hearts rose higher during exercise, and they had stiffer arteries, particularly in their lungs.

It is hoped the findings will help identify women at higher risk of heart failure, so that they can benefit from earlier screening, prevention and treatment.



Cross-sectional image of a damaged blood vessel immediately prior to it triggering the formation of a blood clot inside.



The STAREE trial is led by A/Prof Ingrid Hopper

Scientists develop one-off genetic score to detect stroke risk from birth



A recent study published in *Nature Communications* describes how researchers have collaborated to develop a one-off genetic score which can help to identify the risk of stroke as well – or better – than other known risk factors.

One of the leaders is A/Prof. Michael Inouye, Munz Chair of Cardiovascular Prediction and Prevention at the Baker Institute and a researcher at Cambridge University in the UK. This international project also involves collaborators from the Ludwig-Maximilians-University in Germany.

It showed that genetic data obtained from a single blood or saliva sample can be used to identify individuals at triple the risk of developing ischaemic stroke, and that this genetic risk score is as effective, if not more so, than commonly known risk factors.

Their work also suggests that individuals with this high genetic risk may require more intensive preventive measures to mitigate risk than may be recommended by current guidelines, paving the way for more targeted and effective management.

New drug blocks formation of killer clots to prevent heart attacks and strokes



Monash researchers have found a potential drug that could prevent heart attack and stroke by breaking up 'bad' blood clots, while leaving 'good' clots unaffected.

Heart attacks and strokes are both caused by blood clots blocking vessels in the brain or heart. While drugs like aspirin can prevent clots forming, they only work in about a quarter of cases and can cause serious side effects from bleeding.

This new anti-thrombotic drug was identified when a team led by A/Prof Justin Hamilton from Monash University's Australian Centre for Blood Diseases, discovered that silencing, or removing, a particular enzyme-producing gene in mouse models unexpectedly provided complete protection against heart attack.

Further investigation showed that the absence of this enzyme caused the platelet membranes to change slightly, preventing platelets from attaching to each other or to blood vessel walls. So, while platelets normally 'gear up' their capacity to clot as soon as they detect a change in blood flow – often a hallmark of a heart attack – the platelets without the enzyme did the opposite.

The team is now working on developing a drug candidate suitable to take to clinical trial. The hope is that this will result in an effective treatment that not only prevents platelet-triggered clots forming when there is a risk of heart attack or stroke, but which may also help treat other conditions including COVID-19, where clotting has been implicated as a key cause of death.

STAREE-HEART Sub-Study Explores the Role of Statins in Preventing Heart Failure



Cardiovascular health and statins are in the spotlight at the Monash Public Health and Preventive Medicine.

The STAREE trial, which has been exploring the role of preventive statin use among the healthy elderly, launched the STAREE-HEART sub-study this year after receiving NHMRC funding in late 2018. Led by Associate Professor Ingrid Hopper, STAREE-HEART explores the role of statins in delaying or preventing heart failure and atrial fibrillation.

These two conditions have a significant disease burden profile; atrial fibrillation doubles the risk of mortality in over 80s, and is believed to cause up to 20% of strokes, while heart failure is prevalent in around half a million Australians, with 50-75% of them dying within five years of diagnosis.

The sub-study sees the research team collaborating with Baker Institute to conduct echocardiograms on a subgroup of participants drawn from the main STAREE cohort, as well as determine the impact of statins on incident heart failure and atrial fibrillation across the entire trial population. Following ethics approval, recruitment commenced in 2019.



Diabetes and Obesity

Chemicals in everyday products linked with increased risk of Type 2 diabetes



A new study has found that exposure to Bisphenol A (BPA) and Bisphenol S (BPS), chemicals commonly used in everyday products, may be associated with an increased risk of type 2 diabetes.

BPA is a chemical commonly used in the production of polycarbonate plastic and epoxy resins and is found in consumer products such as food and beverage containers, and thermal cash register receipts. BPS is commonly used as a substitute for BPA.

The study, led by Prof Dianna Magliano and researchers at the Baker Heart and Diabetes Institute, working with French collaborators, looked at data from a French study of 755 people without diabetes who were given two urinary tests, several years apart.

It showed positive associations between exposure to BPA and BPS and the incidence of type 2 diabetes, independent of traditional diabetes risk factors. The link is not as strong as for some other risk factors, like obesity, but adds to a growing body of evidence that these endocrine-disrupting chemicals might play a role in increasing risk, perhaps through



Prof Dianna Magliano

insulin resistance, inflammation and dysregulation of glucose metabolism.

While further research is required to confirm these results, BPA is already being restricted in some parts of the world and Prof Magliano says there is mounting evidence to warrant caution and to question what products we use in our daily lives.

RAGE transactivation blocks pathway leading to inflammation



A discovery by researchers at Monash University's Central Clinical School, published in 2019 in the *Journal of Clinical Investigation*, paves the way for potential new therapies to tackle some inflammatory, degenerative and proliferative disorders, including type 2 diabetes.

The team discovered a new pathway leading to inflammation, whereby certain receptors can transactivate the Receptor for Advanced Glycation End-products (known as RAGE). As RAGE is only present when cells are injured or stressed, RAGE transactivation provides a pathway for benign signals to become more inflammatory and, therefore, to cause more damage.

The team found that by specifically targeting the cytosolic tail of RAGE – which is essential for RAGE-mediated cell signalling – signalling can be blocked and downstream RAGE activity curtailed.

Based on their unique understanding of this process, they developed a 'smart' method to modulate RAGE transactivation using decoy peptides that specifically resemble the activated stage of RAGE, and demonstrated that this can moderate signalling in live animals and alter the course of diseases including atherosclerosis and diabetes.

This will ultimately generate new therapies with broad applicability across a range of inflammatory, degenerative and proliferative disorders in which RAGE is implicated, but for which no RAGE inhibitors are currently available.

Study takes a stand on Diabetes



A world-first randomised controlled trial is underway to see if reducing and breaking up sitting time, and moving more, can help improve glycaemic control in office workers with type 2 diabetes.

The study is being led by Professor David Dunstan, Head of the Baker Institute's Physical Activity Laboratory, who also holds adjunct position with Deakin and Monash Universities.

Recent studies have shown that reducing and breaking up sitting time has beneficial effects on blood glucose control and insulin levels in patients with type 2 diabetes.

The new study, which aims to recruit 250 participants, will investigate the impact of a 'sit less and move more' intervention on the control of blood sugar levels.

Participants randomised to receive the intervention are asked to use a sit-stand workstation at their workplace, participate in one-on-one health coaching sessions and will receive a Fitbit to use for the duration of the study.



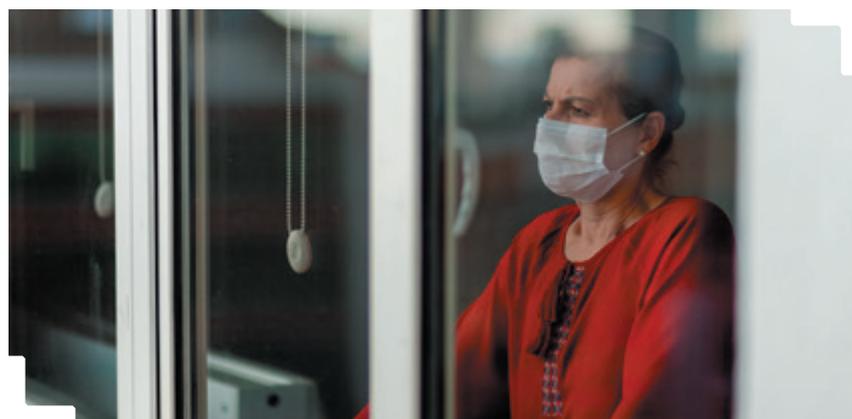
Prof David Dunstan with Melbourne office worker Tiffany Slabik. Tiffany's mother had type 2 diabetes, and she is conscious of reducing her sedentary behaviour





Epidemiology and Public Health

Optimising Isolation, Quarantine and Distancing for COVID-19



The Optimise study helped better understand and predict behaviour to keep COVID-19 infections low.

