Alfred Research Alliance

New thinking.
Real impact.

Research Report 2020–2021

Contents

Chair's report

Welcome to the fourth Annual Research Report from the Alfred Research Alliance. It would be impossible to open this report without recognising the impact that COVID-19 has had, and continues to have, on our precinct and the community more broadly.

Chair, Alfred Research Alliance
Prof Andrew Way

For the second year in a row, the COVID-19 pandemic has completely changed the way we work and live. Our researchers and clinicians have played a pivotal role in many aspects of Australia's pandemic response, from developing best-practice clinical guidelines in real time to providing expert guidance to governments on modelling and public health policy. We've also been part of the global effort to develop safe and effective vaccines against the virus by supporting clinical trials for several vaccine candidates.

While COVID-19 has dominated the headlines, it is just one of many examples of how the Alliance's outstanding depth and breadth of expertise affords us the ability to efficiently translate discoveries into new interventions, improving health outcomes for all.

Throughout the year, our researchers have continued to drive pioneering discoveries and innovations across all our key research areas: blood diseases and cancer, cardiovascular disease, diabetes and obesity, epidemiology and public health, infection and immunity, mental health and neuroscience, nursing and allied health, and trauma, critical care and perioperative medicine.

At the heart of this research excellence is a shared commitment to create real impact by focusing on outcome-driven research that generates health benefits for both the individual and the community. All this work is centred at The Alfred, one of Australia's busiest hospitals, where patients come first.

A great example of our research in practice are the COVID-19 related clinical trials undertaken at our precinct. Clinical trials have risen to prominence over the past 18 months in the race for a COVID-19 vaccine, and our significant capabilities in this space position us as a national leader in the conduct of Phase I to Phase IV trials. You can read more about this on page 14.

> **"At the heart of this research excellence is a shared commitment to create real impact by focusing on outcome-driven research that generates health benefits for both the individual and the community."**

But none of it is possible without our people. Over the past 12 months, the 8000 staff and students on our precinct have worked tirelessly in the face of innumerable challenges, especially those on the COVID-19 frontline.

This year, the World Health Organization extended the International Year of the Nurse and the Midwife from 2020 into 2021 to recognise the contributions of healthcare workers around the globe, and their dedication and sacrifice throughout the pandemic. On our precinct, the contributions of nurses are many and varied, and we celebrate them on page 16.

Whether on the frontline or behind the scenes, I'd like to take this opportunity to thank each and every member of our community for your resilience and commitment to the values of the Alliance. I am incredibly proud of what we have achieved so far and look forward to what's to come as we strive to make a lasting, positive impact on people's lives throughout the pandemic and beyond.

Who we are

Executive Officer's report

Each year, the Annual Research Report affords the opportunity to reflect on the year that was, to celebrate our successes and consider the challenges that have been faced and overcome.

Executive Officer, Alfred Research Alliance
Dr Renée Dutton

1
Hospital

8,000+
Staff & students

3
Universities

1,500+
Researchers

2
Medical research institutes

1,300+
Postgraduate students

2
Biomedical SMEs

The past 12 months have provided no shortage of either, with our researchers celebrating myriad achievements from ground-breaking discoveries in the lab to multi-million-dollar grants and papers published in some of the world's best journals. You can read more about this extraordinary work in our research highlights, starting on page 20.

The challenges have been significant too, as the impact of the COVID-19 pandemic has continued to be felt across Melbourne and the world. But it is times like these that the Alfred Research Alliance really shines — harnessing our diverse expertise, ideas and commitment to solve the world's most critical unmet health needs has always been at the core of what we do.

Built on shared values of research excellence, collaboration and cooperation, the Alfred Research Alliance brings together eight organisations that are recognised leaders in their fields, known for their excellence in research and their outstanding patient engagement.

Together, we share a commitment to furthering knowledge and translating our research into new and improved diagnoses, treatments and public health strategies, as evidenced by the depth of expertise that has contributed to the pandemic response from this precinct (page 18). By working together, we know we can make a bigger difference, sooner.

This year, we have seen our partners expand these collaborative efforts beyond their colleagues and professional peers to consumers — that is, the people who use health services, along with their families and carers.

Our patient-facing members have been running well-established and productive consumer groups for many years, and now our researchers are involving consumers in their work in a variety of ways. Indeed, a community engagement program was formalised at Monash's Central Clinical School this year. Other members are also growing their consumer advisory groups, recognising the importance of including lived experience in all facets of research. You can read more about it on page 8.

Putting people first ensures our research remains outcome-driven and continues to evolve to meet the changing health needs of our community. Ultimately, this is what we're all about: creating better health outcomes for all.

We hope you enjoy this snapshot of 2020/21 at the Alliance — a year that has certainly been like no other.

What we do

Providing better health outcomes through research translation

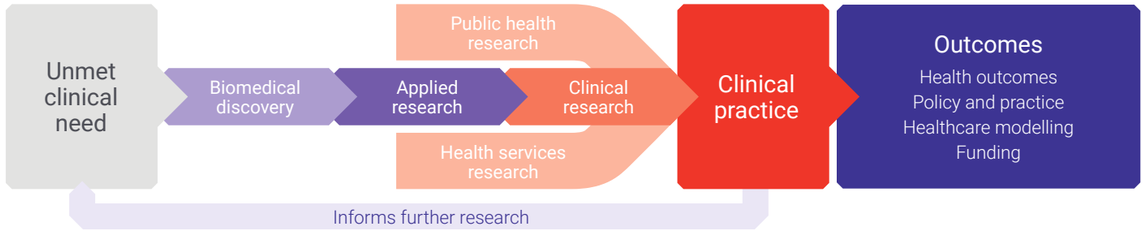
Research is a priority for members of the Alfred Research Alliance. Importantly, our work covers everything from biomedical discovery in the laboratory to applied research, clinical research, and public health and health services research, enabling discoveries to progress from bench to bedside to the broader community.

Our researchers take a clinical unmet need and apply their skills to find a solution for improving health outcomes.

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 processes.

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 research

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

Applied research

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

Health services research

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

Clinical practice

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

Research strengths

- **Blood diseases and cancer**
- **Cardiovascular disease**
- **Diabetes and obesity**
- **Epidemiology and public health**
- **Infection and immunity**
- **Mental health and neuroscience**
- **Nursing and allied health**
- **Trauma, critical care and perioperative medicine**

Precinct highlights

A legacy of excellence

Our pioneering research may be focused on improving health outcomes for the future, but it's built on a long-standing legacy of research excellence. This year, three Alliance partners celebrated significant anniversaries, marking decades of ground-breaking discovery and innovation.

Alfred Health — 150 years

The Alfred has been caring for Victorians since 1871.

The Alfred hospital first opened its doors in 1871 and it has been caring for the people of Victoria ever since. Today, the health service is internationally renowned for its expertise in trauma, burns and intensive care, a reputation forged through decades of being on the frontline of some of the world's biggest health crises. When the typhoid epidemic struck in 1888, The Alfred set up typhoid camps that remained operational for four years. In 1918, they built pavilions to treat large numbers of patients with Spanish influenza.

More recently, the hospital has treated some of the most critically ill patients from events such as the Ash Wednesday bushfires in 1983, Bali bombings in 2002, Black Saturday bushfires in 2009, Bourke Street Mall attack in 2017 and White Island volcano eruption in 2019.

In 2020 and 2021, researchers and clinicians from Alfred Health have drawn on this extensive experience in trauma and critical care to help lead the COVID-19 response in diagnosis, treatment and research.

Baker Heart and Diabetes Institute — 95 years

On 10 May 2021, the Baker Institute recognised 95 years of operation. The deed to establish the 'Thomas Baker, Alice Baker and Eleanor Shaw Medical Research Institute' was signed on that date in 1926 and named after pharmacist and philanthropist Thomas Baker, his wife, Alice, and her sister, Eleanor.

Eleanor Shaw, Thomas Baker and Alice Baker, 1923.

The Institute started with a biochemist, two technicians, a cardiographist, typist and attendant, occupying a small laboratory at the back of The Alfred hospital. Research in the early years ranged from surgery to asthma and infectious diseases. In the 1970s, the Institute began to focus on cardiovascular disease and its research team grew.

The Baker Institute moved into state-of-the-art, purpose-built facilities in 2002, merged with the International Diabetes Institute a few years later and established sites in Alice Springs and Hoppers Crossing. The Institute's world-leading research into the deadly trio of cardiovascular disease, diabetes and obesity continues with more than 340 scientists committed to the cause.

Monash University — 60 years

This year, Monash University celebrated 60 years since the first cohort of 347 students was welcomed to its Clayton campus in 1961. More than 85% were enrolled in arts, medicine, or economics and politics.

From these humble beginnings, the student population has increased by more than 24,000% to be the largest Australian university by student numbers (60,000+). Today, the university has an extensive network of campuses, education centres and partnerships, including their world-class facilities here at the Alfred precinct that house two of its leading schools, the Central Clinical School and the School of Public Health and Preventive Medicine.

From its earliest days, Monash University has been driven by innovation. In 2021, the Monash Central Clinical School was proud to launch its world-first Magnetic Particle Imaging (MPI) system, which you can read about on page 8. At the School of Public Health and Preventive Medicine, this commitment to innovation has driven ground-breaking research and world-leading clinical trials — find out more from page 22.

Monash University Faculty of Medicine, founded in 1961.

COVID keynote from Prof Allen Cheng attracts worldwide interest

A special keynote address by Professor Allen Cheng in November attracted worldwide interest, with well over 1000 viewers logging in to view the virtual presentation about Australia's response to the COVID-19 pandemic.

Professor Cheng is an infectious diseases specialist and an epidemiologist who holds positions as Director of Infection Prevention and Healthcare Epidemiology at Alfred Health and Professor of Infectious Diseases Epidemiology at Monash Public Health and Preventive Medicine. At the time of the address, he was Victoria's Deputy Chief Health Officer, a 12-month appointment that saw Professor Cheng take a lead role in steering the state through its challenging second wave of COVID-19.

In the keynote, he provided a unique insight into Australia's world-leading response to the pandemic, including Victoria's successful response to the second wave, which made news worldwide. The presentation outlined some of the challenges faced by government, policy makers and health experts, the measures which have been taken, and the learnings gathered along the way. Professor Cheng's

Prof Allen Cheng shares his experiences on the frontline of the COVID-19 response.

personal reflections on his involvement, including stepping up to unfamiliar challenges like appearing daily at media briefings, also provided a valuable insight into the multi-faceted nature of the public health response.

Following his address, Professor Cheng presented the prestigious 2020 Alfred Research Alliance annual research prizes, which are awarded for the highest impact journal articles describing original research. Dr Tamara Allen from the Baker Heart and Diabetes Institute and Associate Professor Anna Calkin, also from the Baker Institute, were joint winners in the basic research category, while Michael Traeger from Burnet Institute received the prize for clinical/public health research.

