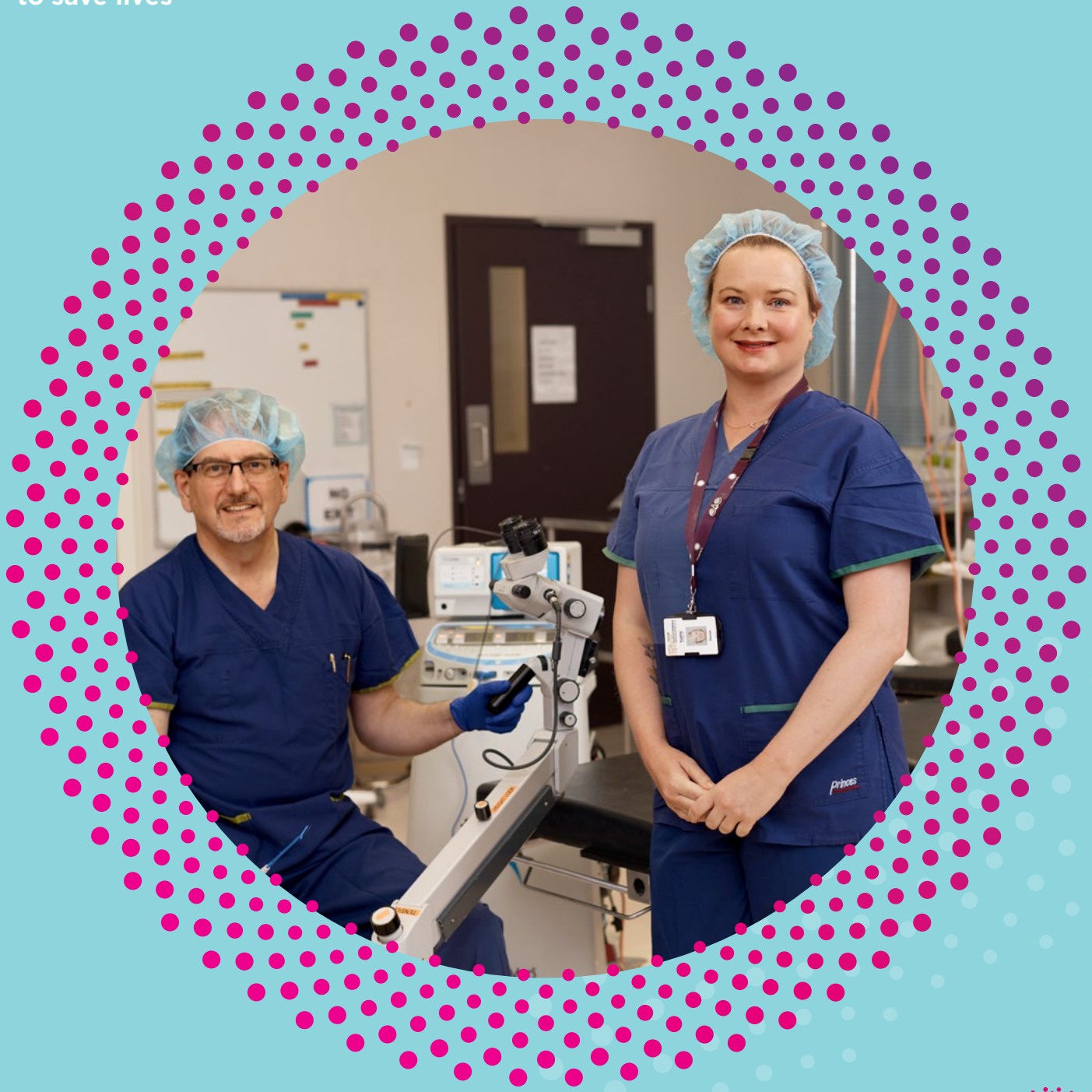
The Women's Research Report 2020

Coming together to save lives



the women's
the royal women's hospital

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$27.4 million GRANTS HELD (INCLUDING $14.9M NHMRC/MRFF GRANTS)

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Thanks and acknowledgements

Acknowledgement of Traditional Owners

The Royal Women's Hospital acknowledges and pays respect to the peoples of the Kulin Nations, the traditional owners of the country on which our sites at Parkville and Sandringham stand and we pay our respects to their Elders past, present and emerging.

The Women's is committed to improving health equity for Aboriginal and Torres Strait Islander women, children and families and we recognise the fundamental significance of cultural traditions, beliefs and connection to country for the health and wellbeing of Aboriginal and Torres Strait Islander peoples.