Burnet Institute has been working in partnership with Doherty Institute and other collaborators including Monash University, on a project focused on reducing the impact of COVID-19 infection. Recognising that there will be no "silver bullet" of a vaccine or cure for some time, the Optimise Study focuses on how to optimise the community's ability to successfully isolate/quarantine, physical distance or enact other behaviours to reduce virus transmission.

The Optimise Study is a multidisciplinary study combining quantitative and qualitative research, behaviour change research and mathematical models to understand and predict people's behaviour and how that impacts the effectiveness of COVID-19 response strategies.

The study includes a large social network cohort study collecting information on compliance with quarantining and physical distancing guidelines and social

isolation during the pandemic. These data help identify the key factors affecting cooperation including health, social and economic factors, and identify vulnerable populations who are disproportionately affected. It measures social contacts and mixing patterns to inform transmission modelling and assess if key groups or individuals are at higher risk of COVID-19 infection.

The findings are then used to inform government strategy, improve messaging, test the feasibility of emerging strategies for COVID-19 testing, and develop mechanisms to improve compliance.

Evidence from the Optimise Study also provides important information to assist community organisations and key health service groups in restoring economic activity and recreational activities whilst keeping new infections of COVID-19 at a low level.

Controlling the spread: Emerging and re-emerging sexually transmitted infections



A review article published in the *New England Journal of Medicine* outlines how established and emerging sexually transmitted infections (STIs) are on the increase and makes recommendations to control their spread.

The article by Adjunct A/Prof Marcus Chen from the Melbourne Sexual Health Centre and Prof Deborah Williamson from the Doherty Institute, notes that in many countries, STIs like gonorrhoea and congenital syphilis are approaching levels not seen since the 1970s. New, or re-emerging, infections with potentially serious or fatal consequences are also on the rise.

With international travel and online social networking driving social interconnectedness and more people taking pre-exposure prophylaxis, the incidence of these conditions will doubtless continue to increase, making timely testing and treatment critical.

To counter the spread, the authors recommended improving access to adequately resourced health care and clinical services for at-risk individuals and groups; public health initiatives like health promotion and biomedical prevention like vaccines. Implementing robust surveillance systems is also suggested so that new outbreaks can be quickly identified and interventions evaluated for effectiveness.

Incorporating genomic technologies into STI surveillance offers great promise in defining transmission networks and may allow improved targeting of public health interventions. The authors note that experience shows that it is only through genuine partnerships among governments, nongovernment organisations, the private sector and the community that adequate control of STIs can be achieved.

Improving the health of vulnerable populations – COVID-19 and drug users



One of Burnet Institute's longstanding projects is providing new insights into the impact of COVID-19 on Melbourne's illicit drug market.

Led by Prof Paul Dietze, the SuperMix study of more than 1,300 people who inject drugs has been running since 2008 and is the largest cohort study of its type ever conducted in Australia.

Changes to border controls, regulations around physical distancing, as well as prohibitions on public gatherings incorporated into COVID-19 lockdowns, were anticipated to have profound impacts on drug markets and people who use drugs.

SuperMix has been able to collate valuable information on behaviour change, illicit drug prices, accessibility, changes in consumption and access to opioid antagonist treatments such as methadone and buprenorphine. The study is ongoing, and data are being updated regularly to determine wider trends in the impact of COVID-19 restrictions on this cohort of vulnerable and marginalised people in the community.



Burnet's maternal and child health projects have a major impact on the survival and health of mothers and babies in Papua New Guinea.

Improving maternal and child health in Papua New Guinea



Burnet Institute continues to have a significant presence in Papua New Guinea with research programs across maternal and child health and infectious diseases aimed at reducing child morbidity and mortality. This year, another major research study commenced as an extension to Burnet's 'Healthy Mothers, Healthy Babies' program.

The project, in East New Britain Province, aims to determine the burden of stunted growth and development in children across different age groups, and estimate the prevalence of known risk factors in children under the age of five years.

Risk factors include biomedical factors, such as specific infections and nutritional deficiencies, as well broader social, economic, environmental and cultural factors that affect child growth and development. Children are being screened for anaemia and malaria using rapid diagnostic tests, and blood samples are being collected to allow subsequent testing for specific micronutrient deficiencies.

The research will enable a better understanding of the relative burden of stunting and poor child growth, and the major causes and risk factors in children up to the age of five years. This knowledge will help identify potential interventions, rank them for priority, and design intervention trials to reduce the stunting burden.

New Registry Captures Data on Re-Emerging Problem of Silicosis



Since 2015 there has been an alarming re-emergence of silicosis in Australia, primarily affecting stonemasons and other workers who produce and install kitchen benchtops from artificial stone materials. Fine silica dust particles released from the stone upon cutting enter the lungs and across repeated, ongoing exposure cause irreversible scarring, which may lead to lung transplantation or premature death.

WorkSafe Victoria launched a free health assessment program in 2019, aimed at screening all stone bench top industry workers for potential silicosis. In association with this program the Silica-associated Disease Registry was established at Monash SPHPM to capture all new diagnoses of silicosis among this cohort. Registry staff work closely with a multi-disciplinary advisory board and a network of experienced occupational and respiratory physicians to record 51 diagnoses of silicosis in the first 10 months, 39 of which were caught at an early stage and 12 with advanced disease.

Data has revealed a strong association between exposure to dry processing of artificial stone and disease development, flagging the hazardous work conditions many stone benchtop industry workers have experienced. Analysis of the Registry has also found that most workers diagnosed with silicosis had normal lung function and no noticeable symptoms, highlighting the important role of respiratory health screening in driving early detection.



Infection and Immunity

Burnet's vaccine quest tackles malaria, hepatitis C and coronavirus



As well the long-time targets of malaria and hepatitis C (HCV), Burnet Institute's extensive Vaccine Development team has, since early 2020, broadened its focus to coronavirus.

This year saw significant progress made in the HCV vaccine project, with a paper published in the *Journal of Biological Chemistry* outlining a key method for manufacturing the vaccine which would enable low-cost production of a superior antigenic form that is suitable for inclusion in a human vaccine.

The group also made excellent progress on the development of viral vectored vaccines, demonstrating that the antigen can be included in those vaccines to generate a good immune response. This has resulted in a new patent application to protect intellectual property, pave the way for commercial partnerships, and underpin further applications for funding to accelerate vaccine development and provide a platform for global vaccine advocacy.

The Institute is also taking a unique approach to the development of a vaccine for COVID-19 in a project which is led by Dr Andy Poubourios and Prof Heidi Drummer (pictured below).

The research focuses on the surface spike protein of the SARS-CoV-2 virus, which is the primary target of neutralising antibodies in our immune system. By tweaking the spike protein so that it attracts more focused attention from the immune system without sending it into overdrive, the team hopes the resulting antibody response will be protective but will not be able to cause antibody-dependent enhancement (ADE) – a potential complication of vaccines that has been observed for SARS, Dengue and Zika virus vaccines.

Burnet expects early results from animal vaccination trials before the end of the 2020.