Alliance welcomes Victoria's Lead Scientist to precinct

In March, the Alliance welcomed Victoria's Lead Scientist, Dr Amanda Caples, for a tour of the Alfred precinct and a round-table discussion with senior personnel from Alliance member organisations.

Dr Amanda Caples met with the Alliance leadership after her tour.

A delegation led by Professor Andrew Way, Chief Executive of Alfred Health and Chair of the Alliance Council, and Dr Renée Dutton, Executive Officer of the Alfred Research Alliance, welcomed Dr Caples and provided an overview of the precinct's capacity, capabilities and achievements, and its plans for the future.

Dr Caples then toured Nucleus Network, Australia's largest Phase 1 clinical research organisation, where multiple clinical trials, including some into COVID-19 vaccines, were underway. The facility is just one example of the extensive infrastructure and resources at the Alfred precinct which have been made possible in part by significant past investment by the Victorian Government.

The tour was followed by a round-table discussion with the leadership of the

Dr Amanda Caples with Dr Jason Lickliter, Chief Medical Officer of Nucleus Network.

Alfred Research Alliance, giving Dr Caples the opportunity to review the impact of previous government investment, and how the future health needs of Victorians will be best supported through translational research and medicine.

A world first in imaging technology

Monash University launched its world-first Magnetic Particle Imaging (MPI) system in June. MPI is a new non-invasive molecular imaging technique that works by detecting magnetic nanoparticles. It offers faster, more accurate results than traditional imaging techniques such as MRI and PET.

The preclinical Momentum™ MPI system, developed by Magnetic Insight, is the world's first MPI system with CT and hyperthermia capabilities. It generates extremely sensitive images at high resolution by detecting superparamagnetic nanoparticles that have been introduced to the body and bind solely to cells of interest.

For example, cells (minimum 250) involved with inflammation can be tracked over many days, even weeks, to better understand inflammatory conditions like autoimmune disease progression; the identification of specific impacts of traumatic brain injury can offer insights into new treatment opportunities; and chemotherapy treatments can be monitored for optimal efficacy.

Together, the MPI and hyperthermia technology can be used to pin-point a specific area and induce localised heat to a desired therapeutic temperature for a variety of applications such as promoting cell death (cancer treatment) and aiding drug delivery (new vaccine and drug development).

Dr Karen Alt is the head of the NanoTheranostics Laboratory at the Australian Centre for Blood Diseases and the Alliance's key expert on MPI technology. Her team uses imaging techniques to better understand the underlying mechanisms of disease progression and the impact of targeted therapies.

According to Associate Professor Christoph Hagemeyer, Head of the NanoBiotechnology Laboratory at Monash University's Australian Centre for Blood Diseases, MPI and targeted, controlled hyperthermia are seen as the most promising new developments in diagnostic imaging and therapy in decades because they combine the non-invasive nature of MRI with the sensitivity of PET, merging the best features of these two technologies.

This world-leading facility provides a range of new opportunities for research in critical fields such as vaccine technology development. The MPI system was funded by the Australian Government through the Australian Research Council with contributions from Monash University and RMIT University.

Putting patients first across the precinct

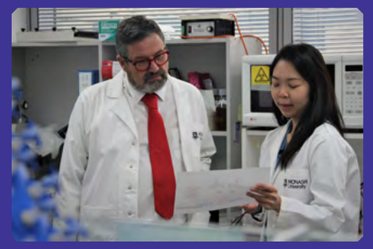
Patient-centred care has been a key tenet of our health services for decades, and consumer engagement is increasingly becoming a focus for researchers and funding bodies alike to ensure research is addressing the community's health needs in a practical, accessible way.

Consumers share their experiences with researchers in ACBD's pilot program.

Across the precinct, consumer engagement takes many different forms from participation in clinical trials to patient committees and dedicated consumer advisory roles, where past and current patients can share their experiences to help improve future care.

In March, the Community and Researcher Engagement (CARE) Committee at Monash University's Australian Centre for Blood Diseases (ACBD) introduced a new community engagement program, the latest iteration of patient-first care on the precinct.

This program aims to connect dedicated researchers at the ACBD with community members who have experienced a blood disorder or cancer. Consumers are partnered with researchers or a research group, bringing their valuable lived experiences to the team and contributing to a shared goal of turning new discoveries into better patient outcomes.



PhD student Charlene Lam discusses her research with consumer partner Ken.

The pilot program was established by the ACBD with support from the Alfred Foundation, and has since been expanded to other departments in Monash's Central Clinical School. They are also hosting a series of webinars on different diseases to inform and connect with the community.

Australia Day and Queen's Birthday Honours 2021

Each year, the Australia Day and Queen's Birthday Honours recognise eminent Australians for their outstanding community service. In 2021, nine researchers from across the Alfred Research Alliance have been acknowledged for their contributions to a wide array of medical and research fields including endocrinology, cancer, urology, forensic medicine, musculoskeletal disease, women's health, HIV/AIDS and epidemiology.

Australia Day Honours

Professor Susan Davis, Professor of Women's Health at Monash University's School of Public Health and Preventive Medicine (SPHPM) and Director of the Specialist Women's Health Clinic at Alfred Health, was made an Officer of the Order of Australia (AO) for distinguished service to medicine, to women's health as a clinical endocrinologist and researcher, and to medical education.

Professor Helen O'Connell from Monash SPHPM was made an Officer of the Order of Australia (AO) for distinguished service to medical education, and to medicine in the field of urology as an academic and clinical, and to professional groups.

Associate Professor Gregory Goodman from the Department of General Practice at Monash SPHPM was made a Member of the Order of Australia (AM) for significant service to medicine, to skin and cancer research, and to education.

Professor Jonathan Serpell, Professor of Surgery at Monash Central Clinical School and Head of the Breast, Endocrine and General Surgery Unit at The Alfred, was made a Member of the Order of Australia (AM) for significant service to medicine, particularly to endocrine surgery.

Queen's Birthday Honours

Professor Soren Blau, Adjunct Senior Lecturer in the Department of Forensic Medicine at Monash SPHPM, was made a Member of the Order of Australia (AM) for significant service to forensic medicine, and to scientific organisations.

Professor Flavia Cicuttini, Head of the Musculoskeletal Unit, Monash University and Head of Rheumatology, Alfred Health, was made a Member of the Order of Australia (AM) for significant service to medicine, and to musculoskeletal disease research.

Professor Helena Teede, Director of the Monash Centre for Health Research Implementation within SPHPM, was made a Member of the Order of Australia (AM) for significant service to medical education and research, to endocrinology, and to women's health.

Associate Professor Edwina Wright, infectious diseases physician at The Alfred and Co-Head of the HIV Elimination Program at Burnet Institute, was made a Member of the Order of Australia (AM) for significant service to medicine and research, notably for people living with HIV/AIDS.

Professor Dianna Magliano, Head of the Diabetes and Population Health Unit at Baker Heart and Diabetes Institute and diabetes researcher with Monash University's SPHPM, received a Medal of the Order of Australia (OAM) for service to epidemiology, and to tertiary education.

"In 2021, nine researchers from across the Alfred Research Alliance have been acknowledged for their contributions to a wide array of medical and research fields including endocrinology, cancer, urology, forensic medicine, musculoskeletal disease, women's health, HIV/AIDS and epidemiology."

Research performance

2020 external funding awarded for health and medical research

$162M

External research funding by funding source — 2020

$90.8M
Australian competitive grants

$19.4M
Other public sector research income

$38.8M
Other competitive research grants

$9.4M
Industry income

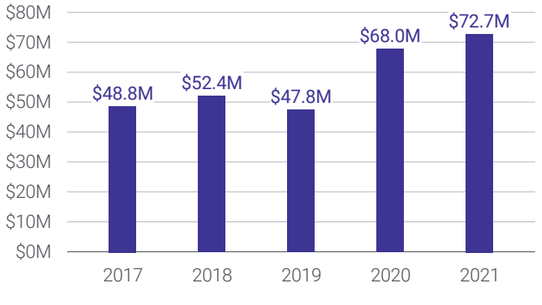
$3.6M
Other research income

$162M
Total

NHMRC funding commitments secured by Alfred Research Alliance commencing in 2021

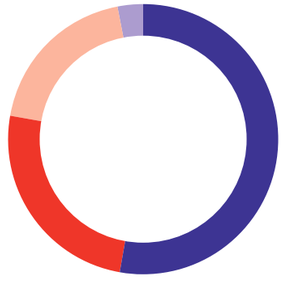
$72.7M

NHMRC funding commitments directly administered by Alliance members



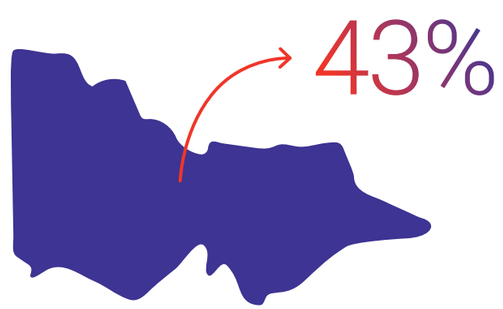
External research funding by research area — 2020

External research funding by research theme — 2020



- **53%** Public health/health services research
- **25%** Clinical research
- **19%** Biomedical discovery
- **3%** Applied research

Victoria secured 43% ($362M) of total new NHMRC commitments commencing in 2021.



The Alfred Research Alliance received:

100% of all Victorian NHMRC funding for dermatology

97% of all Victorian NHMRC funding for haematology

92% of all Victorian NHMRC funding for cardiology (including cardiovascular diseases)

Philanthropy

In addition to the $162M in external funding secured specifically for research, Alliance partners also received **over $27 million in philanthropy and fundraising revenue** in 2020.