We acknowledge the importance of kinship and family structures as a cohesive force that binds Aboriginal and Torres Strait Islander peoples and we recognise their cultures, community connection, and self-determination as critical protective factors for wellbeing.

Thanks to our supporters

As a public hospital, the Women's relies on the generous support of donors to fund vital clinical research, including many of the initiatives highlighted in this report.

We offer heartfelt thanks to our community of supporters, donors, charitable trusts and patients past and present. Their generosity helps ensure women and babies – of this generation and the next – receive world-leading, evidence-based care.

Thanks to our contributors

We would like to sincerely thank all those who contribute to our research efforts – from the many different funding agencies, our research staff, collaborators, and supporters; to our dedicated Human Research and Ethics Committee members. Most importantly, we extend our gratitude to the patients and families who participate in our research. Your contributions make progress, hope and change possible.

Support our work

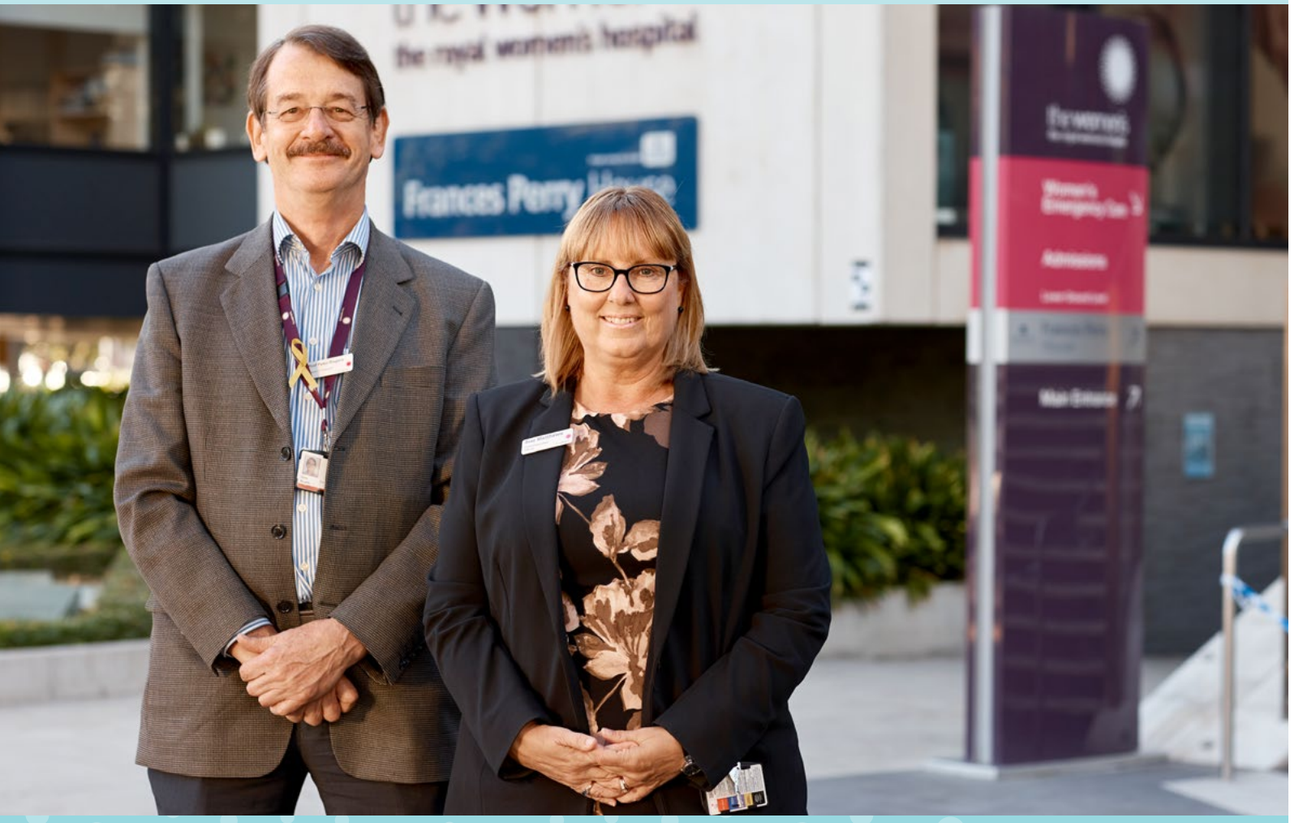
Gifts, bequests and grants play an integral role in supporting the research, innovation and leadership described in this report and enable the Women's to deliver world-class advances in clinical care, treatment and social support.