World's first re-usable anti-viral mask



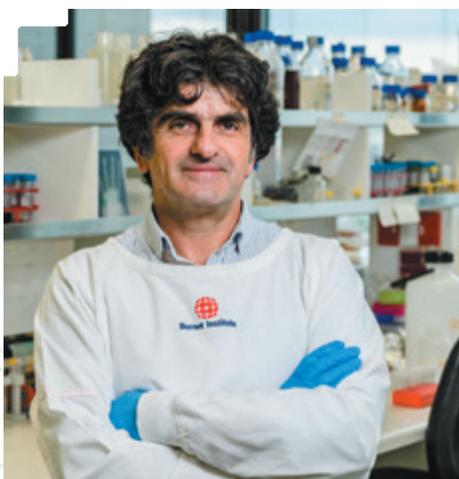
As Victoria moved into stage 4 restrictions in August, it became mandatory for all Victorians to wear a mask when outside their home. NATA-accredited clinical trial speciality laboratory, 360biolabs, has played a key role in helping bring an innovative anti-viral mask to market, by providing specialist skills to mask manufacturer, Colan Australia.

The COLAN PAMTM range of masks, made from Colan's Metis PCATM fibre, are the world's first re-usable cloth mask with inherent anti-viral properties.

Employing virucidal testing, 360biolabs showed that the Metis PCATM fibre inactivated SARS-CoV-2 – the coronavirus which causes COVID-19 – in a world-first which led to the fibre's TGA approval as a Class 1 medical device. This opens up the potential for the PAMTM fabrics to be used in a wide range of PPE clothing and equipment.

And, because the anti-viral properties of the masks are inherent to the fibre, not a result of chemical treatment, they offer protection over extended periods of use.

Manufacture of the masks is now underway, with this Australian invention a new tool in the fight to reduce the risk of COVID-19 infection in our community.



Research reveals how HIV infection may contribute to metabolic conditions



Prof Dmitri Sviridov

Research published in *PLoS Pathogens* and the *Journal of Biological Chemistry* reveals how infection with the human immunodeficiency virus (HIV) may wreak havoc on the body and lead to the development of chronic and potentially deadly diseases like heart disease, diabetes and dementia.

Studies show that not only are people living with HIV at increased risk of these chronic diseases, they are occurring at an earlier age and progress faster.

The recent research, led by Prof Dmitri Sviridov, Head of Lipoproteins and Atherosclerosis at the Baker Institute and Professor of Research – Biochemistry and Molecular Biology with Monash University, shows a single viral factor released from HIV-infected cells may be behind the increased risk.

By explaining the mechanisms, Prof Sviridov and his team have paved the way for targeted treatment that could help provide a longer and healthier life for the 36 million people globally living with HIV/AIDS.

Burnet focuses on point-of-care tests for COVID-19



Over the past decade, Burnet Institute has developed significant expertise in the development of rapid point-of-care (POC) diagnostics. Recently, the team has turned its attention to developing tools to answer the key questions of who has been infected, and who is potentially immune to infection and reinfection from COVID-19.

Current POC tests for COVID-19 can measure antibodies as a biomarker of past infection, but provide no information on whether these antibodies are actually protective. In addition, they can't identify whether the infection is very recent or not, which is essential in diagnosis and contact tracing.

Following on from its successful commercialisation of the Visitect CD4+ diagnostic for people living with HIV, Burnet is now developing two POC assays for COVID-19: one to effectively determine current or past infection, and in collaboration with Prof Dale Godfrey and colleagues at the Doherty Institute, a second to determine potential immunity to future infection.



A/Prof David Anderson

Led by Burnet Deputy Director A/Prof David Anderson, the research will support the development of separate POC tests which can be used to identify recent infections (within the last week to two months) or to measure neutralising antibody responses, and potential immunity to COVID-19. The ultimate aim is to provide tools that are effective in determining infection status and potential immunity in individual patients, and can be used to screen populations at scale.

Early prototypes of both tests have been developed, and now with additional State Government support, will undergo final development and validation studies to enable commercial partnerships and large-scale manufacturing and deployment.

Tests like this will help monitor COVID-19 infection and immunity in the population which is vital in efforts to contain the virus, even if we have an effective vaccine.



Burnet Institute has well-recognised expertise in the development of point-of-care tests.



Mental Health and Neuroscience

Advances in epilepsy research helps establish pioneering treatment

AlfredHealth

Ground-breaking work in the functional neurosurgery space at Alfred Brain has given new hope to epilepsy patients and led to The Alfred becoming one of the first hospitals in Australia performing a highly-specialised technique during surgery for patients with advanced epilepsy.

Stereo electro-encephalography (SEEG) is a technique used to guide surgical resection in patients with drug refractory epilepsy. Electrodes are inserted directly into the brain to record seizures and identify the epileptogenic zone.

Dr Andrew Neal, A/Prof Martin Hunn and A/Prof Rubina Alpitsis have been leading research using recordings from SEEG intracranial electrode implantations to understand the role of neuronal networks in cognition and epilepsy. During the past year, they – together with Cecilia Harb and Dr Josh Laing – performed advanced epilepsy surgeries on 10 different patients at The Alfred using SEEG.

While it is being increasingly adopted in Europe and the US, SEEG is still in its infancy in Australia. The Alfred has brought together a large, complex, multidisciplinary team including experienced neurosurgeons, neurologists, neurophysiology scientists, radiologists, and neuroscience nurses. It is now one of few Australian sites performing the technique and has been recognised as a Level 4 Epilepsy Centre according to the National Association of Epilepsy Centre's criteria.

Most importantly, it provides local and interstate patients with complex, drug-resistant epilepsy, access to a specialised service. In many cases, this surgery is the only realistic option for these patients to achieve control of their seizures. The SEEG team received the 2019 Alfred Health Recognising Excellence Award in the 'Leading Innovation' category.

Breaking up sitting time can boost mental health



Research led by Prof David Dunstan and Prof Neville Owen from the Baker Institute's Physical Activity and Behavioural Epidemiology laboratories found that extended time sitting is associated with poorer mental health – an important finding, given that the average Australian adult sits for about nine hours a day.

While previous studies by Baker Institute researchers have shown sedentary behaviour significantly increases the risk of cardiovascular disease, diabetes and premature death, this new research links extended sitting with poorer mental health. The good news is that the studies have also highlighted possible strategies to offset the negative effects.

After examining data from more than 40,000 people, researchers found that even short interruptions to sitting every half hour or so – such as getting up off the couch during an ad break, rather than binge-watching – can halve the rate of depression and anxiety symptoms.

A separate study also showed that what you do while you are sitting also has an impact, with activities which are mentally passive – like watching TV – appearing to increase the risk while those involving mental activity – like reading, working or problem-solving – may protect against the development of depression.

While the need to move more is clear, encouraging people with depression to engage in less passive sedentary behaviour may also be beneficial for treating depressive symptoms, especially in those who find exercise difficult during the early stages of treatment.



The Alfred's SEEG team in action.

Australian autoimmune encephalitis study



A biomarker study of autoimmune encephalitis is set to help provide faster and more accurate diagnosis for patients of this little-known disease.

“Autoimmune Encephalitis - a rare and debilitating neurological illness affecting the Australian population. A study of the Australian Autoimmune Encephalitis Consortium” is led by researcher Dr Mastura Monif from Monash University’s Central Clinical School, and received a grant of more than \$2M last year as part of the 2019 MRFF RCRDUN Neurological Disorders Mission 2020 to help progress research into the disease.

Autoimmune encephalitis was discovered just 12 years ago. It is a condition in which patients describe as feeling like their ‘brain is on fire’.

The condition causes immune systems to inexplicably attack healthy brain cells, leading to inflammation. Steroids can stop the damage but the longer it takes to diagnose the more damage there is. Diagnosis almost always takes too long because it mimics many other conditions, including dementia, delirium or psychiatric illnesses like psychosis and schizophrenia.