Students 2020

1351
Postgraduate degree students

199
Masters student completions

69
PhD/doctoral student completions

Commercial impact

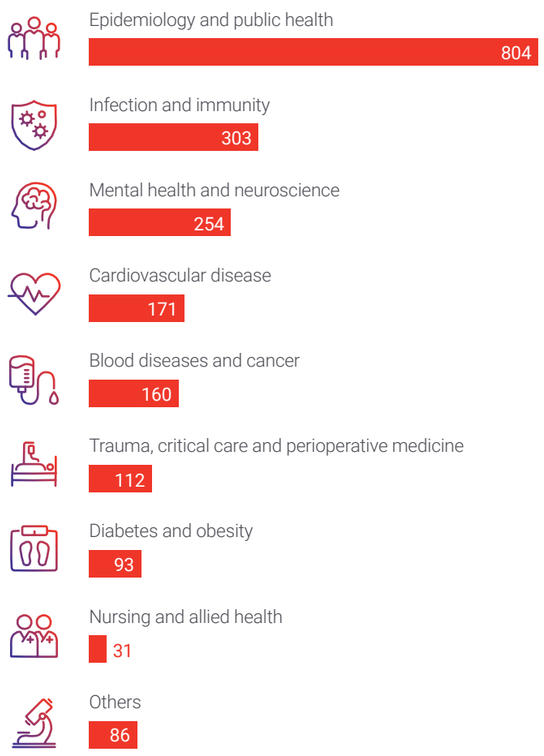
23
National Phase Entry

18
PCT patent applications

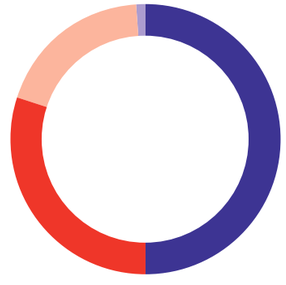
10
Provisional patent applications

2
Patents granted

Original research publications by research area — 2020



Original research articles by research theme — 2020



- **50%** Public health/health services research
- **30%** Clinical research
- **19%** Biomedical discovery
- **1%** Applied research

Our members

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

Baker Heart & Diabetes Institute

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.

Deakin University

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.

Nucleus Network

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 more than 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."

Monash University

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 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.

Burnet Institute

Medical Research. Practical Action.

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.

La Trobe University

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, and promote interdisciplinary and inter-institutional collaboration in healthcare delivery and research. We provide a centre of excellence for education in nursing and are leaders in implementation science — the uptake of research evidence into clinical practice.

These objectives 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.

360biolabs

a BioAgilytix company

360biolabs, a BioAgilytix company, is the leading and most comprehensive specialty laboratory in the Australia and New Zealand region focused on supporting pharmaceutical and biotech partners in all phases of drug development.

Recently joining the global BioAgilytix team and now with laboratory locations in North Carolina's Research Triangle Park; Cambridge, Massachusetts; San Diego, California; Hamburg, Germany; plus Melbourne and Brisbane, BioAgilytix provides large and small molecule PK, immunogenicity, biomarkers, flow cytometry, virology and cell-based assay services supporting the development and release testing of therapeutics across a number of industries and disease states.

360biolabs and the global BioAgilytix laboratories offer assay development, validation and sample analysis under ISO/IEC 17025, ISO 15189, GLP and GCP, GMP quality control testing (i.e. product release testing, stability testing, etc in USA labs) and diagnostic testing services at its CLIA-certified, CAP-accredited Boston laboratory.

A team of highly experienced scientific and QA professionals ensures high-quality science, data integrity and regulatory compliance through all phases of clinical development. 360biolabs and the global BioAgilytix team is a trusted partner to many top global pharmaceutical and biotech companies.

Clinical trials at the Alfred Research Alliance

Without clinical trials, ground-breaking discoveries in the laboratory would never become the treatments or medicines that improve the health and wellbeing of the community. They are a key part of the process that translates the latest medical research into real-world outcomes — and the Alfred Research Alliance is a world leader.

504

clinical trials commenced or continued at the Alfred Research Alliance in 2020

What are clinical trials?

Clinical trials are the mechanism to systematically test new medicines, treatments and preventions to ensure they are safe and effective before making them available to the community to treat or prevent specific diseases and conditions.

Why are they important?

Clinical trials are crucial for evaluating whether a new treatment or medicine is safe and effective. Other testing modalities are helpful in the initial stages of discovery, but new drugs, therapies, devices and interventions can only be properly tested in humans. Clinical trials also ensure that the benefits of a new treatment or medicine are experienced by a large cohort of people, rather than a random few.

Benefits of clinical trials

In 2020, there were 328 commercially sponsored trials at this precinct (65% of all trials at the precinct).

The pharmaceutical and biotechnology industry trusts the expertise of our members to undertake clinical trials on their behalf. These trials bring in funding to the precinct supporting local, highly skilled jobs that underpin the state's clinical trials capability.

The high percentage of commercially sponsored trials at the Alfred precinct means that both local and international industry is experiencing this capability, helping to grow the economy and continue to promote the precinct as a preferred destination for clinical trials.

There were 176 investigator-initiated trials at the precinct in 2020 (35% of all precinct-based trials), highlighting the high-quality research capability focused on improving clinical outcomes. Investigations made through clinical research into the effects of treatments in existing routine clinical practice underpin evidence-based improvements to health care standards for more effective patient outcomes.

Why here?

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 the Alfred Research Alliance.

Of all new trials commenced in Australia in 2019,

1 in 5

were at the Alfred precinct.*

*MTPConnect, 2021. *Australia's Clinical Trials Sector* and unpublished data. Data for 2020 was not published to enable local comparison.

An integrated community

The Alliance brings together a health service, three universities, two independent medical research institutes, a phase I clinical trial specialist company and a specialty laboratory services organisation for therapeutic, vaccine and diagnostics development. This unique integration of experience and expertise, enhanced by co-appointments between partner organisations, creates the ideal environment for the conduct of clinical trials. Because of our breadth and depth of knowledge across many different disciplines, the Alliance is a global leader in clinical trials and a sought-after site for both local and international trials.

Consumers first

From their base at the Alfred precinct, our member organisations ensure their research is patient-focused and outcome-driven by delivering clinical trials directly to areas of need. For example, the Baker Institute Clinical Trial and Research Centre has recently opened in Hoppers Crossing in Melbourne's south-west to address high rates of heart disease in the local population.

Ethics

Ethics approval for clinical trials can often be a time-intensive process, but the 'one-stop shop' approach through Alfred Health makes ethics approval more straightforward. Shared resources help our partners navigate ethics approval in an efficient and streamlined manner, while ensuring the highest standards of compliance are applied and upheld across the precinct.

Rural and regional reach

Clinical trials are typically conducted in metropolitan regions, which can create issues of accessibility for people in rural or regional areas. For example, cancer patients who live in a capital city may be able to access new cancer treatments via clinical trials that are not available to patients in the regions. Alfred Health's TrialHub is an initiative funded by the federal government that enables clinical trials to reach regional and rural health services using a hub-and-spoke model, providing patients with the opportunity to access new medicines through these trials.

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Visit the website at **alfredresearchalliance.org.au/research/clinical-trials/** to find out more and who to contact at each organisation.

Foundations for flexibility

A reputation for excellence supported by a well-established clinical trial framework means the Alfred precinct can respond quickly and efficiently to emerging health crises like COVID-19. Throughout the pandemic, Alliance partners have conducted numerous clinical trials in many different areas including trials for multiple new vaccine candidates, improving COVID-safety with x-ray procedures and trialling patient care and safety measures such as temperature screening in hospitals.

Phase I to Phase IV

The Alliance undertakes trials across all phases, from Phase I (initial testing in a small group of people) to Phase IV (monitoring the ongoing effectiveness of a treatment after it has been released to the public). In many cases, the preclinical research that informs these trials is done on our precinct too, as well as the integration into clinical practice on successful completion of the trial. This creates a full translational research loop on site, enabling our partners to deliver better health outcomes, sooner.

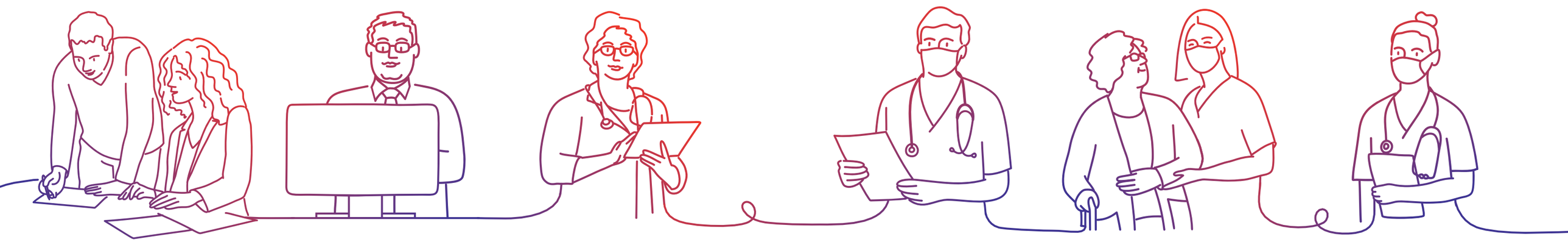
Clinical trials in 2020

Phase I (including FTIH)	233
Phase II	76
Phase III	95
Phase IV	26
Device (FTIH and beyond)	48
Other trials	26

Next-generation nursing: the future of care

In 2021, the International Year of the Nurse and Midwife was extended to recognise the extraordinary contribution of nurses throughout COVID-19. Nurses have been on the frontline of the pandemic response since day one, but at the Alfred Research Alliance their impact spreads far beyond the ward. From shaping clinical care guidelines and education to conducting clinical trials and advising on public health policy, our 4000+ nurses and nurse researchers are playing an active role not just in the pandemic, but in shaping the future of innovative, patient-centred care.

4,000+ nurses and nurse researchers on the Alfred precinct



Training and education

Our university partners educate undergraduate, graduate and postgraduate nurses, and Alfred Health has more than 1500 Bachelor of Nursing and Master of Nursing students across their three sites. As a teaching hospital with a rich history of nurturing the next generation of general and specialist nurses, along with our future clinical nursing leaders, patients at The Alfred know they're in great hands.

Some nurses decide to become researchers and undertake PhDs and continue with postdoctoral roles. Nursing researchers are also trained at our site and the Alliance is a prestigious location for international postdoctoral study.

Leading best practice

The Alliance's focus on translational research extends to our nurses, who integrate research evidence into clinical practice to improve quality care for patients. This research aims to address unmet needs across all areas of healthcare, using a variety of technological solutions such as electronic medical records (EMR) data to create innovative outcomes.

Nursing research also aims to advance best practice for the profession itself, providing expertise on nursing practices, education and policy as well as fostering a culture of mentorship for emerging researchers.

This focus on leadership has seen nurses transition into operational and management positions, working in executive roles across the health service and in important programs such as clinical registries.

Public health studies

Public and preventive health studies can take many years to complete and involve the ongoing collection of clinical information and monitoring of participant health. In these studies, nurses are part of a multidisciplinary team working with patients to generate the data that helps to inform effective public health measures to support the health and wellness of our communities.

Clinical trials

Nurses are key to conducting clinical trials. In trials for new medicines and therapies, nurses are a critical part of the research team in supporting a participants' journey. Their role includes screening, monitoring and and supporting in-patients, as well as further monitoring of out-patients where required.

Nursing staff are responsible for the clinical monitoring of participants in studies testing behavioural or preventive interventions too.

With their expert clinical knowledge and communication skills, nurses also make some of our great clinical trial coordinators. As investigators, they lead trials that impact clinical care.