If you would like to support our research efforts, you can donate online at **www.thewomens.org.au/donate** or contact our Philanthropy and Community Investment Office on (03) 8345 2954 or send an email to give@thewomens.org.au

Foreword

Medical research took centre stage in 2020 as the world grappled to control the COVID-19 pandemic.

While normal life paused for many, healthcare professionals and medical researchers bore the heavy responsibility of trying to keep people alive and develop a vaccine at record speed.



Within our own area, the Melbourne Biomedical Precinct, more than 40 hospitals, research, teaching and biotechnology organisations rallied to better understand the virus and contribute to global efforts to develop potential treatments and vaccines.

Alongside our eminent research colleagues, the Women's made a contribution in the effort to improve our understanding of COVID-19 by initiating a study into the impact of the virus on pregnant women and their babies. As this was a novel virus, its effect was completely unknown. One of our leading researchers led the establishment of a national registry to collect data on pregnant women with COVID-19 (see more pages 6–7) and thus began an important new study that is now contributing to global research efforts.

Meanwhile, hospitals, including our own, transformed themselves to become COVID care centres, introducing strict measures to protect patients and healthcare workers and providing effective care and treatment for patients with a suspected or confirmed case of COVID.

Our staff rallied to the challenge; whether it was through layers of PPE or through a digital screen delivering telehealth, they aimed to deliver the exceptional patient care the Women's is renowned for.

Research does save lives. And as you'll read in this year's report, despite the interruption of COVID, our 10 research centres continued to advance the understanding, prevention and treatment options of a variety of conditions affecting women and newborns.

If there is a silver lining to this pandemic, it is the deep respect frontline healthcare workers and medical researchers now command.

We extend our thanks and deep gratitude to our research staff and students for their tremendous efforts in 2020, and express our pride in the achievements of our wonderful colleagues across the Melbourne Biomedical Precinct and farther afield.

We would also like to extend our sincere thanks to Chair of our Board Research Committee Professor David Copolov AO, who retired in June after more than five years in the role.

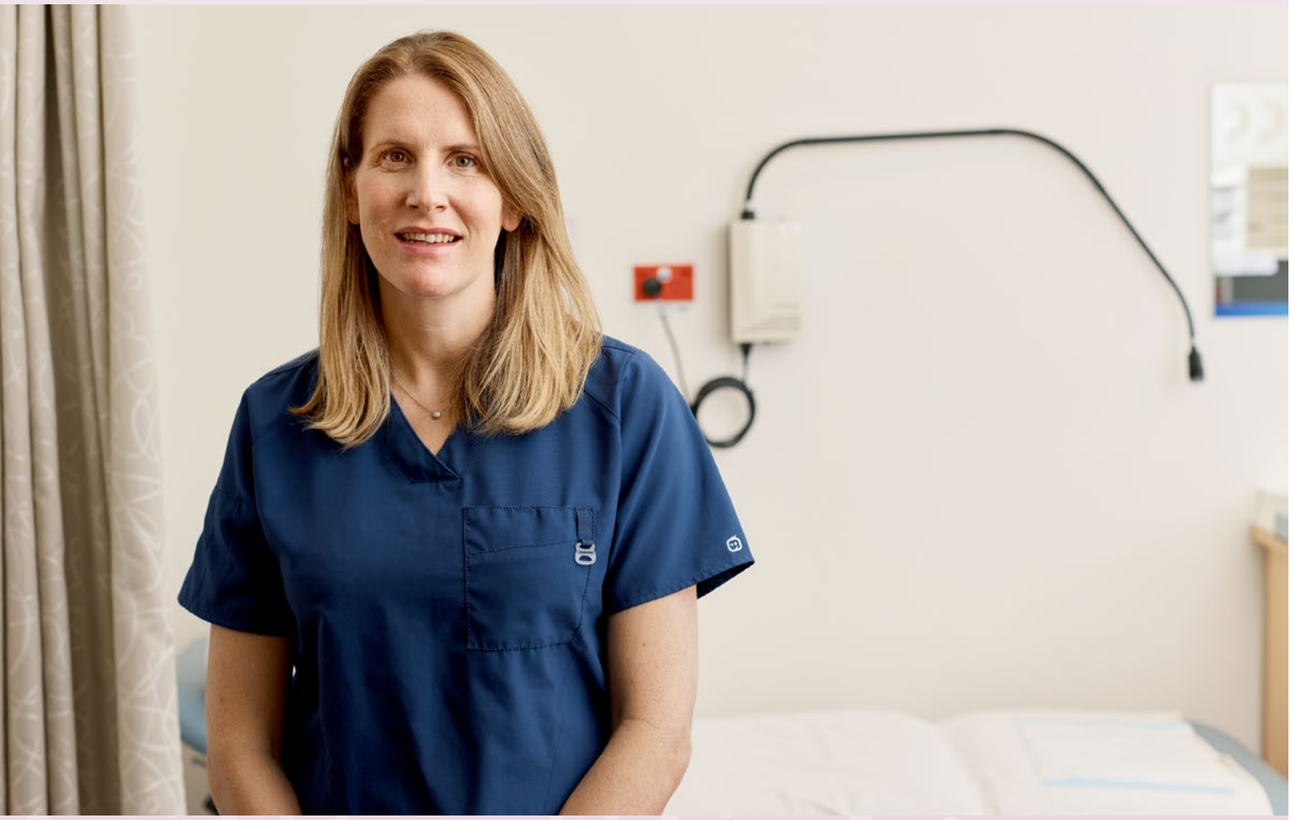
We don't know what 2021 will hold, but we do know we can achieve great things when united in a common cause.