Being able to detect autoimmune encephalitis biomarkers will help with accurate diagnosis and, it is hoped, provide faster access to treatment for patients.



COVID-19 pandemic and mental health in frontline workers



The current COVID-19 pandemic is uniquely challenging, not the least for health care and other frontline workers. The COVID-19 and Mental Health Survey will track the psychological impact of the pandemic in that cohort, with online surveys conducted every two months over two years.

The research is being conducted by a multi-disciplinary team from Monash, led by A/Prof Caroline Gurchich, with expertise spanning psychiatry, psychology, neuropsychology, statistics, and women’s, rural, indigenous and digital mental health.

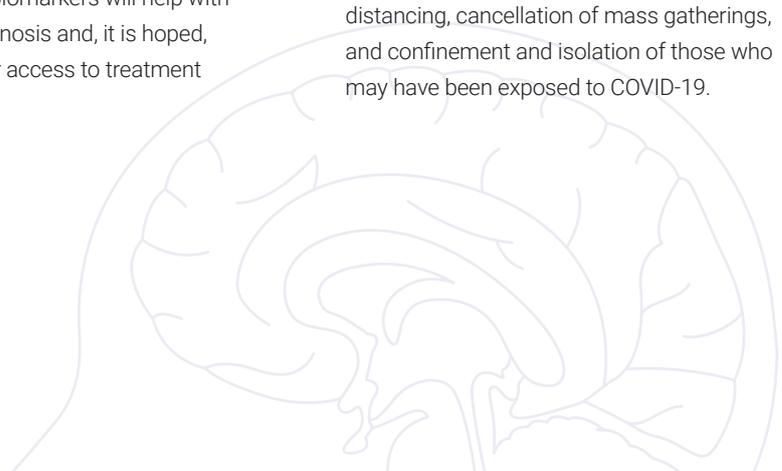
It will measure risk factors that contribute to poorer mental health in those workers, and different coping and resilience strategies associated with better mental health.

The first wave of data analysed was collected from 1495 participants between 3 April to 3 May 2020, when Australia had just under 7,000 cases and 89 deaths, and was under restrictions including physical distancing, cancellation of mass gatherings, and confinement and isolation of those who may have been exposed to COVID-19.

While responses varied, females reported more severe symptoms than males. Almost half of respondents reported at least one PTSD symptom, with a significant number also reporting moderate to severe levels of depression, stress and anxiety. Suicidal thoughts were reported in 17% of females and 14% of males.

‘Positive emotion focused’ coping styles – like actively looking for positives in the situation, reframing it in more positive ways and focusing on what can still be done in lockdown, rather than what is not possible – were found to be associated with better mental health. Humour was also found to be effective for coping with stress. At the same time, researchers found maladaptive coping strategies, such as venting and self-blame, should be discouraged.

The data gathered will be vital to provide an evidence base for developing effective resources, strategies and therapeutic interventions to manage the mental health and wellbeing of the community and mitigate the impact of COVID-19, particularly on those frontline workers.





Nursing and Allied Health

Communicating with older people across transition points of care



AlfredHealth

When older people move from one location to another in the health system, mistakes are often made with their medications and 80% of the errors that lead to serious harm are caused by breakdowns in communication.

This study led by Prof Elizabeth Manias and funded by the Australian Research Council, examined communication processes between older people, family members and health professionals about the management of the patients' medication when they transitioned across points of care.

Using interviews, focus groups and observations conducted in medical and surgical wards at The Alfred, and rehabilitation wards and Geriatric Evaluation and Management units at Caulfield hospital, the project considered the different perspectives of the participants, and sought to identify strategies to improve communication – and avoid dangerous communication gaps.

The findings of the study will lead to recommendations on how to facilitate effective communication about medications as older people move from one environment to another, to formulate strategies for key national and international patient safety organisations, and to develop guidelines for key consumer organisations.



Finding better ways to communicate with older patients and their families avoids dangerous medication errors.

Safe medication management in hospital settings



Despite an increased focus on patient safety and healthcare quality it is still common to see errors, and consequent adverse outcomes, in hospital settings. Now, new research shows that patients can play an important role in promoting their own safety.

Two studies, led by Deakin University's Prof Tracey Bucknall, were designed to investigate how medication is administered in hospitals, the policies which influence that administration, how nurses' workflow might be redesigned to promote patient participation, and the patients' own preferences for information and involvement in their medication management while in hospital.

They found firstly that nurses work in complex adaptive environments that change moment by moment, making it vital to understand the cognitive

workload in 'real world' situations when developing policies for medication administration.

Secondly, they discovered that patients differed widely in how much they wanted to be involved in managing their medication. This points to a need to identify preferences early – on admission if possible – and to better educate health professionals, patients and families so that patients can be more involved and better prepared for discharge.

Further research is planned to develop and test interventions that may help nurses reduce their cognitive workload and minimise interruptions and distractions while they are giving medication to patients, and to see how patients can be included more effectively in their own medication management when in hospital.



New research shows patients can play an important role in medication management.



The PRONTO study looks at ways to help improve management of deteriorating patients.

PRONTO – Prioritising responses of nurses to deteriorating patient observations



**DEAKIN
UNIVERSITY**

AlfredHealth

Vital signs are the most common assessment technique employed in healthcare – but if signs of deterioration are missed, misinterpreted or mismanaged, serious patient complications and even death may result.

To detect that deterioration early, vital signs must be measured frequently and accurately so that the proper interventions can be implemented, and care of the patient escalated to appropriate clinicians.

Despite a growing body of evidence that shows the benefits of early recognition and management of deteriorating patients, there is often a gap between what the research shows should be done, and what happens in the clinical setting.

In the PRONTO study, researchers were looking at ways to close

this gap. Led by Deakin Prof Tracey Bucknall, this randomised trial was conducted across four Victorian hospitals and involved the measurement of 26,000 vital signs in more than 6,000 patients.

Using an evidence-based facilitated implementation approach, tailored to local ward context, it sought to determine if nurses' recognition of, and response to, abnormal vital signs could be improved.

The study has already provided important information to underpin improvements to patient care and safety and health delivery, as well as informing knowledge translation in health services. This methodology and intervention has the potential to be translated to other healthcare standards.

Are thermal cameras effective for COVID-19 fever detection?



**DEAKIN
UNIVERSITY**

AlfredHealth

While demand for technologies to safely detect COVID-positive individuals is high, it is vital to know how accurate proposed solutions are, to avoid either over-burdening healthcare systems with 'false positive' results, or creating a false sense of security by failing to detect symptomatic individuals.

Thermal cameras have been widely implemented to detect people with fever-like symptoms in high-traffic areas like hospital entrances, shopping centres and offices. Offering almost instant results, with no need for direct contact and, therefore, cleaning between uses, and minimal disruption to traffic flow in public places, they seem in many ways ideal for the job. Yet there has been little independent clinical evidence to support their use.

Researchers from Deakin University's School of Nursing and Midwifery and Engineering recently conducted studies to evaluate the efficacy of thermal cameras and non-touch infrared temperature scanners which are widely used in hospitals for mass fever screening. Thermal cameras were found to have low accuracy and precision. Similarly, non-touch infrared thermometers showed low sensitivity and specificity for febrile individuals. Both pose a potential risk to workplaces if febrile individuals pass through screening undetected. Researchers recommended additional screening processes to reduce the risk associated with these technologies.

While more research will be required, the results of this study will be vital to ensure decisions about screening technologies can be made on the basis of firm evidence during COVID-19 and future pandemics.





Trauma, Critical Care and Perioperative Medicine

Trauma in adults experiencing homelessness

AlfredHealth

Homeless individuals suffer a greater burden of health problems than the general population. This assertion is backed by recent research by Alfred Health, which looked specifically at this at-risk population in a trauma care setting.