Specialist training

Patients come first at The Alfred, and part of making this happen in such a busy health service is access to many general and specialist nurses. Nurses complete additional training to become specialists in specific fields, which enables them to work in the intensive care unit, emergency department and operating theatres. Our workforce also includes many other specialists like cardiac, stroke, cancer, pain and burns nurses.

Nurse educators are important specialists too. They help teach patients how to better manage chronic conditions such as cardiovascular disease and diabetes, as well as supporting staff and students' education and training.

Community engagement

Nurses play an important role in community engagement at both a local and international level.

On the precinct, there is a strong consumer focus with patients and their families actively involved in the co-design of health services and research projects.

Beyond the setting of the health service, nurses provide advice to policymakers to assist in the creation of effective health policy and guidelines for improved clinical care. Their expertise is regularly shared with overseas counterparts who travel to the Alfred precinct to undertake specialist training in, for example, ECMO and trauma nursing.

Our COVID-19 response

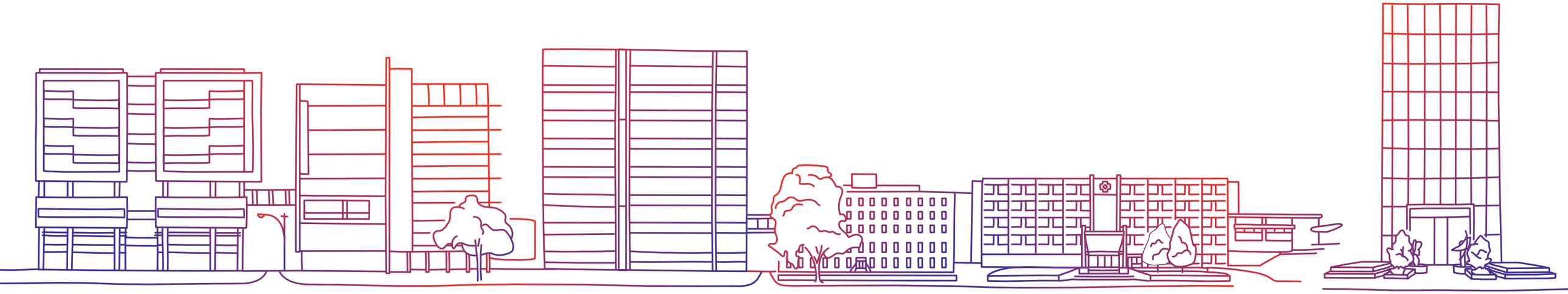
Over the past two years, the Alfred precinct has demonstrated outstanding determination and commitment to improving health outcomes for patients and the community, as each of our member organisations mobilised to play key roles in the COVID-19 pandemic response. The innovation and discovery that began on this site in early 2020 has rippled out to benefit the rest of the state, country and world. Read on for a snapshot of some our COVID-19 research and public health response highlights.

Vaccine development

The precinct was home to several clinical trials for COVID-19 vaccines. Nucleus Network conducted four in-human Phase 1 and Phase 2 trials, including for Novavax, which is due to become available in Australia in late 2021. 360biolabs has also been involved in vaccine development, providing specialist laboratory services to some COVID clinical trials.

Patient wellbeing

Patients hospitalised with COVID-19 needed to be isolated, which brought with it a host of challenges for medical teams. As nurses provided clinical care on the frontline, nursing researchers investigated ways to improve the experience for patients and families, as well as testing the efficacy of temperature screening and fever detection technologies.



Clinical practice

Alliance researchers are part of the National COVID-19 Clinical Evidence Taskforce, enabling clinicians around the country to translate the latest research into clinical guidelines in real time. Other joint studies by Monash and Alfred Health are focused on improving the critical care response for COVID-19: recording real time, detailed reporting of the sickest patients admitted to the ICU (SPRINT-SARI); helping emergency departments rapidly identify and predict the outcomes of patients with COVID-19 infection (COV-ED); and further developing the ECMO registry with outcomes of patients who experienced this life-saving intervention.

Treating the virus

As a novel coronavirus, researchers have had to work quickly to understand COVID-19 and how to best treat it. Researchers from Monash are leading the global REMAP-CAP trial, which brings together more than 250 experts to efficiently evaluate a range of treatment options for critically ill COVID-19 patients. Other researchers at the precinct are examining whether repurposing existing antiviral medications to treat COVID-19 is effective, while Burnet is applying their antibody expertise to the search for other drugs. Researchers from Monash and Alfred Health are studying clinical pathogenesis in COVID-19 patients via a biobank of clinical samples seeking insights to guide effective treatments.

Long-term effects

As the pandemic progressed, 'long COVID' — a collection of symptoms experienced by some COVID-19 patients after their infectious period — became an increasing concern. Several partners are researching these ongoing effects, including a study by Monash that tracks patients' recovery over time, another into the neurological effects of the virus, and one by the Baker Institute and Alfred Health to understand the impact of COVID-19 on the heart.

Advising government

Staff from several Alliance partners were seconded to advisory roles and working groups to provide expert advice to State and Federal Government's COVID responses, advising on public health measures, testing, contact tracing, vaccination and modelling. Professor Allen Cheng from Monash University and Alfred Health was Victoria's Deputy Chief Health Officer throughout much of 2020 and 2021, helping to guide Victoria through its deadly second wave.

Testing and diagnostics

Widespread testing was crucial for understanding the spread of COVID-19, but the typical PCR test, while very accurate, could be slow to return a result. Burnet Institute's diagnostics platform enabled researchers to start developing a rapid point-of-care test measuring current or past COVID-19 infection, as well as potential immunity to future infections. Monash has also been working on new diagnostic measures for detecting asymptomatic COVID-19 infection using DNA amplification technology for rapid testing.

Impacts of the pandemic

The highly infectious nature of COVID-19 necessitated that governments around the world institute a variety of strict public health measures, including lockdowns. Alliance researchers are investigating the knock-on effects of these measures on mental and physical wellbeing, with longitudinal studies to track how community members are coping throughout the pandemic, and what interventions may be required to support people and communities to help inform pandemic responses. Burnet Institute's Optimise study, Monash's COVID-19 work and health study and Living with COVID-19 restrictions in Australia study are three examples of research that will inform interventions for recovery.

Blood diseases and cancer

Antibody engineered to prevent clotting in stroke and heart attack

MONASH University

Monash researchers have invented an antibody which can prevent the formation of bad clots, such as those in stroke and heart attack, while lowering the risk of complications presented by current treatments.

Heart attack and stroke remain the leading causes of mortality and morbidity worldwide. However, treating these events is challenging because current anti-thrombotic (anti-clotting) therapies also interfere with normal blood clotting, which can lead to severe bleeding complications.

Existing anti-platelet drugs therefore cannot be used in higher doses. As a result, their efficacy remains disappointingly low and future therapies require a fundamental redesign.

In a paper published in Haematologica, Dr Erik Westein and Associate Professor Christoph Hagemeyer from Monash University's Australian Centre for Blood Diseases (ACBD) describe how they have designed a novel antibody that inhibits one particular blood-borne protein, Von Willebrand Factor (VWF).

This new antibody can stop pathological thrombosis without impacting normal healthy clotting, so researchers expect it can be used at a much higher and effective dose compared to existing therapies.

This is an in vitro study, working only with human blood samples. The next step will be to test the efficiency of the antibody in small animal models to understand how it works in a complex living system analogous to humans.

In recognition of his significant contribution to translational research on this and other projects at ACBD, Christoph Hagemeyer was promoted from Associate Professor to Professor (Research) in June 2020.

Innovative Australian trial investigates new treatment for deadly blood disorder

MONASH University

The DIAAMOND study (Diagnosis of Aplastic Anaemia, Management, and Outcomes utilising a National Dataset) is the first Australian trial in more than 30 years looking at a new treatment for aplastic anaemia, a rare and often deadly blood disorder.

The innovative design sets it apart from many other trials: it uses an adaptive Bayesian Optimal Phase II design, and is embedded within an existing clinical registry, the Aplastic Anaemia and Other Bone Marrow Failure Syndromes Registry, run by the Transfusion Research Unit at Monash's School of Public Health and Preventive Medicine.

Dependent on factors including patient age, disease severity and availability of matched bone marrow donors, current treatments of aplastic anaemia are immunosuppressive therapy (IST) or bone marrow transplantation (BMT). However, not all patients respond to IST. For many patients the response is moderate at best, and they will require ongoing treatments such as antibiotics, white cell growth factors, red blood cell and platelet transfusions.

The DIAAMOND trial, supported by the Medical Research Future Fund, is being conducted to find out if giving the thromobopoietin-stimulating agent avatrombopag improves outcomes for patients with severe aplastic anaemia, including safer blood counts, reduced transfusions and reduced hospitalisations. The therapy is administered to newly diagnosed patients and to patients who have relapsed or who have disease refractory to IST.

Recruitment for the trial began in late 2019, and it now has 43 patients across 12 sites nationally. The team has also begun work with Biobanking Victoria on a national biobank funded by Maddie Riewoldt's Vision that will link to the registry. This will form an important national resource for future research projects into aplastic anaemia, by enabling access for approved researchers to biological samples linked with detailed clinical data to build a more complete picture of this complex and serious disease.

Breakthrough therapy discovered for acute myeloid leukemia

AlfredHealth

A phase I clinical trial led by The Alfred hospital with collaborative support from the Royal Melbourne Hospital, Peter MacCallum Cancer Centre, Austin Hospital and Box Hill Hospital has for the first time demonstrated the feasibility of anti-cancer drug venetoclax in combination with intensive chemotherapy as a treatment option for acute myeloid leukemia (AML).

AML is a rare type of leukemia and can progress quickly if not treated. Around 1100 Australians are diagnosed with AML each year, most of whom are over 65. The five-year survival rate is around 20%, so only one in five patients will be alive five years after diagnosis — this is why new treatment options are so vital.

In the CAVEAT trial, patients with AML over the age of 65 and fit for intensive chemotherapy were allocated to venetoclax dose-escalation cohorts. The study found that venetoclax combined with induction chemotherapy was safe and tolerable in fit older patients with AML, and there were no unexpected side effects compared to conventional intensive chemotherapy. However, researchers did observe bone marrow suppression as patients received more treatment cycles which required close monitoring.

Researchers observed very promising clinical responses with the treatment schedule when compared to historical results from conventional intensive chemotherapy, especially in patients with "de novo" AML where 97% of patients achieved remission. However, these results will need to be formally proved in a larger randomised clinical trial.

An additional benefit with this treatment schedule is that all therapy after the first cycle were delivered in the outpatient setting, therefore avoiding unnecessary or prolonged hospitalisation.