Dr Sue Matthews
Chief Executive, the Women's

Professor Peter Rogers
Director of Research, the Women's

Pandemic unleashes push for better data in pregnancy

Obstetrician and maternal-fetal medicine specialist Dr Clare Whitehead started working at the Women's in February 2020. By March, she was leading the establishment of a national registry to collect data on pregnant women with COVID-19 – not only to understand its impact on pregnancy outcomes but also to ensure women and babies impacted would be able to receive evidence-based care.



Dr Whitehead's drive to establish the national registry was born out of her experience researching the effects of another challenging virus. In 2015, a growing outbreak of the mosquito-borne Zika virus was causing alarm in a number of countries. Infants of infected mothers were being be born with microcephaly, a rare neurological condition which presents as a significantly smaller head, and other congenital malformations.

"Different people were reporting different outcomes and it was very hard to put all that information together to come up with cohesive details about the impact of Zika on pregnancy," she recalls.

"At the start of the COVID pandemic no one knew what was going to be the effect on mothers and babies so a group of us got together and said, 'Let's try and collect data locally but more importantly contribute to some of the international work going on'. So it was quite a global approach; we all collected similar data to better inform clinicians and patients as the pandemic progressed."

With COVID-related research fast-tracked, the Coronavirus Health Outcomes in Pregnancy and Newborns (CHOPAN) registry had ethics approval by April 2020 and began collecting data in May (see article page 13).

More than 20 maternity hospitals around Australia signed up to participate. The second wave of infections that emerged in Victoria from May saw participant numbers grow.

By the end of 2020, the registry was collecting data on 93 pregnant women who had contracted COVID.

"Because we've had smaller case numbers in Australia we've been very lucky that we've been able to collect data on people who have been infected but not required a hospital admission. That's much more representative in many ways of what the disease process is, rather than just focusing on those with the most severe disease, as has been the case with a lot of overseas research," Dr Whitehead explains.

She says while some women in Australia did become very ill and require hospital care, overall the results have been reassuring.

"What we're seeing locally is that most women did very well and were managed at home, they didn't need to come into hospital, and their pregnancies proceeded to a term delivery with a baby that was well."

While the registry didn't require testing of babies at birth, most women who had COVID around the time of birth had their placenta tested; none revealed active infection – suggesting the virus hadn't crossed the placenta to reach the baby. Some babies who were admitted to Neonatal Intensive Care Units were tested but none were found to be positive.

The CHOPAN registry will report its findings in 2021 and the data will feed into a global prospective analysis looking at COVID impacts on pregnancy. And with the national network now in place, Dr Whitehead says the group may turn their attention to COVID vaccine use in pregnancy.

Between leading the registry and providing clinical care to pregnant women, Dr Whitehead also sits on the Pregnancy and Perinatal Care Panel of the National COVID-19 Clinical Evidence Taskforce – the committee developing national, evidence-based guidelines for the clinical care of people with COVID-19.

She's also been busy advocating for the inclusion of pregnant women in clinical trials.

"There's been systemic exclusion of pregnant women from the COVID trials. We're having to extrapolate information for pregnant women from trials that have been done on middle-aged men that don't take into consideration the physiology and pathology of pregnancy. It means women are behind in terms of being offered proper evidence-based care," Dr Whitehead explains.

Her advocacy efforts have already contributed to the inclusion of pregnant women in the Australasian COVID-19 Trial (ASCOT), which is comparing treatments for COVID-19 in people who are hospitalised.