The study by Jean-Philippe Miller, Gerard M O' Reilly, Jessica L Mackelprang and Biswadev Mitra was conducted with nearly seven years of data from 25,000 patients in The Alfred Hospital Trauma Registry. Results showed that homeless patients were more likely to present after assault and intentional self-harm, and had higher rates of penetrating injury, albeit with overall lower injury severity score. Homelessness was also associated with higher odds of psychiatry admissions, positive blood-alcohol concentration, and of discharge against medical advice.

The study identified a number of issues presenting barriers to effectively understanding and serving this population including variable definitions of 'homelessness', and a lack of standardised identification procedures and documentation in medical records.

While further research is needed to fully understand the prevalence and nature of injury among this cohort, the study provided important information to help optimise trauma outcomes for people experiencing homelessness.

Elective surgery patients screened for COVID-19



A recent COVID-19 research project involving Monash University, ANZCA's Clinical Trials Network and Australian National University has seen elective surgery patients in 14 Australian hospitals screened for COVID-19 in hospital to establish infection rates and manage surgical risk.

Led by Prof Paul Myles, from the Central Clinical School at Monash and The Alfred's Department of Anaesthesiology and Perioperative Medicine, the trial saw some 3000 Australians given a nasal swab and having blood samples taken while under anaesthetic, to check for current COVID-19 infection or the presence of antibodies that would indicate a previous infection.

Prof Myles co-leads a federally-funded national project of coronavirus surveillance for elective surgery, which was established in the wake of a major global study that found patients infected with the coronavirus are at a heightened risk of dying postoperatively.

That study, by the University of Birmingham, looked at more than 1,100 patients across 24 countries who had surgery between 1 January and 31 March this year. Just over 25% went ahead with the elective surgery despite there being evidence that the coronavirus was escalating globally. Of the study cohort, more than two-thirds were diagnosed with COVID-19 post-surgery, and a quarter of those died within 30 days of surgery.

Waiting lists for elective surgery continue to grow around the country and globally due to treatment delays caused by the pandemic. This mounting international evidence highlights the need for careful management to balance the need for surgery and the risks of admitting asymptomatic COVID-positive patients or of a compromised patient contracting the virus, with potentially fatal consequences. The Australian results are greatly reassuring.



Prof Paul Myles led a study testing elective surgery patients for COVID-19.

Study shows hyperoxia during ECMO treatment does not impact clinical outcomes



A new study by La Trobe University researchers addressed concerns about the use of ECMO life support for patients.

A new study by La Trobe University researchers has addressed concerns about the use of ECMO life support for patients after heart attacks, showing no link between the high oxygen levels caused by the treatment and patients' clinical outcomes.

Venoarterial extracorporeal membrane oxygenation – commonly known as V-A ECMO – is used to provide life-support to patients with cardiogenic shock, a condition where the heart is suddenly unable to pump enough blood to meet the body's needs. V-A ECMO is a mechanical circulatory support which improves both perfusion and oxygenation.

While ECMO has been proven to improve blood flow and oxygenation in these patients, there has been increasing concern that clinical outcomes may be compromised by hyperoxia, or high oxygen levels, during treatment.

The study was led by La Trobe University masters student and ICU nurse, Paul Ross, Dr Charne Miller, from La Trobe University's Alfred Health Clinical School, Jayne Sheldrake (ECMO Specialist Nurse) and two intensivists from Alfred ICU, Dr Andrew Udy and Dr Aidan Burrell. It looked at the oxygen levels among 60 patients receiving treatment in hospital after a major heart attack. The results of patients who received ECMO were compared with a sample of patients treated with an intra-aortic balloon pump (IABP), to investigate the association between hyperoxia and in-hospital mortality.

While the V-A ECMO group did show extreme hyperoxia in the first 24 hours compared with the IABP group, there was no significant association between the in-hospital mortality levels or other clinical outcomes.



Prof Belinda Gabbe

Global Burden of Injury Research

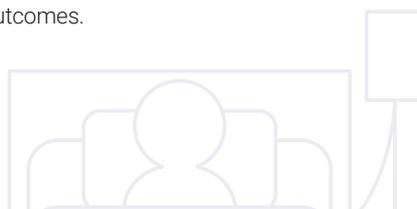


Leading trauma researcher Prof Belinda Gabbe from Monash SPHPM, has harnessed The Alfred's unique capacity in trauma care for a number of significant studies.

The Major Trauma Recovery Coordinator (MTReC) project trialed a model of coordinated care delivery to trauma patients on discharge from hospital, building on earlier findings indicating disjointed post-discharge care. While MTReC showed that patients valued the new care coordinators and identified multiple issues in existing care delivery, it found no association between MTReC engagement and patient-reported outcome measures, or the use of healthcare services, in the six months after injury.

The ongoing Better Outcomes Following Injury and Trauma Project will evaluate a new, purpose-built trauma ward at The Alfred, and an accompanying model of care that facilitates early, active rehabilitation which may reduce hospitalisation and recovery times. Findings will help inform the allocation of allied health staff and trauma ward design, and to set a benchmark for models of early rehabilitation for trauma patients.

Prof Gabbe also led a major study using an online survey developed using WHO resources to assess how prepared major trauma centres across Australia, Canada, England and New Zealand were to deal with unexpected mass casualty incidents. While disaster preparedness was high across communication, safety, security, committee presence and training plans, the study identified a lack of real-world disaster drills, testing of surge capacity in key specialties, information about staff capacity and training, and uptake of post-disaster plans.



Staff Achievements & Accolades

2019 Alfred Research Alliance Research Prizes



Prof Ricky Johnstone, Peter MacCallum Cancer Centre, delivered the 2019 Research Day keynote address.

The Alfred Research Alliance Research Prizes, annually to recognise the excellence of published research articles by researchers at the Alfred Research Alliance, were presented by Prof Ricky Johnstone, Executive Director, Cancer Research & Head Gene Regulation Laboratory, Peter MacCallum Cancer Centre, who delivered the 2019 Research Day Keynote Address.

Dr Dragana Dragolievic from Baker Heart and Diabetes Institute, took out the first Basic Research Prize, for an article in the *European Heart Journal* on her team's project, Defective Cholesterol Metabolism in Haematopoietic Stem Cells Promotes Monocyte-Driven Atherosclerosis in Rheumatoid Arthritis.

The second award in the Basic Research category went to **Dr Melanie Zeigler**, also from Baker Institute, for her article A Single-Chain Antibody-CD39 Fusion Protein Targeting Activated Platelets Protects from Cardiac Ischaemia/Reperfusion Injury which appeared in the *European Heart Journal*.

The awards in the Clinical Research category went to **Prof Paul Myles** from Monash University and The Alfred's Department of Anaesthesia and Perioperative Medicine, and **Prof John McNeil AM** from Monash Public Health and Preventive Medicine.

Prof Myles was recognised for his article the Restrictive versus Liberal Fluid Therapy for Major Abdominal Surgery which was published in the *New England Journal of Medicine*, and Prof McNeil's award was made for the outstanding achievement of publishing a total of three articles in the *New England Journal of Medicine* arising out of his group's ground-breaking ASPREE trial. The articles were Effect of Aspirin on Disability-Free Survival in the Healthy Elderly; Effect of Aspirin on Cardiovascular Events and Bleeding in the Healthy Elderly; and Effect of Aspirin on All-Cause Mortality in the Healthy Elderly.

Prof Tracey Bucknall Inducted into International Nurse Researcher Hall of Fame



Prof Tracey Bucknall

Deakin Professor Tracey Bucknall received one of the highest accolades in nursing when she was inducted into the International Nurse Researcher Hall of Fame at Sigma International's 2019 International Nursing Research Congress.