Cardiovascular disease

Understanding aortic mechanisms as a way to treat heart conditions

LA TROBE UNIVERSITY

Baker HEART & DIABETES INSTITUTE

A joint initiative by La Trobe and Baker Heart and Diabetes Institute, led by Dr Alex Pinto and Professor Grant Drummond, is investigating the mechanisms behind aortic stiffening in the hope it offers some insights into new treatments for heart conditions.

The aorta is the largest artery in the body and delivers blood from the heart to the peripheral organs. The aorta is highly elastic and this property is crucial to its ability to buffer the pulsatile left ventricular ejection of blood and convert it into continuous flow.

In hypertension and ageing, the aorta becomes stiffened, impairing its buffering capacity and exposing target organs to damaging mechanical forces that can lead to heart failure, kidney injury, stroke, dementia and retinopathy.

Currently, there are no treatments for aortic stiffening. Dr Pinto's team is using state-of-the-art animal disease models, single cell transcriptomics, high dimensional flow cytometry and immunohistochemistry to investigate the cellular and extracellular processes responsible for aortic stiffening with a view to identifying novel therapeutic targets.

Using genetic and biomarkers to map heart disease risk

Baker HEART & DIABETES INSTITUTE

Tragic events like heart attacks and strokes are preventable, but we need to get better at identifying those people at risk. A new trial at the Baker Heart and Diabetes Institute is looking at how polygenic and metabolic risk scoring could be used for early detection of coronary artery disease, paving the way for individuals to take preventive action or treatment years before disease strikes.

Hundreds of family and friends of Victorians with heart disease have been recruited to the trial, which will develop personalised heart risk profiles as unique as a fingerprint. Following a simple blood test, the trial will give each participant a polygenic risk score, a new way of measuring genetic predisposition to coronary artery disease independent of other known risk factors.

Those who are identified as most genetically at-risk of coronary artery disease will then receive a CT scan for further investigation. This project brings together the work of labs from across the Institute all developing different, but complementary, ways to improve cardiovascular disease risk prediction.

It is the most popular trial the Institute has ever recruited for, receiving more than 2000 responses to the recruitment campaign. This alone highlights the strong community support and significant need for early detection of heart disease.

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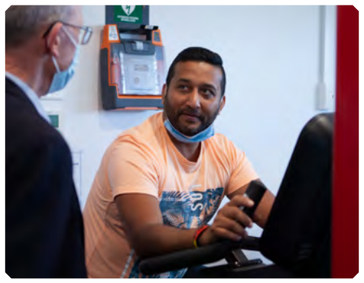
With a family history of heart disease, Genevieve Paterson wants to better understand future risk for her and her children.

Investigating the long-term impact of COVID-19 on the heart

Baker HEART & DIABETES INSTITUTE

The Baker Heart and Diabetes Institute is recruiting more than 1000 people who have had COVID-19 to be part of a $2.5 million MRFF intervention study to understand the ongoing cardiovascular effects of the infection.

There has been a lot of discussion about the symptoms of 'long COVID' but the mechanism is very unclear and there is much to be learnt in this area.



The study, called PERCEIVE, aims to understand whether COVID-19 causes damage to the heart chambers and blood vessels and impacts functional capacity. It also aims to determine if best practice management (for example, heart medication or exercise training) can restore function.

This project brings together the Institute's cardiac imaging, heart failure and exercise physiology expertise, working in collaboration with several health services, including The Alfred.

Participants will be required to undergo cardiac scans and exercise testing to see if any damage has occurred to their heart. If there is evidence of heart damage, they will receive a review with a cardiologist and will either receive exercise training or medication to help their heart recover.

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Abhi Nair contracted COVID-19 last year and is part of a study with Prof Tom Marwick to better understand the long-term impact of the virus.

The new technology keeping hearts alive outside the body for longer

AlfredHealth

Cardiac specialists from The Alfred have been part of a ground-breaking trial across Australia and New Zealand that could change the future of heart transplantation, potentially enabling up to 15 per cent more heart transplants to occur each year.

To date, The Alfred's specialists have performed five human heart transplants using a novel method known as 'hypothermic ex-vivo perfusion' to preserve the donor heart during transit. In one of the transplants, the donor heart recorded an 'ischemic' time — the time the heart does not have blood supply — of more than seven hours, the longest period of time recorded worldwide to date.

The trial could potentially double the amount of time donor hearts remain viable for transplantation, increasing the current four-hour standard to eight hours. This would mean donor hearts could travel greater distances, ultimately saving more lives.

It is the first time the hypothermic ex-vivo (outside the body) perfusion technology, developed by XVIVO Perfusion in Sweden, has been applied outside Europe. The process involves putting donor hearts on an 'ex-vivo perfusion machine', which pumps a liquid called perfusate through the heart muscle, cooling it to 8°c and keeping it supplied with oxygen.

The advancement follows four years of pre-clinical research led by the Critical Care Research Group (CCRG) in Brisbane. Five sites across Australia and New Zealand are involved in the trial, with The Alfred the first to perform five transplants.

Diabetes and obesity

Identification of a gene that regulates storage of dangerous fat

Baker HEART & DIABETES INSTITUTE

Scientists have discovered a gene that is important in regulating the storage of dangerous fat to prevent it becoming toxic and driving diabetes and heart disease.

The preclinical study, led by Associate Professor Brian Drew and published in Nature Communications, showed that removal of this gene meant that dietary fats were more readily stored in their rightful place, adipose tissue.

When excess fat overflows from the adipose tissue, it gets stored in organs where it normally wouldn't, such as the liver, muscle and heart. In these organs, the fat becomes toxic and can lead to many chronic diseases such as diabetes, fatty liver disease and cardiovascular disease. It also poses an increased risk for up to 14 different types of cancer.

In addition, scientists found that this gene changed the levels of a 'master regulator' in our fat tissue that dictates differences in weight gain between men and women, suggesting that it could be manipulated to alter a person's predisposition to obesity.

Professor Wendy Brown, Chair of the Monash University Department of Surgery, Alfred Health, says there is an urgent need for effective treatment options for obesity. In Australia, two in three adults are either overweight or obese. Obesity now kills more people than smoking, and it has become a major burden on our health and economic systems.

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A/Prof Brian Drew led a ground-breaking preclinical study that could guide future treatment of conditions like diabetes and heart disease.

Study reveals why processed foods trigger chronic kidney disease

MONASH University

A study led by Monash University diabetes researchers has shown that a diet high in processed foods brings on leaky gut syndrome, which in turn increases the risk of kidney disease.

The rodent-based study, published in Science Advances and led by Associate Professor Melinda Coughlan from Monash Central Clinical School's Department of Diabetes, revealed that certain harmful chemical compounds called Advanced Glycation End Products (AGEs) switch on the body's danger signals leading to an inflammatory response and chronic kidney disease. AGEs, found in heat-treated or processed food, are what gives browned, roasted, fried, grilled and baked foods their flavour and aroma.

However, researchers found that the inflammatory response brought on by AGEs could be switched off by introducing foods containing high resistant starch fibre, in turn restoring gut health and improving kidney health. These foods include oats, cooked and cooled rice, barley, beans and legumes such as black beans and peas, and cooked and cooled potatoes — they help by getting down into the lower gut and serving as food for gut bacteria, which then ferment food-producing metabolites that are anti-inflammatory.

Now that this study has shown that certain chemical compounds in highly processed foods play a role in chronic kidney disease, researchers can look to make alternative food formulations or functional foods aimed at dampening the body's response.

Epidemiology and public health

Developing affordable solutions to prevent preterm birth globally

Burnet Institute Medical Research. Practical Action.

A research program led by Principal Research Fellow and Co-Head of the Global Women's and Newborn's Health Group, Associate Professor Joshua Vogel, is studying ways to improve survival for women and newborns in preterm births, particularly in low-resource settings where health services are scarce. Preterm birth affects 15 million babies each year and is the leading cause of death globally in children under the age of five.

Associate Professor Vogel and his collaborators developed sophisticated treatment protocols using antenatal corticosteroids as an effective and affordable intervention in low-resource settings to not only reduce the risk of preterm birth, but also improve health outcomes for the preterm newborn. He set up studies across five countries, working with the World Health Organization (WHO) to apply these protocols with the aim of preventing a significant proportion of deaths due to preterm birth. This followed his earlier work of documenting 15 million premature births globally.

The trial results are informing WHO policies and actions which address the UN Sustainable Development Goal 3.2 of ending preventable deaths of newborns and children under five by 2030.

This significant achievement was recognised by the NHMRC, which awarded Associate Professor Vogel two prestigious awards in 2021. Professor Vogel also received the Nature Research Award for Driving Global Impact in 2020.

Unique study focuses on how Victorians are experiencing and responding to COVID-19

Burnet Institute Medical Research. Practical Action.

The Optimise Study explores the impacts of COVID-19 at both an individual and community level. Led by Burnet and Doherty Institutes, the findings provide governments with real time, high quality data to inform COVID-19 responses.

Since September 2020, the study team has recruited participants from a broad range of cultural and socioeconomic backgrounds. Led by Professor Margaret Hellard AM, the study team engages with government, community organisations and advocates to ensure pandemic responses account for the diverse needs of these different communities.

One finding showed how Victorians responded to government restrictions on social distancing and gathering. Participants reported that shorter lockdowns were easier to deal with and described a range of strategies to manage their lockdown experiences.

The study also found only one in three participants with symptoms of COVID-19 got a test. This followed earlier findings that showed fear and stigma are preventing young Australians and key community groups from deciding to be tested for COVID-19. Reasons included the impact of forced isolation and not being able to provide for themselves.

The Optimise reports highlight strategies for government policy and responses, such as the critical role of clear communication for implementing testing, isolation and physical distancing.

The Optimise Study is a partnership between Burnet Institute and Doherty Institute in collaboration with University of Melbourne, Swinburne University of Technology, Monash University, La Trobe University, Murdoch Children's Research Institute, the Centre for Ethnicity and Health, and the Health Issues Centre.

COVASIM — understanding and predicting epidemic outcomes through mathematical modelling

Burnet Institute
Medical Research. Practical Action.

Since the spread of COVID-19 in Australia, Burnet Institute's COVASIM model has been projecting epidemic outcomes and running scenarios to assess the potential impact of different measures and decisions.

In 2020, the COVASIM model was fundamental in helping to shape the outcome of Stage 4 lockdown during Victoria's second wave. The model warned of the risks of opening up too quickly, and was used by the Victorian Government to inform the gradual easing of Stage 4 restrictions throughout September-November 2020. The decisions that the model informed opened the door for Victoria to achieve elimination of COVID-19 on 26 November 2020.

Burnet's modelling in 2021 has been studying how different levels of vaccine coverage impact the need for public health measures such as social distancing, mask wearing, use of QR codes and lockdowns. The results highlight the need to preserve these measures to control COVID-19 even with high vaccine coverage, but that more options for maintaining control will become available as vaccination coverage increases.