"It takes these big events or a pandemic sometimes to change the [research] culture," she says.

"Hopefully there'll be more research opportunities for women in pregnancy generally. Women should be given the opportunity to decide for themselves whether they want to be involved in research; and have the right to be able to contribute to their own understanding about what might be the best option for them in pregnancy."

Dr Whitehead is part of the Women's Pregnancy Research Centre (see page 12). Her regular areas of research focus are placental diseases in pregnancy and how they affect pregnancy outcomes, including pre-eclampsia, fetal growth restriction and stillbirth.

Gynaecology Research Centre

2020 figures

7	45	$7.8 million	$3.7 million
Clinical trials	Publications	Grants held	Grants spent

The Women's Gynaecology Research Centre brings together clinical, psychosocial and laboratory expertise to investigate common conditions affecting women of all ages.

The centre's research has directly improved patient care through prevention, diagnosis and management of a wide range of conditions affecting women's health.

Professor Martha Hickey
Co-Director

Professor Eva Dimitriadis
Co-Director

Professor Peter Rogers
Deputy Director

Improving lives of endometriosis sufferers

Lead Researchers: Professor Peter Rogers, Associate Professor Martin Healey, Associate Professor Emma Readmann

A 5-year program of research has commenced at the Women's to improve the quality of life for women living with endometriosis.

Awarded $3.9 million from the Medical Research Future Fund (MRFF), nine research projects will look at ways to improve diagnosis, pain management and treatment options for endometriosis.

"More than 700,000 Australians are affected directly by endometriosis and associated persistent pelvic pain, and the impacts can be life-changing.

On top of the pain which can be debilitating, fatigue, mental health issues and infertility can occur – all of which can affect relationships and financial stability," said Professor Peter Rogers, Lead Researcher and the Director of Research at the Women's.

"There are thousands of people out there who feel their pain is not understood and their lives are completely dictated by this condition. We know, with research, we can improve outcomes for people with endometriosis and persistent pelvic pain."

More than 1500 women will be recruited to participate in the research projects, with 11 other hospitals and health organisations participating.

"The program is a powerful mixture of clinical trials, longitudinal studies and laboratory-based research that will lead to a better understanding of factors involved in the development and progression of endometriosis and will provide high-quality evidence for new treatments that can be rapidly translated into clinical practice," Professor Rogers said.

Research was identified as one of three priorities in the National Action Plan for Endometriosis – Australia's first ever blueprint seeking to improve the treatment, understanding and awareness of the disease – launched in 2018.

Mapping risky behaviours to health and social outcomes

Lead Researchers: Dr Jennifer Marino, Professor Martha Hickey, Professor Rachel Skinner

Sex and gender will be a key topic in a study exploring the association between risky behaviours in adolescence and negative health, social and economic outcomes through young adulthood.

The study will be conducted using longitudinal data provided by The Raine Study, linked to Western Australian health and social datasets. Established in 1989, the Raine Study is one of the largest prospective cohorts of pregnancy, childhood, adolescence and adulthood to be carried out anywhere in the world.

Between 1989 and 1992, 2,900 pregnant women in Perth were recruited to the study and their 2,868 offspring have been followed up at regular intervals since birth.

"Risk-taking is part of normal adolescent development, but risky behaviour can lead to a range of adverse health events and social harms, from contracting a sexually transmitted disease as a result of sexual risk-taking to serious injury or death due to reckless driving," explained Dr Jennifer Marino, Lead Researcher from the Women's.

"Through the Raine Study we're able to link different datasets to measure the effects of different types of risk-taking to see their true costs in young people's lives and to our economy."

One of the topics being covered with study participants at ages 14, 17, 20 and 27 includes age of first sexual activity, sexual behaviour, contraception use, gender identity and sexual orientation. Any diagnosis of chlamydia, gonorrhoea, syphilis, hepatitis B and C – all reportable to the Notifiable Infectious Diseases Database – will also be captured.

"We are hoping that with a more complete picture of the health and social impacts of risky behaviour in adolescence, we can identify the potential benefits of health investment in this age group to improve outcomes across the life course," Dr Marino said.

Newborn Research Centre

2020 figures

13	58	$6.0 million	$1.0 million
Clinical trials	Publications	Grants held	Grants spent

The motto of the Women's Newborn Research Centre is "making the babies better". To achieve this, the team at the centre is working hard to give all babies, irrespective of their size and maturity at birth, the best chance of growing into healthy adults.

Research in the delivery room is a difficult task due to the often chaotic and stressful environment but the centre has demonstrated that it is possible to do high-quality studies and discover new ways of monitoring and treating newborn babies.