Prof Bucknall is globally recognised as a decision scientist in health care, with research focusing on improving patient safety and reducing medical error. The honour was bestowed on the basis of the significant and sustained national and international recognition for her work, and for conducting research that has improved the profession and the people it serves.

The Hall of Fame was created in 2010 and admits an average of only 11 nurse researchers each year, confirming Prof Bucknall's place as a true global leader in her profession.

Dr Vincent Cornelisse Wins Best Public Health Researcher Prize



Dr Vincent Cornelisse

Dr Vincent Cornelisse from the Melbourne Sexual Health Centre and Alfred Health, took out the Victorian Premier's Prize for Best Public Health Researcher in April, 2019, for his research into new strategies to prevent HIV and other sexually transmitted diseases.

As well as validating the use of HIV pre-exposure prophylaxis (PrEP) eligibility criteria, providing important information for the Australian PrEP guidelines, his investigations also implicated throat gonorrhoea in transmission between sexual partners, leading to trials of antiseptic throat gargle as a new strategy for prevention.

Senior Staff Appointments

Associate Professor Morag Young named Alice Baker & Eleanor Shaw Gender Equity Fellow

A/Prof Morag Young, a leading authority on the role of hormones in cardiovascular disease, was named inaugural recipient of the distinguished five-year Alice Baker & Eleanor Shaw Gender Equity Fellowship.

The Fellowship, made available by the Baker Institute and Baker Foundation, is a great example of the precinct's commitment to promoting women in STEM. A/Prof Young, who was chosen for this honour from a very competitive list of applicants, commenced at the Institute in 2020.

Australia Day and Queen's Birthday Honours

Among the eminent Australians who have been recognised for their outstanding community service in this year's Australia Day and Queen's Birthday Honours are Director of the Department of Clinical Epidemiology at Monash's SPHPM, **Prof Rachelle Buchbinder**, former Burnet Institute Chair **Robert Milne**, and Burnet Associate and former Program Director, **Professor Suzanne Crowe**, who were all made Officers in the Order of Australia (AO), and former General Council at The Alfred and current Board Chair for AMREPAS **Mr Bill O'Shea** – the Baker Institute's Chairman, **Mr Peter Scott** and Life Governor, **Mr Philip Munz**, who were made Members of the Order of Australia (AM).



Dr Iain Abbott

Research Fellow - Infectious Diseases, Monash University; Infectious Diseases Physician, Alfred Health.



A/Prof David Ascher

Head – Computational Biology & Clinical Informatics, Baker Institute.



Dr Alyssa Barry

Head – Translational Genomics Working Group, Burnet Institute; A/Prof – Systems Epidemiology of Infection, Deakin University.



Dr David Greening

Head – Molecular Proteomics, Baker Institute.



Prof Anne Holland

Professor of Physiotherapy, Monash University; Professor of Immunology, Alfred Health.



Prof Natasha Lannin

Professor (Research), Monash University Department of Neuroscience; Professor, Alfred Health.



Dr Nenad Macesic

Research Fellow – Infectious Diseases, Monash University and Alfred Health.



Dr Lindi Masson

Senior Research Fellow, Burnet Institute.



Dr Shane Nanayakkara

Cardiology Fellow, The Alfred; Cardiology Research Fellow, Baker Institute.



Prof Terence O'Brien

Head – Central Clinical School and Chair of Medicine (Neurology), Monash University; Program Director – Alfred Brain; Deputy Director of Research, Alfred Health.



Dr Nathan Papa

Senior Research Fellow and Head of Prostate Cancer Research, Monash Public Health and Preventive Medicine



Ms Anne Wollett

Director – Clinical Trials Hub, Alfred Health.



A/Prof Morag Young

Head – Cardiovascular Endocrinology and Alice Baker & Eleanor Shaw Gender Equity Fellow, Baker Institute.

Platform Technologies

Several platforms support research at the Alfred Research Alliance by providing specialised services, equipment and staff.

Alfred Research Alliance Flow Cytometry Core Facility

This state-of-the-art cell sorting and analysis laboratory has a PC2 environment for animal and human cell sorting and a dedicated PC3 environment for infectious sample sorting, four high-throughput cell sorting platforms, nine cell analysis platforms and an imaging flow cytometer. Facility staff focus on effective data generation and interpretation and offer comprehensive training in platform use and experimental design.

Contact

amrepflow.services@burnet.edu.au

Visit

amrepflow.org.au

Collaborative Partners

Monash University, Burnet Institute, Baker Heart and Diabetes Institute, Alfred Health

Monash Histology Platform at Alfred Precinct

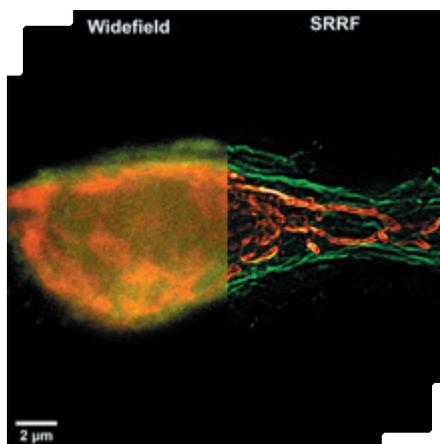
This Platform is available to Alliance and external researchers on a fee-for-service basis. It offers a professional histology service, access to equipment for do-it-yourself histology including a paraffin embedder, microtomes, H&E staining area and a cryostat, and a wide array of special stains, IHC and IF staining, tissue microarray production, vibratome sectioning and image creation via brightfield and fluorescent scanners. Highly experienced staff are available to assist with all histological requirements ensuring high quality and timely processing for frozen and paraffin sectioning.

Contact

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camilla.cohen@monash.edu

Visit

platforms.monash.edu/histology



Mitochondria super resolution

Monash Micro Imaging at the Alfred Precinct

This facility manages core imaging resources within the Baker Institute, Monash Central Clinical School and Burnet Institute. PC2 laboratories house three confocal and several conventional fluorescence microscopes and a PC3 lab offers a dedicated deconvolution microscope. Super resolution technologies are also available that enable imaging beyond the capability of conventional microscopes.

Contact

stephen.cody@monash.edu

Visit

platforms.monash.edu/mmi

Collaborative Partners

Monash University, Burnet Institute, Baker Heart and Diabetes Institute

Monash Simoa HD-X Analyser

The ultrasensitive digital Simoa HD-X analyser enables best-in-class digital immunoassay performance to quantify protein biomarkers in small volumes of serum, plasma or cerebrospinal fluid. A variety of single and multiplex assays are available across research areas including neurology, oncology, cardiology, inflammation and infectious disease. Access is available to researchers on a fee for service basis, and academic and industry collaborations are welcome.

Contact

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Genomics Capability

The collective genomics capabilities of the Alliance enable researchers to share resources, equipment and learnings to stay at the cutting edge. State-of-the-art sequencing facilities include Illumina NextSeq 500, MiniSeq, MiSeq and NovaSeq 6000 Sequencers; Bio-Rad QX200 ddPCR system with AutoDG and ddSeq (single cell) capability; Covaris M220; MultiNA Fragment Analysis (Shimadzu); Agilent TapeStation 4200; EpMotion liquid handler; Affymetrix GeneChip System 3000Dx v.2 for microarray analysis; and Intellicyt iQue high content screener. Access is through collaboration and/or cost recovery.

Monash CCS provides next-generation sequencing expertise and training on a collaborative basis, including experimental design, sample preparation (transcriptome [including single cell], whole genome and epigenome profiling), sequencing and basic bioinformatics using a DolomiteBio platform (Drop-Seq), 10x Genomics Chromium (via Baker Institute collaboration), the Illumina machines listed above, and Oxford Nanopore MinION sequencing systems.