The COVASIM model was developed by Burnet Institute and Institute for Disease Modelling in the USA.

Nationwide registry to shape better decision-making for ECMO patients

MONASH University

The national extra-corporeal membrane oxygenation (ECMO) Registry, called EXCEL, has repeatedly proven its value during the COVID-19 pandemic. Established in 2018 and run by the Monash School of Public Health and Preventive Medicine, the registry captures standardised health data and outcomes information for some of Australia's sickest patients — those in intensive care who need mechanical support of their lungs or heart in the form of ECMO.

ECMO is a costly, life-saving technology which pumps blood through large cannulae in the neck or groin into a mechanical oxygenater before it is returned to the body. The use of ECMO has been rapidly increasing, even prior to the pandemic. The speed of its adoption meant that decisions around use were largely unsupported by strong evidence, and a clear national standard on use was lacking.

Since inception of the registry, 687 patients have been included, 384 of those in the last 12 months alone. Last year the registry team pivoted to incorporate COVID-19 specific data points that are aligned with similar international registries. Five separate clinical trials are embedded in the registry including the ECMOCARD study, an observational study looking at the effect of ECMO on clinical outcomes of COVID-19 patients.

The registry data is already yielding important findings that will guide better decision-making about ECMO use, including approaches to minimise complications of ECMO and early rehabilitation for those on ECMO to aid in their recovery.

'Living guidelines' lead the way for translating medical evidence into clinical practice

MONASH University

Driven by Cochrane Australia experts at the Monash School of Public Health and Preventive Medicine, the Australian Living Evidence Consortium (ALEC) has become a global model of 'living guideline' implementation over the last 18 months. The Consortium is a coalition of national clinical guideline developers, peak health NGOs and academic research groups across five high-burden chronic disease areas.

The 'living guidelines' model, one that rapidly incorporates the latest medical evidence into clinical guidelines, was first tested in stroke, and is now being piloted in diabetes, arthritis and chronic kidney disease. These demonstration projects have shown that it is feasible to reduce the time for important new research to be incorporated into guideline recommendations from years to months, without compromising scientific rigour.

In early 2020, the Consortium established the National COVID-19 Clinical Evidence Taskforce to provide Australian clinicians with trusted, nationally consistent, up-to-date guidance on the best clinical care for people with COVID-19.

The Taskforce has brought together 32 peak health organisations working with 100% consensus to publish 150 recommendations for the clinical care of COVID-19 across primary, acute and critical care settings. The frequently updated guidelines have been viewed by more than 216,000 individual users in 189 countries across the world.

ALEC staff are now helping others to adopt the model, including the National Institute for Health and Care Excellence (NICE) in UK and the World Health Organization. In Australia, funding secured via state and federal governments, as well as philanthropic donors, will see ALEC's work expand significantly over the coming years.

Understanding the impact of COVID-19 on health and aged care workers

MONASH University

The COVID-19 pandemic has put health and aged care workers in high-exposure risk situations, leaving many stressed and fatigued. The Coronavirus in Victorian Healthcare and Aged Care Workers (COVIC-HA) Cohort Study aims to examine the impact of the pandemic on these workers over time, harnessing the expertise of researchers from a wide range of disciplines within the School of Public Health and Preventive Medicine and the Monash Partners network to do so.

Led by infectious diseases experts Professor Karin Leder and Dr Sarah McGuinness, the project team has engaged multiple Victorian health service partners, including Alfred Health, across hospital, ambulance, primary care and aged care sectors.

Quantitative surveys of 1017 participants have explored COVID impacts on workload and on mental health, past and current COVID-19 infection status, and quarantine/furlough history. Semi-structured interviews with workers and organisational representatives have been conducted to better understand the lived experiences of workers, and mitigation strategies implemented at an organisational level since the pandemic began.

Preliminary results suggest that workers roles influence mental health outcomes, and that those who have experienced quarantine/furlough have been more heavily impacted. Workers have also expressed concerns about effects on patient care. Further surveys will be conducted in the second half of 2021 and again in 2022 to monitor workers' health and wellbeing as the pandemic evolves.

Infection and immunity

A new era for diagnostics at Burnet Institute

Burnet Institute took the significant and ambitious step in 2020 to create the Burnet Diagnostics Initiative (BDI), to focus capacity for engaging in the point-of-care (POC) in vitro diagnostics industry.

BDI will translate existing and new technologies into practical health solutions and products. The initiative is also addressing the need for fast, affordable, POC tests including making these accessible to vulnerable populations in low- and middle-income countries. BDI builds on Burnet's solid track record in POC diagnostics and global partnerships.

Leading virologist Professor Heidi Drummer was appointed BDI's Scientific Director to manage its pipeline expansion and the translational work required to turn research into commercial products. She will also lead its Global Health Diagnostics Development Laboratory to capitalise on the strengths of existing labs and integrate components into a centralised BDI lab at Burnet. Professor Drummer is also Burnet's Program Director for Disease Elimination and Co-Head of the Viral Entry and Vaccines Group.

The COVID-19 pandemic has further highlighted the need for scientific solutions to health challenges and establishing the BDI is a forward-thinking step for the Institute.

Leading the way in COVID-19 clinical trials

Throughout the pandemic, Nucleus Network has played a critical role in the development of COVID-19 vaccines and treatments by running a number of Phase 1 and Phase 2 clinical trials for international and domestic clients.

Following on from a positive Phase 1 trial, Nucleus Network began dosing for Phase 2 of Novavax's NVX CoV2373, a SARS-CoV-2 Recombinant Spike Protein Nanoparticle vaccine, in September 2020. The study comprised approximately 155 people in a randomized, placebo-controlled, observer-blinded study, with 125 at the Melbourne clinic and 30 at Nucleus Network's Brisbane facility.

The Phase 2 trials showed promising results with a significant increase in antibodies against the Delta variant of COVID-19. At the time of going to print, the vaccine was in Phase 3 trials in the UK and awaiting approval by the Therapeutic Goods Administration for use in Australia.

The Novavax vaccine was one of three in-human COVID-19 Phase 1 and 2 vaccine trials conducted by Nucleus Network. They also ran Phase 1 trials for the Serum Institute of India, as well as an orally-delivered, room-temperature stable DNA vaccine candidate, bacTRL-Spike, by Symvivo Corporation.

In addition, Nucleus Network conducted the first human trials of a potential COVID-19 treatment being developed by Beijing biopharmaceutical company BeiGene. The treatment, known as DXP-593, is based on leveraging the antibodies identified in people who have recovered from SARS-CoV-2 and will hopefully provide a more effective solution than some of the first generation plasma treatments.

Genomics, digital health and AI to prevent and treat superbugs

Professor Anton Peleg and a multidisciplinary team from Alfred Health and Monash's Central Clinical School were awarded $3.4m from the Medical Research Future Fund (MRFF) Genomics Health Futures Mission for a project called "Genomics, Digital Health and Machine Learning: The Superbug AI Flagship".

This innovative project will integrate the most transformative technologies in healthcare — genomics, electronic healthcare data and artificial intelligence — to diagnose, treat and prevent antimicrobial resistance in hospitals and the healthcare system.

The research also aims to create a tracking and response system to lead to earlier detection of superbugs, personalised treatment for patients and prevention of outbreaks. SuberbugAi has the potential to save patient lives, prevent superbug spread, and improve healthcare quality, resource utilisation and costs.

Antimicrobial resistance is a huge challenge for healthcare systems around the world. According to the World Health Organization, 700,000 people die from antimicrobial-resistant infections each year. By 2050, without interventions such as this one, the world could see 10 million deaths annually from previously treatable diseases.

Professor Peleg's project draws on the expertise of a large team of collaborators from across the Alfred Research Alliance precinct and beyond. Researchers from Alfred Health and Central Clinical School are joined by associated researchers from the School of Public Health and Preventive Medicine, the Biomedicine Discovery Institute, Human Centred Computing, Monash Data Futures Institute and the School of Clinical Sciences at Monash Health.

Prof Anton Peleg and his team are using AI and other technologies to find solutions for antimicrobial resistance in hospitals.

Mental health and neuroscience

Lipids show promise for diagnosing and understanding Alzheimer's disease

Baker HEART & DIABETES INSTITUTE

Researchers Prof Peter Meikle, Dr Satvika Burugupalli and Dr Kevin Huynh work in the Baker Institute's Metabolomics Laboratory.

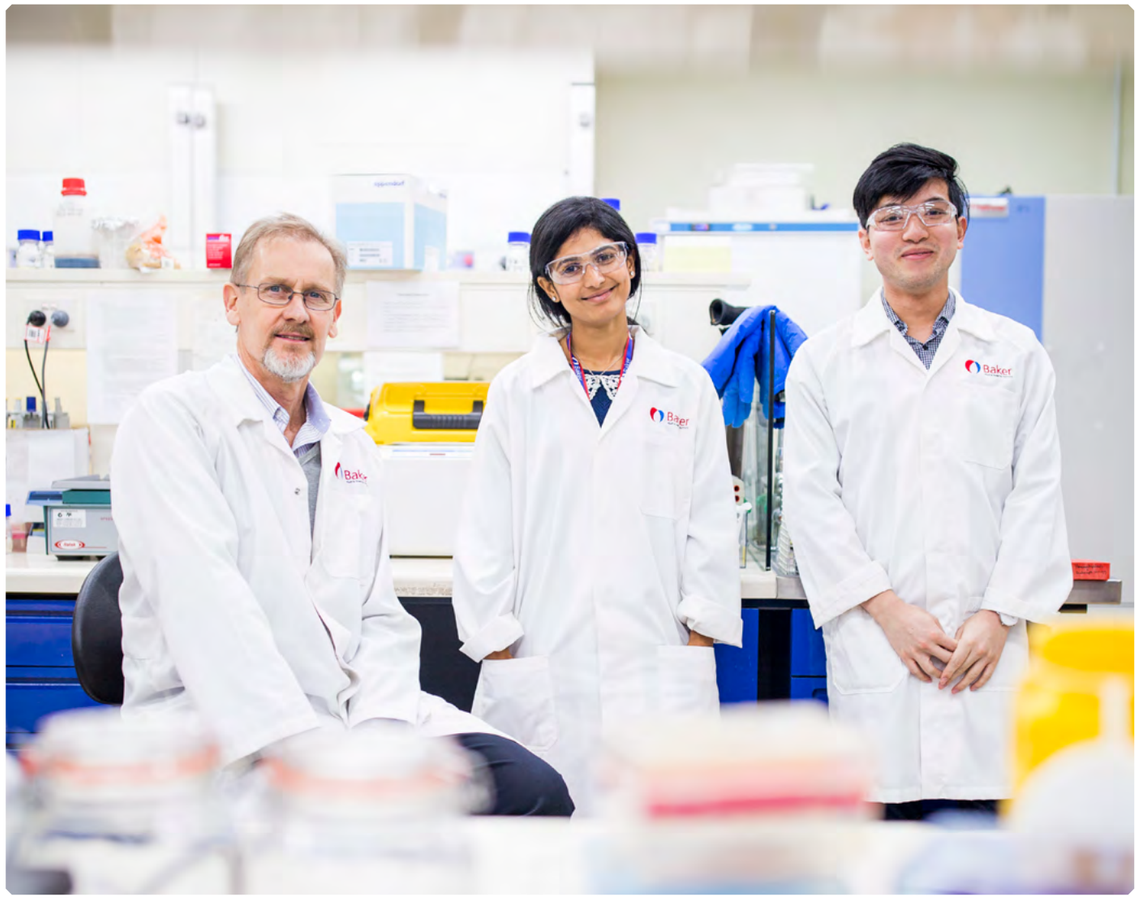
A study has shown lipids — fats in the blood — could be used as markers to identify people at high risk of Alzheimer's disease and may provide a therapeutic pathway to prevention.