The centre conducts research into the care given to babies immediately after birth, throughout their time in hospital and during their first years at home.

The centre is also working towards a better understanding of the long-term outcomes for tiny babies beyond the nursery, including into adulthood.

Professor Peter Davis
Director

Dr Marta Thio
Deputy Director

Cell therapy the 'new frontier' for neonatal medicine

Lead Researchers: Dr Elizabeth Baker, Professor Peter Davis, Associate Professor Sue Jacobs

Bronchopulmonary dysplasia (BPD) is a chronic lung disease that affects around half of all babies born extremely premature. Despite advances in neonatal medicine to address many other conditions associated with prematurity, there are few therapies to treat or prevent BPD.

A cutting-edge research project evaluating the safety of human amnion epithelial cells (hAECs) – a type of cell therapy – is underway in Neonatal Intensive Care Units at the Women's and Monash Children's Hospital.

Lead Researcher of the Renewal project, Dr Elizabeth Baker, said hAECs had been shown in laboratory trials to prevent and repair lung injury, modifying the inflammatory response to help restore normal lung architecture.

"By giving a hAEC infusion to extremely preterm babies who are at high risk of developing BPD, we're hoping to replicate outcomes seen in the lab," she said.

A total of 30 babies born at less than 29 weeks' gestation are being recruited to the study. Babies receive a hAEC infusion two to three weeks after birth. As recruitment to Renewal progresses, the dose each baby receives is increased to find the optimal dose for future trials. Participants will be followed for two years to track outcomes.

"While it's a small trial in terms of the number of babies involved, to date, it's the biggest trial of intravenous cell therapy in the preterm population," Dr Baker said.

"BPD presents a real burden for infants, their families and the health system – it can cause life-long problems with lung health and is associated with neurodevelopment problems. Cell therapies, and hAECs in particular, offer real promise for babies and their families."

Survival rates increase for extreme premmies

Lead Researchers: Professor Jeanie Cheong, Professor Lex Doyle AO, Professor Alicia Spittle

The world's largest and longest-running study of babies born extremely premature found survival rates have increased by nearly 20 per cent since the early 1990s.

In a paper published in *BMJ Open*, evidence from the Women's-led Victorian Infant Collaborative Study (VICS) also found that extremely premature babies stayed on breathing support for three times as long as they did in the early 1990s – an outcome of the new ways in which clinicians are now helping babies breathe.

Over the same period, prevalence of the brain injury cystic periventricular leukomalacia – often resulting in childhood disability – decreased from 6 per cent to 1 per cent.

"VICS data from the past 25 years has allowed us to look at how, over time, care has improved for Victoria's youngest and most vulnerable patients – with survival rates rising from 68 per cent in 1992 to 87 per cent in 2017," said Professor Jeanie Cheong, Lead Researcher who has been involved in VICS since 2006.

"The introductions of technology such as nasal high flow – a non-invasive breathing treatment for babies – and the associated research by clinicians at the Women's, mark major steps forward in neonatal care. It's the new technologies and research that give our clinicians the confidence to give these babies a fighting chance in the delivery room."

Prior to the introduction of effective assisted ventilation in neonatal intensive care nurseries in the 1970s, very few babies born extremely premature survived.

VICS has been following cohorts of all babies born either below 1000g or before 28 weeks' gestational age in the state of Victoria from the 1970s, 1980s, 1990s, and 2000s into school-age, and in some cases, into adulthood. More than 1,200 participants continue to be involved in the study.

Pregnancy Research Centre

2020 figures

5	29	$3.0 million	$0.3 million
Clinical trials	Publications	Grants held	Grants spent

The focus of the Women's Pregnancy Research Centre is to better understand the causes of pregnancy disorders that compromise the health of mothers and their babies. Common pregnancy complications include miscarriage, pre-eclampsia, fetal growth restriction, gestational diabetes and preterm labour.

The centre's work on pregnancy and its disorders ranges from biomedical laboratory research through to clinical studies, treatment trials and public health initiatives, all designed to support evidence-based clinical practice.

The mission of the centre is to apply contemporary research techniques to the investigation of clinically important problems in maternal and fetal medicine and related fields.

Professor Shaun Brennecke AO
Director

Dr Bill Kalionis
Deputy Head, Laboratory Research

National registry to shed light on COVID in pregnancy

Lead Researchers: Dr Clare Whitehead, Dr Kirsten Palmer, Associate Professor Lisa Hui

A clinical registry initiated at the Women's after COVID-19 was declared a global pandemic is helping inform the development of national clinical care guidelines and contributing to global research efforts.