Contact

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Visit

alfredresearchalliance.org.au/resources/genomics

Collaborative Partners

Monash University, Alfred Health

Metabolomics Platform

The Baker Institute's Metabolomics Laboratory uses state-of-the-art liquid chromatography-tandem mass spectrometry techniques to obtain metabolic profiles (primarily lipids and fats) from cell and animal models and clinically relevant human samples. Its targeted lipidomics approach has enabled quantification of more than 750 lipid species across 30 lipid classes and subclasses.

Contact

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Preclinical Imaging Facility

This purpose-built preclinical imaging facility offers capabilities such as brain, abdominal, cardiovascular, muscular and articular imaging. It houses a state-of-the-art 9.4T MRI scanner equipped with cryocoil technology and a NanoPET-CT scanner, both capable of high-resolution, high-efficiency MRI, PET, and X-Ray CT images, and one of only two Magnetic Particle Imaging (MPI) instruments in Australia, which will be equipped with additional features including a dedicated CT and HYPER module.

Contact

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Collaborative Partners

Monash University,
Baker Heart and Diabetes Institute

Clinical Research Domain

The Baker Institute's Clinical Research Domain offers imaging and diagnostic tools that are used to better understand disease development and treatment, including a state-of-the-art MRI scanner capable of detailed morphologic and functional cardiac imaging, with the ability to acquire real-time data during exercise; transthoracic and stress echocardiography and body composition (DEXA) scanning. Research and investigational services include ECG, Holter and ambulatory BP monitoring, ankle:brachial indices and cardiopulmonary exercise testing, and The Alfred Centre houses a clinical and research gymnasium and dedicated clinical research rooms.

Contact

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Antiviral Testing Facility

The Burnet Institute's Antiviral Testing Facility can evaluate chemical agents for inhibitory activity against HIV and herpes simplex (HSV) type 1 and 2 viruses in cell culture assays. This enables the development of new molecules that may lead to better treatments and/or prophylactics for these chronic infections. All work undertaken by the facility uses principles outlined in the FDA guidelines for Antiviral Product Development.

Contact

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Preclinical Cardiology Microsurgery and Imaging Platform (PCMIP)

The Baker Institute's PCMIP has established expertise, facilities and highly reproducible techniques specialising in mouse models of cardiovascular conditions such as myocardial infarction (ischemia with reperfusion), hypertension and heart failure. It provides advice, design support and flexible technical services including: microsurgery, echocardiography (non-invasive) and pressure-volume catheterisation (hemodynamic assessment) to model clinical conditions and phenotype these models using clinically-equivalent approaches.

The PCMIP allows Alliance scientists to comprehensively assess heart function in both novel genetic models and surgically-induced cardiovascular conditions, in response to pharmaceutical interventions, and offers experienced contract research and preclinical trial support, on a case-by-case basis.

Contact

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Global Health Diagnostics Laboratory

Burnet Institute's Global Health Diagnostics Laboratory develops prototype rapid, point-of-care (POC) tests for infectious diseases and other priority global health conditions. Its innovations have led to products for diagnosis of hepatitis E and active syphilis infections, measurement of CD4 T-cells, and plasma separation for HIV viral load, all of which have been successfully out-licensed for manufacture, and for AT1 liver disease in partnership with Burnet's spin-off Nanjing BioPoint Diagnostics. The team is currently working with Alfred Health on a POC test to detect signs of severe infection that contribute to sepsis.

Contact

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Preclinical Metabolic Phenotyping/Bioenergetics Facility

The Baker Institute's Preclinical Metabolic Phenotyping Facility enables high-quality metabolic and physiologic phenotyping to study models of obesity, diabetes, cardiovascular disease and other metabolic diseases. The Bioenergetics Facility equipment measures mitochondrial and glycolytic functionality, the two main energy pathways of the cell. Access to equipment is available for a fee, and collaborative projects are welcome.

Contact

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Optima

Optima is a suite of tools which help inform decisions on the best public health investments in areas like HIV, hepatitis C, nutrition, maternal and child health, tuberculosis and malaria. Each tool consists of a mathematical model of disease transmission and progression, integrated with an economic analysis framework and a formal mathematical optimisation routine. Open access and available via web-based interfaces, Optima has been used to guide resource allocation and assist with national strategic and operational planning in over 60 countries.

Contact

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The Monash Outcomes Research and health Economics (MORE)

MORE develops epidemiological and economic models to evaluate the real-world impact of ill-health and the real-world benefits of interventions, translating measures of efficacy into measures of effectiveness and cost-effectiveness. The team consults to all levels of Australian and international governments, as well as private healthcare industry, and their commercial-in-confidence projects have led to reimbursement of a multitude of treatments and therapies.

Contact

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Bioinformatics and Biostatistics

Both Monash University, through its Central Clinical School and School of Public Health and Preventive Medicine, and the Baker Heart and Diabetes Institute provide important bioinformatics and biostatistical support for researchers at the Alfred Research Alliance.

Biostatistics Consulting Platform

The Biostatistics Consulting Platform (BCP), located within Monash Public Health and Preventive Medicine, provides high-quality biostatistical support to Alfred precinct-based researchers from Monash and Alfred Health. BCP biostatisticians can provide consulting and collaborative assistance with:

- Design of experiments, clinical trials and other studies, including sample size calculations and the development of proposals and protocols
- Statistical analysis and reporting of results
- Biostatistical appraisal of protocols and manuscripts
- Research into new or specialised biostatistical methods
- Statistical software advice and guidance

BCP biostatisticians have experience with a wide range of statistical methods and specialist software.

Visit

monash.edu/medicine/sphpm/epidemiology/about/units-centres/biostats-consulting

Collaborative Partners

Monash University, Alfred Health

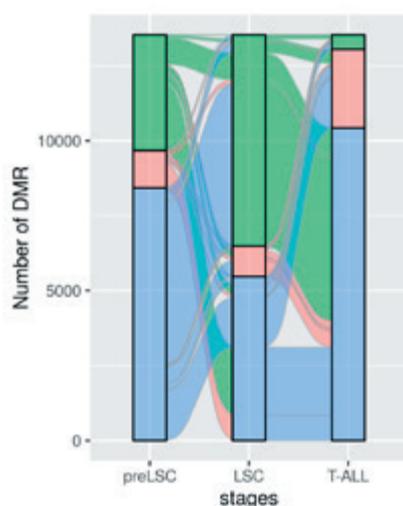


Image: Feng Yan, Monash Bioinformatics Platform

Monash Bioinformatics Platform at the Alfred Research Alliance

The Monash Bioinformatics Platform is a hub for the network of bioinformaticians working within Monash University and its affiliates.

The platform offers bioinformatics tools and computing resources for data analysis, visualisation and exploration across a variety of experiments and research projects.

Dr Nick Wong was appointed in 2017 as the liaison between Monash Central Clinical School, Alfred Health and the main bioinformatics team on the Clayton campus. Drawing on his expertise in genomics and bioinformatics, Dr Wong's role is to offer advice, consultancy and training around genomic analysis with next-generation sequencing (NGS) and nucleic acid (RNA / DNA) platforms to Alliance members.

Nick is actively involved in The Carpentries (carpentries.org) and is a certified instructor. He also organises training workshops on the Alfred precinct covering topics including bioinformatic analysis, R, Python and other data science training in the context of Monash Data Fluency (www.monash.edu/data-fluency/home).