Global rates of Alzheimer's disease are expected to reach 81 million by 2040 and there is a significant unmet need around risk assessment, diagnosis, prevention and treatment. The failure of many Alzheimer's disease clinical trials over recent years highlights the need for new approaches in this area.

The Baker Heart and Diabetes Institute has recently expanded its lipidomic platform to better characterise lipid species, enabling researchers to measure hundreds of lipids in the blood and to analyse if and how they contribute to various types of disease.

Evidence that lipids are involved in Alzheimer's disease has been demonstrated by alterations observed in several classes of lipids in both the blood and brain. It is now recognised that changes in our metabolism are involved in the development of this disease, and researchers are seeking to understand what is happening at a molecular level.

The next stage of this work will be to test biomarkers in independent population studies to provide risk assessment and early detection, and to develop appropriate interventions to maintain a healthy metabolism as we age and so reduce the risk of developing Alzheimer's disease.



Grief and bereavement in the time of COVID-19

AlfredHealth

A paper published in Internal Medicine Journal by a team of palliative care researchers from Alfred Health has drawn attention to the psychological damage being caused by the COVID-19 pandemic and its ongoing impact on grief and bereavement.

'Silent suffering of the dying and their families: impact of COVID-19' outlines how death, grief and bereavement have been affected by the global pandemic. Patients and families are suffering as a result of COVID-19 itself, and the measures required to contain it. As a result, health professionals need to be aware of the potential for additional psychological distress, as well as the risk of prolonged grief disorder.

The very factors implemented to protect from COVID-19 are likely to contribute to patient and family distress. In the paper, the researchers have urged fellow healthcare professionals to take notice of early anecdotal experience and emerging literature about the likely impact of the COVID-19 pandemic on death, dying, grief and bereavement, including a suggestion to prepare for a 'steep rise in traumatic, disenfranchised, and chronic grief in the aftermath of the epidemic outbreak'.

Furthermore, they highlight that it's not just those directly impacted by COVID-19 deaths who are at risk for prolonged grief disorder (PGD) — the suffering for families is universal and the full toll is yet to be appreciated.

The authors suggest that by seeking to understand the sources of distress for patients and families and finding creative solutions, it is possible to deliver family-centred care during a pandemic.

Understanding the impacts of sports-related concussion

AlfredHealth

Sports-related concussion (SRC) is a serious health concern, with many healthcare professionals seeking urgent action at all levels of community and professional sport to reduce head trauma. In many competitions, players are cleared to return to play two weeks after concussion, however new research from Alfred Health has found that even after this time there were still clear signs of changes indicative of white matter injury in the brains, as detected by MRI.

The study, led by Associate Professors David Wright, Richelle Mychasiuk and Sandy Shultz and published in Cerebral Cortex, investigated whether MRI could detect neuropathophysiological changes following SRC. Recently concussed athletes and age- and education-matched non-concussed control athletes underwent MRIs 24 to 48 hours after their injury and again two weeks later.

The scans revealed white matter differences between athletes with SRC and their non-concussed counterparts at 48 hours' post-injury. These differences were still present two weeks after their injury, despite SRC athletes being cleared to return to play.

Crucially, the changes persisted beyond the resolution of self-reported symptoms, indicating that athletes may still have increased cerebral vulnerability even once other symptoms of concussion have abated.

The researchers also found that the changes were sex-specific — male athletes reported more symptoms and greater symptom severity compared with females, and also had significantly greater white matter disruption compared with female athletes.

These results have important implications for the management of concussion, including guiding return-to-play decisions, and further improve our understanding regarding the role of sex in SRC outcomes.

Nursing and allied health

Professor Anne Holland appointed Head of Respiratory Medicine at Alfred

MONASH University

After a highly competitive selection process, Professor Anne Holland was appointed to the position of Head of Respiratory Research@Alfred, The Department of Immunology & Pathology, The Central Clinical School, Monash University.

In this role, Professor Holland will be responsible for academic leadership and ongoing strategic development of the University Respiratory Research@Alfred section, and academic Respiratory Medicine across Alfred Health and the Central Clinical School, Monash University.

Professor Holland is an academic physiotherapist who leads an internationally renowned research program investigating non-pharmacological treatments for chronic lung disease, including novel models of pulmonary rehabilitation and the use of new technologies. This includes having led 27 randomised controlled trials of non-pharmacological interventions to completion.

One such example is her development of a novel home-based rehabilitation model to improve access to best care for people with chronic lung disease, which was included in NHMRC's '10 of the Best' showcase of projects that support improvement in human health.

Professor Holland's outstanding career contributions to respiratory medicine were also recognised this year by award of the Society Medal from the Thoracic Society of Australia and New Zealand (TSANZ). The Society Medal is TSANZ's highest award, and Professor Holland is the first allied health professional to receive this award since its inception in 1992.

Vital signs hold the key to better patient outcomes

DEAKIN UNIVERSITY

AlfredHealth

Although research demonstrates the benefit of early recognition and management of deteriorating hospitalised patients, failure to escalate care and manage these patients remains a relatively frequent occurrence.

Vital signs are the primary indicator of physiological status and for determining the need for urgent clinical treatment. If these signs of deterioration are missed, misinterpreted or mismanaged, it can lead to critical illness, unplanned intensive care admissions, cardiac arrest or death.

Using implementation science, researchers from Deakin University and Alfred Health conducted a trial to measure the effectiveness of a facilitation intervention to improve nurses' vital sign measurement, interpretation, treatment and escalation of care. The PRONTO (Prioritising Responses Of Nurses To deteriorating patient Observations) study was conducted in four Australian major metropolitan teaching hospitals, across 36 wards.

The researchers reviewed patient records across three time points to assess nurses' recognition and response to clinical deterioration. Facilitators then worked with nurses in the intervention wards to help them increase their understanding, skills and communication during escalation of care. This resulted in patients in these wards having shorter hospital stays that was sustained for six months after the intervention was completed.

In decreasing the length of stay, this study demonstrated cost effectiveness for the health services and showed that facilitating the translation of research into practice can lead to improved patient and organisational outcomes.

Improving care for patients in isolation

DEAKIN UNIVERSITY

AlfredHealth

During the COVID-19 pandemic, the number of isolated patients in Victorian hospitals rapidly increased, with restrictions and precautions placed on both staff and visitors. These restrictions created significant challenges for patients and their families and led to many negative outcomes including anxiety, depression, preventable hospital complications, decreased patient satisfaction, and communication failures between patients, families and staff.

Despite the widespread experience of these issues, effective management strategies to prevent the negative effects of isolation were lacking. Researchers from Deakin University and Alfred Health wanted to better understand and counter the negative impacts of patient isolation on care and health outcomes for patients, families and staff.

In their systematic review, the research team discovered a lack of quality research evidence with only six studies addressing the research aims. Interventions were mostly targeted towards patients in protective isolation for immunocompromised patients and included music therapy, psychological counselling and exercise training.

Through their own subsequent research including focus groups and video interviews, the team found that while isolating large numbers of patients and restricting visitors resulted in good pandemic management, it came at a considerable cost to patients, families and staff by impacting standards of care and adding significant stress. Research evidence to support improved patient outcomes and workforce models of care is urgently needed to deal with the current and future pandemics.

Long-term family satisfaction with critical care and decision making at Alfred ICU

DEAKIN UNIVERSITY

AlfredHealth

A study by researchers from Deakin University and Alfred Health has found that families of patients admitted to The Alfred's intensive care unit (ICU) are among the most satisfied in the world.

Patient- and family-centred care is a core component of high-quality interdisciplinary care in ICUs around the globe. Partnering with patients and families to make decisions about care needs is a safety and quality standard in Australian health services that is often not assessed systematically, nor measured over time.

This study evaluated the satisfaction with care and involvement in decision-making among family members of patients admitted to The Alfred ICU by analysing responses to the Family Satisfaction in the Intensive Care Unit (FSICU) questionnaire between 2014-2019. In total, 1322 family members fully completed the survey. Overall mean satisfaction was high among respondents (90.26%), as was mean satisfaction with care (93.06%) and decision-making (89.71%). Despite some criticism of waiting times and noise levels, responses showed sincere gratitude for patients' treatment in ICU, and appreciation for the care, skill and professionalism of the staff.

The satisfaction levels reported by family members during this study were much higher than anywhere else reported internationally. This type of routine, prospective evaluation of family member satisfaction can provide valuable insights for clinicians and administrators seeking to improve decision making and care in ICU settings.

Testing the accuracy of infrared fever-detection technologies during the COVID-19 pandemic

DEAKIN UNIVERSITY

AlfredHealth

In the frenzy to prevent the spread of the COVID-19 pandemic, there was high demand for technologies to quickly and easily detect symptoms of the virus. Temperature screening using infrared technologies was an accessible, easy-to-use solution that was implemented internationally. However, in the rush to implement these devices, research to support their accuracy was lacking.

Researchers from Deakin University tested the accuracy of two types of fever detection technologies — non-contact infrared thermometers (NCIT) and thermal cameras — compared to TGA-approved temperature measuring devices used in hospitals. NCIT measurements are taken from the frontal bone or the temporal artery. The NCIT does not require sterilisation between individuals and little training to use. Thermal cameras use facial infrared emissions to detect individuals exhibiting an elevated core-body temperature. Both these technologies were strong contenders for mass-screening in pandemic situations.

However, researchers found that individual characteristics, such as gender and skin colour, effected the accuracy of both types of technology. The NCIT and thermal cameras both had low accuracy overall, demonstrating the need for caution in using untested technologies during a crisis to avoid the high costs of inaccurate device usage from both a health and economic perspective.