The Coronavirus Health Outcomes in Pregnancy and Newborns (CHOPAN) registry began collecting data on pregnant women in Australia with COVID-19 in May – hoping to better understand the virus' impact on pregnancy and ensure pregnant women and babies receive evidence-based care.

Spearheaded by obstetrician and maternal-fetal medicine specialist Dr Clare Whitehead (read feature story, page 6), more than 20 maternity hospitals around Australia have signed up to collect data.

"Thankfully, compared to many other parts of the world, we've had smaller case numbers in Australia and we've been very lucky that we've been able to collect data on people who have been infected but not required a hospital admission," she said.

"That's much more representative in many ways of what the disease process is rather than just focusing on those with the most severe disease, as has been the case with a lot of overseas research."

Dr Whitehead also sits on the Pregnancy and Perinatal Care Panel of the National COVID-19 Clinical Evidence Taskforce, with data from the CHOPAN registry helping to inform a number of pregnancy and perinatal care recommendations developed by the taskforce.

By the end of 2020, 18 living recommendations for the clinical care of pregnant and postpartum women with COVID-19 had been published, including in the A*ustralian and New Zealand Journal of Obstetrics and Gynaecology.* Care recommendations include mode of birth, delayed umbilical cord clamping, skin-to-skin contact, breastfeeding, rooming-in, and advanced respiratory support interventions.

Stem cell hope for pre-eclampsia

Lead Researchers: Dr Bill Kalionis, Ms Shixuan Zheng, Professor Shaun Brennecke AO

Pre-eclampsia is the most common serious medical complication of pregnancy. It affects around five to eight per cent of all pregnancies in Australia and can sometimes be severe enough to threaten the lives of both mother and baby.

In 2018 the Women's became the first hospital in Australia to introduce a blood test to help predict who will and will not develop the potentially deadly condition.

While identification is becoming easier, treatment is not. Drugs may be used to control blood pressure and prevent convulsions but in severe cases of pre-eclampsia the only cure is to deliver the baby and placenta.

A study exploring the potential of stem cells as a treatment was published in the journal *Pregnancy Hypertension* and provides fresh hope for a long-awaited cure.

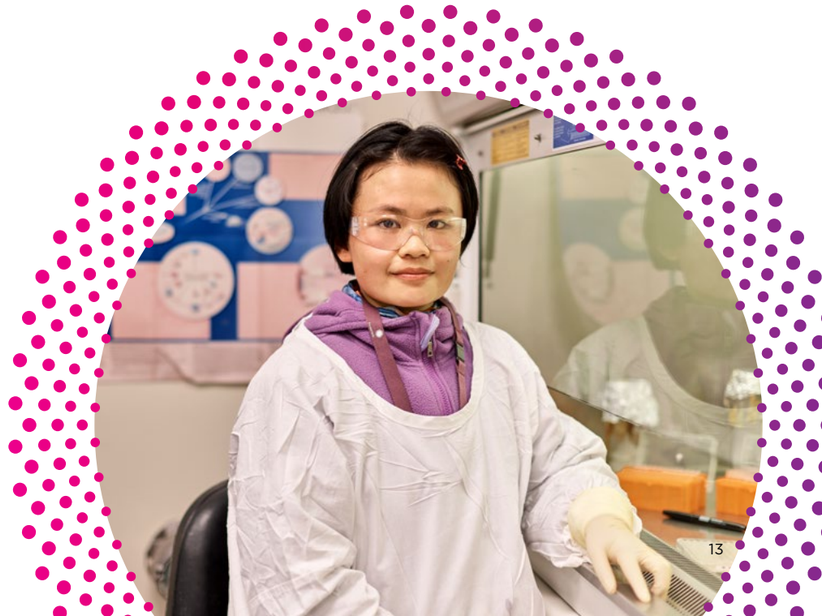
The study investigated whether vesicles released by stem cells can restore blood vessels to a healthy state in a cell culture model of pre-eclampsia.

"Cells from the lining of umbilical cord blood vessels were prepared in the laboratory so that they resembled blood vessels affected by pre-eclampsia. These cells were then treated with vesicles derived from stem cells," said Professor Shaun Brennecke AO, one of the Lead Researchers.

"Stem cells vesicles were shown to heal these damaged cells that were treated to mimic pre-eclampsia.

"For decades, researchers have searched for more effective treatments for pre-eclampsia. The possibility of vesicles released from stem cells being used as a treatment is exciting and truly ground-breaking."