Contact

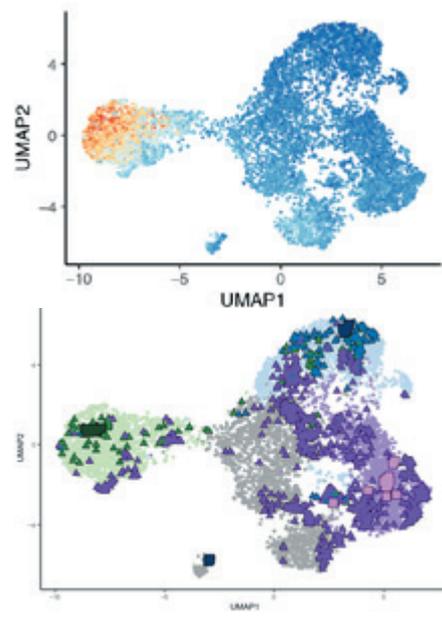
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Visit

monash.edu/researchinfrastructure/bioinformatics/

Collaborative Partners

Monash University, Alfred Health



Images: Jan Schroeder, Monash Bioinformatics Platform

Bioinformatics Program at the Baker Institute

The Bioinformatics Program at the Baker Institute aims to build bioinformatics capacity through collaboration (internal and external), support and training. The program offers data analysis through a range of different technologies, including genomics, epigenomics, transcriptomics, proteomics, metabolomics and metagenomics / microbiota, as well as cross-omic integration.

A diverse set of analytical techniques is employed, from statistical analysis and machine learning to network analysis, high-dimensional data visualisation and computational algorithms. This facilitates the identification of genetic variants, genes and other biomolecular/organismal entities that differ between conditions, in turn enabling researchers to make disease predictions, infer pathogenesis and identify targets for intervention.

Contact

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Clinical Registries and Biobanks

The Alfred Research Alliance is home to the largest concentration of clinical registries in Australia and also houses biospecimens, samples and other datasets which provide important resources for researchers.

Monash clinical registries

Monash Public Health and Preventive Medicine maintains approximately 30 clinical registries at the Alfred Research Alliance. Clinical registries are databases that systematically collect health-related information on people who have undergone a particular treatment, been diagnosed with a certain illness or managed via a specific healthcare resource.

With this information, the registries can benchmark outcomes of clinical procedures, report on the quality of care, and monitor the safety of new drugs, devices and surgical procedures. The registries at the Alfred precinct include state and national databases, as well as providing data to international registries. They also supply the School with important health research data.

Some of the medical conditions, devices and clinical procedures captured in the registries include:

- Cancer registries, including prostate, gastrointestinal and colorectal, lung, ovarian and thyroid
- Cardiac procedures and surgery
- Blood disorders including lymphoma and myeloma, and massive transfusions
- Trauma – general and orthopaedic, ECMO, burns and cardiac arrest surgeries
- Device and procedure registries, including breast devices (implants, tissue expanders and acellular dermal matrices), bariatric surgery, spine surgery and pelvic floor surgery
- Medical registries including cystic fibrosis, rheumatology and dementia

Contact

med-clinicalregistries@monash.edu

Visit

monash.edu/medicine/sphpm/registries

AusDiab

Coordinated by the Baker Heart and Diabetes Institute, the AusDiab study is the largest Australian longitudinal population-based study designed to examine the natural history of diabetes, heart disease and kidney disease in Australians over 25 years of age. The baseline study of 11,247 participants provided benchmark national data on the prevalence of diabetes, obesity, hypertension and kidney disease in Australia.

Researchers and potential collaborators wishing to access the AusDiab datasets or biological samples are able to do so via completing a data access form.

Visit

baker.edu.au/impact/ausdiab

Victorian HIV Blood and Tissue Storage Bank

Established in the 1990s, the Victorian HIV Blood and Tissue Storage Bank and clinical database is an initiative of the state-wide Victorian HIV Service at The Alfred and Burnet Institute. It has prospectively stored leftover serum samples from requested HIV viral load tests for patients managed at The Alfred. The biobank is active and growing, and currently holds nearly 70,000 samples linked with relevant clinical information from close to 5000 HIV patients. It has the ability to track individual patients from naïve to treatment suppressed, and also contains historical samples from before the widespread use of antiretroviral therapy. It is available as a research tool.

Contact

j.roney@alfred.org.au

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Collaborative Partners

Burnet Institute, Alfred Health, Monash University



The ASPREE Healthy Ageing Biobank

The ASPREE Healthy Ageing Biobank

Located on the Alfred precinct, Monash University's state-of-the-art biorepository houses biospecimens from a diverse range of studies, including blood and urine specimens collected from Australian participants of the NIH/NHMRC-funded ASPREE (ASPirin in Reducing Events in the Elderly) clinical trial.

The ASPREE Healthy Ageing Biobank includes both baseline and three-year follow-up biospecimens from more than 10,500 ASPREE participants. Together with clinical data from the participants, they represent a unique global resource for genetic and biomarker discoveries in older Australians. The biorepository also houses tumour tissue samples collected for ACES (ASPREE Cancer Endpoints Study), an ASPREE sub-study examining the effect of low-dose aspirin on cancer.

Visit

aspree.org/aus/sub-studies/

Sudden Cardiac Death Registry

The Sudden Cardiac Death (SCD) Registry is a collection of key information about people aged 1–50 years who have been affected by sudden cardiac arrest, including survivors and genetic family members, who may share inherited cardiac conditions. An outcome of the Australian Unexplained Cardiac Death Project it commenced in Victoria in 2019 with the registry team at the Baker Heart and Diabetes Institute working closely with Ambulance Victoria, the Victorian Institute of Forensic Medicine, The Alfred, Royal Melbourne, Royal Children's and St Vincent's hospitals. It will become a national registry to further research into SCD.

Contact

EndUCD@baker.edu.au

Visit

ucd.baker.edu.au

Collaborative Partners

Baker Heart and Diabetes Institute, Alfred Health

Ethics at the Alliance

The Alfred Research Alliance members are committed to maintaining the highest standards of ethics and compliance in all research endeavours.

We work closely together to ensure that current standards are applied consistently across the precinct and that the relevant legislation, regulations, guidelines and codes of practice for all ethical research conduct are actively met at every level.

Shared resources also help our member organisations to navigate ethics approval processes in an efficient and streamlined manner, which enables us to get research underway sooner.

Human Research Ethics

The Alfred Hospital Ethics Committee is a NHMRC-registered and certified Human Research Ethics Committee, which undertakes ethical review of human research for all Alliance members and can also review applications for any site participating in the Victorian or national 'single ethical review' (or 'streamlined') scheme.

The Ethics Committee is supported by two sub-committees: the Research Review Committee, which undertakes a preliminary specialised scientific/medical and safety review of drug, device and risky interventions; and the General Ethical Issues Sub-Committee, which considers more general ethical issues, including but not restricted to human research, of relevance to Alfred Health and the wider community.

Animal ethics

The Alfred Research Alliance Animal Ethics Committees (AECs) undertake the ethical review of proposals for the use and breeding of animals for scientific purposes for Alliance-based organisations.

There are two AECs in operation, each meeting on a monthly basis, resulting in the ethical review of proposals on a fortnightly basis. The AECs are supported by the Alfred Research Alliance AEC Secretariat, which also coordinates post-approval monitoring of research projects and annual reporting to state government on behalf of Alliance members licensed for the use of animals for scientific purposes.

Dealings with Genetically Modified Organisms

The Monash University Biosafety Committee, via the Monash Research Office, administers compliance with regulations covering genetically modified organisms for Alfred Health, Baker Institute and Burnet Institute, as well as Monash University.

 Visit alfredresearchalliance.org.au/research/research-ethics-and-compliance to find out more about ethics across the precinct.



Alfred Research Alliance

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