Trauma, critical care and perioperative medicine

$2.4m funding received for Phase I ‘bionic’ skin trial

MONASH University

Associate Professor Heather Cleland from Monash University’s Central Clinical School has received more than $2.3 million from the Medical Research Future Fund (MRFF) for her Phase I clinical trial into using engineered skin to treat third-degree burn wounds.

Traditionally, severe burns have been treated with skin grafts, where a thin layer of skin is removed from elsewhere on the patient’s body and placed over the healthy tissue under the burn. However, skin grafts can lead to serious complications such as infection, bleeding and scarring. More than 40% of burns survivors live with pain and disability caused by scarring of skin grafts and their donor sites (where the skin is taken from).

In this Phase I trial, researchers will treat patients with severe burns with bioengineered skin developed in the laboratory and grown from small samples of their own skin.

Development of a reliable skin graft substitute to be tested in this study will save lives and improve the quality of life for survivors of severe burn injury by minimising the need to use a patient’s own unburned skin to graft burns.

A new triage solution for PNG emergency departments

MONASH University

AlfredHealth

Alfred Health emergency clinician Dr Rob Mitchell has been working with colleagues at Monash Public Health and Preventive Medicine and in Papua New Guinea (PNG) on a project to improve emergency department triage in PNG hospitals, which face a lack of resources and systems for emergency care.

The project involves implementing and validating a new triage system based on simple colour-coding, developed by the World Health Organization (WHO), International Committee of the Red Cross and Médecins Sans Frontières.

Dr Mitchell and colleagues led the implementation of the program in two hospitals, one in Port Moresby and the other in Mt Hagen, in the highlands of PNG.

PNG hospitals are trialling a new triage system to improve outcomes in the emergency department.

The initial implementation model involved in-person training and mentoring by Australian clinicians. Initial results published in The Lancet Regional Health last year were favourable, but continuation of the program was stymied by pandemic-related border closures.

The WHO widely released the model in mid-2020 in an attempt to support healthcare in areas with stretched health resources. At the time, around 70 per cent of symptomatic patients attending PNG emergency departments were COVID-positive, lending the validation project a new urgency. To continue the work program, the team pivoted to an untested digital training strategy and remote implementation approaches.

They leveraged a Clinical Support Program, funded by the Australian Government through the PNG-Aus Partnership, to utilise a novel digital learning platform designed for low-bandwidth internet, and the ability to deploy a team of nurses locally to support the new system. This has allowed ongoing implementation and validation of the triage and patient flow tool in the context of a COVID-19 surge.

While still ongoing, the preliminary results are looking promising.

Dexamethasone treatment safe in surgery

MONASH University

A large clinical trial by Monash University has definitively found a steroid drug commonly used during anaesthesia before surgery to prevent nausea and vomiting does not increase the risk of a surgical wound infection as once feared.

The trial, led by Monash University and the Australian and New Zealand College of Anaesthetists Clinical Trials Network, found that a low-dose of dexamethasone may be safely given to patients undergoing surgery without causing an increase in these infections, including in vulnerable populations such as patients with diabetes. The same drug has recently been shown to decrease the risk of death from COVID-19 in severely ill patients.

The Perioperative Administration of Dexamethasone and Infection Trial (PADDI), led by Professor Tomás Corcoran, enrolled 8725 patients having all types of non-cardiac surgery over the past four years from 55 hospitals across Australia, New Zealand, Hong Kong and South Africa.

Half of the patients received a single 8 mg dose of dexamethasone and the other half received placebo during their surgery and were followed up for six months afterwards. The findings showed that 8.1 per cent of patients who received dexamethasone experienced a wound infection at 30 days after surgery, compared to 9.1 per cent in the placebo group, indicating no evidence of any major differences between the groups.

The findings of the PADDI trial are important because these infections are common. In Australia alone, there are at least 200,000 healthcare-associated infections, including wound infections, diagnosed in hospital patients each year, costing approximately $1 billion a year.

Real-time ED solutions for patients with suspected COVID-19

AlfredHealth

As the early months of the COVID-19 pandemic threatened to overwhelm healthcare resources, it became imperative to provide ED clinicians with real-time tools to identify patients at high risk for adverse outcomes.

Predictive models for patient-level outcomes, based on real-time data, could help improve clinical care and ED processes. The COVID-19 Emergency Department (COVED) Quality Improvement Project was initiated to meet this objective by providing flexible and responsive clinical tools to determine the predictors of key ED-relevant outcomes.

The COVED Project is a prospective cohort study conducted across several Australian EDs. The fourth instalment of the study, COVED-4, described the epidemiology and clinical features of patients presenting to the ED with suspected and confirmed COVID-19 during Australia’s ‘second wave’.

This analysis presented data from 12 sites across four Australian states for the period from 1 July to 31 August 2020. There were 106,136 presentations to the participating EDs and 12,055 (11.4%) underwent testing for SARS-CoV-2. Of these, 255 (2%) patients returned a positive result. Strong clinical predictors of the SARS-CoV-2 test result included self-reported fever, sore throat, bilateral infiltrates on chest X-ray, and absence of leucocytosis on first ED blood tests.

The COVED project is ongoing and will continue to inform real-time improvements in ED care. By determining the clinical predictors of patient-centred outcomes for patients with COVID-19, it will enable a dynamic approach to systems design, resource allocation and clinical management during the pandemic.

Platform technologies

Our important platform technologies offer researchers the opportunity to undertake critical biomedical and clinical research in the pursuit of new health interventions.

Often, platform technologies are housed in dedicated facilities and require skilled staff to operate and maintain them. The resource-intensive nature of establishing platform infrastructure paves the way for supporting a collaborative and open access ethos in the research community, and the Alfred Research Alliance is no exception.

At the Alliance, there are many platforms that offer access to world-leading facilities and services to advance innovation. A brief outline of the platform technologies is on this page.

ARAFlowCore facility is Monash's state-of-the-art cell sorting and analysis laboratory. It has PC2 capability for animal and human cell sorting, as well as a dedicated PC3 environment for infectious sample sorting.

Monash Histology Platform at Alfred Precinct is a node of the Monash Histology Platform offering a professional histology service, as well as equipment access for do-it-yourself histology.

Monash Micro Imaging at the Alfred Precinct manages core imaging resources including confocal, conventional fluorescence and deconvolution microscopy on site. Super resolution technologies are also available.

Genomics Capability through Monash University and Alfred Health offers state-of-the-art sequencing capability with a wide range of sequencing applications and instrumentation, including a NovaSeq 6000.

Metabolomics Platform at the Baker Heart and Diabetes Institute uses liquid chromatography-tandem mass spectrometry techniques to obtain metabolic profiles (primarily lipids and fats) from cell and animal models and clinically relevant human samples.

Monash's ARA Preclinical Imaging Facility is a purpose-built preclinical imaging facility in collaboration with the Baker Institute, housing a 9.4T MRI scanner with cryocoil technology, a NanoPET-CT system and a world-first magnetic particle imaging (MPI) scanner.

Clinical Research Domain at the Baker Institute offers a range of imaging and diagnostic tools including MRI, transthoracic and stress echocardiography, and body composition (DEXA) scanning. Other research and investigational services are also available.

Antiviral Testing Facility at Burnet Institute has the capacity to evaluate chemical agents for inhibitory activity against HIV and herpes simplex (HSV) type 1 and 2 viruses in cell culture, enabling development of better treatments or prophylactics.

Preclinical Cardiology Microsurgery and Imaging Platform (PCMIP) at the Baker Institute provides advice, design support and technical services to preclinical cardiology researchers through their purpose-built facilities, highly reproducible techniques and expertise.

Burnet Diagnostics Initiative was established in February 2021 to translate existing and new technologies to practical health solutions and products. Bringing research and diagnostics capability together provides a unique opportunity to help solve challenging health problems.

Preclinical Metabolic Phenotyping/ Bioenergetics Facility at the Baker Institute enables high-quality metabolic and physiologic phenotyping to study models of obesity, diabetes, cardiovascular disease and other metabolic diseases.

Optima suite of tools at Burnet Institute helps decision-makers choose the best public health investments through mathematical models of disease transmission and progression integrated with an economic analysis framework and mathematical optimisation.

The Monash Outcomes Research and health Economics (MORE) develops epidemiological and economic models to evaluate impacts of ill health and benefits of interventions, translating measures of efficacy into measures of effectiveness and cost effectiveness.

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To find out more about any of the above platform technologies and who to contact, go to **alfredresearchalliance.org.au/resources/platform-technologies**.

Bioinformatics and biostatistics

Bioinformatics and biostatistics use computer technology to collect and analyse different types of biological datasets, from genetic codes to large population datasets. Both Monash University and the Baker Heart and Diabetes Institute provide important bioinformatics and biostatistical support for researchers at the Alfred Research Alliance.

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For more on the Alliance's bioinformatics capabilities, visit **alfredresearchalliance.org.au/resources/bioinformatics-and-biostatistics/**.

Monash Bioinformatics Platform at the Alfred Research Alliance networks bioinformaticians working at Monash University and its affiliates. Offering bioinformatics tools and computing resources for data analysis, visualisation and exploration, the platform supports a diverse range of research projects.

Bioinformatics Program at the Baker Institute builds its capacity through internal and external collaboration, support and training. The program offers data analysis and cross-omic integration for a range of different technologies including genomics, epigenomics and more, using a diverse set of analytical techniques.

Biostatistics Consulting Platform (BCP) at the Monash School of Public Health and Preventive Medicine provides high-quality biostatistical support to Alfred precinct-based researchers from Monash and Alfred Health. BCP biostatisticians help with experimental design, statistical analysis, and advice on methods and software.

Clinical registries and biobanks

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

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For more information on the Alliance's clinical registries and biobanks, head to **alfredresearchalliance.org.au/resources/clinical-registries/**.

Monash clinical registries at the School of Public Health and Preventive Medicine maintains about 30 clinical registries (databases that systematically collect health information on people who have been treated or diagnosed with a certain illness) to benchmark outcomes, report on quality of care and monitor safety of new drugs, devices and surgical procedures.

AusDiab is coordinated by the Baker Heart and Diabetes Institute and 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 ASPREE Healthy Ageing Biobank at Monash University houses biospecimens from Australian participants of the NIH/NHMRC-funded ASPirin in Reducing Events in the Elderly clinical trial. Together with clinical data from the participants, they are a unique resource for genetic and biomarker discoveries in older Australians.

Victorian HIV Blood and Tissue Storage Bank and clinical database is a state-wide Victorian HIV Service at The Alfred and Burnet Institute, storing serum samples from HIV viral load tests for patients managed at The Alfred. The biobank currently holds nearly 70,000 samples linked with clinical information from almost 5000 HIV patients.

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 Animal Ethics Office, 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 Heart and Diabetes 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.

Afred Research Alliance

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