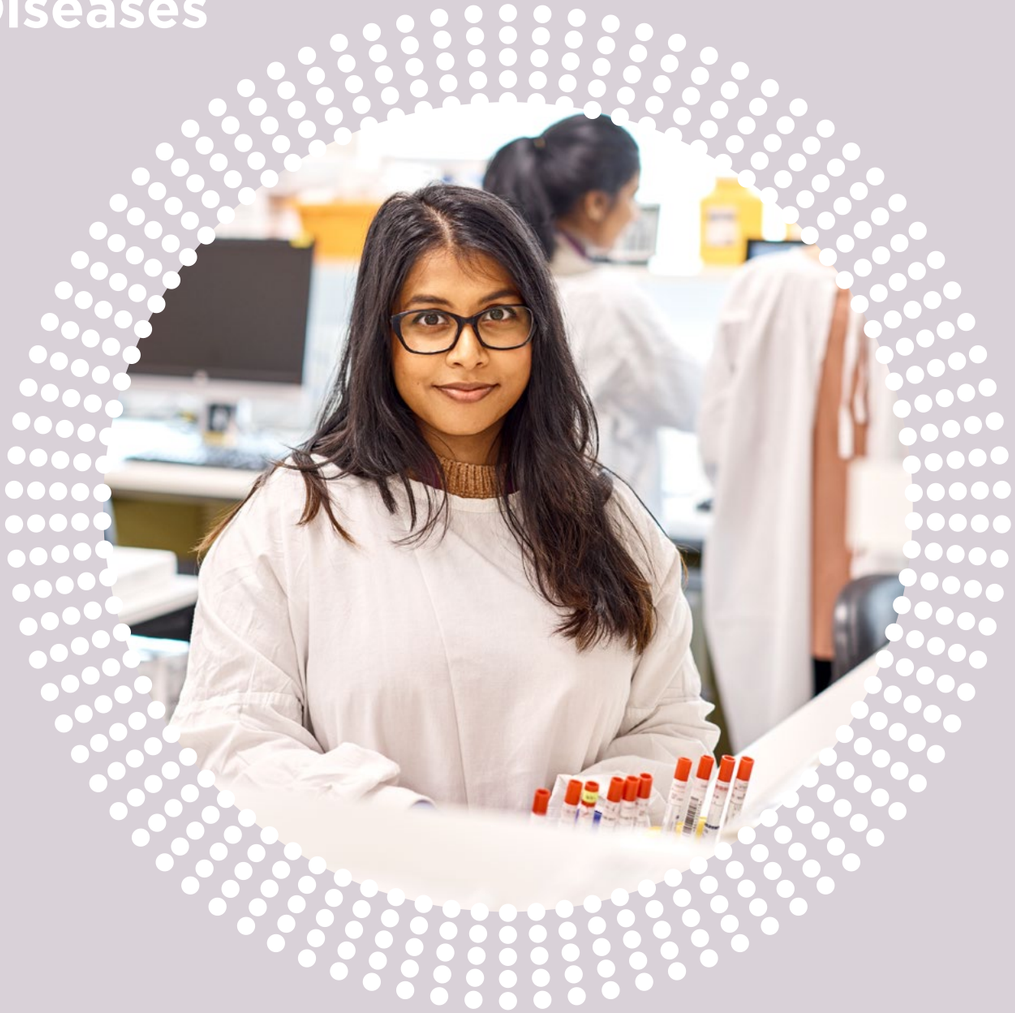
The next step involves seeking funding to carry out animal trials, the results of which will lay the groundwork for human pregnancy clinical trials.



Centre for Women's Infectious Diseases

2020 figures

33	$2.8 million	$0.2 million
Publications	**Grants held**	**Grants spent**



The Centre for Women's Infectious Diseases conducts clinical research, cutting-edge molecular diagnostics and geno-surveillance in the fields of neonatal and infectious diseases research, including reproductive and sexual health.

Key research areas include cervical and anal cancer, and sexual health and mother-to-baby infections, with emphasis on providing evidence for changes that may translate into clinical practice to support improved patient health.

Professor Suzanne Garland AO
Director

Dr Gerald Murray
Senior Scientist

Evidence mounts on cervical cancer vaccine

Lead Researchers: Professor Suzanne Garland AO, Dr Alyssa Cornall, Mr David Wrede, Dr Jan Pyman

The Women's continues to play a key role in the fight against cervical cancer.

Since 2011 the VACCINE Study Group has been measuring the effectiveness of the quadrivalent human papillomavirus (HPV) vaccine, with findings helping to inform the rollout of the school-based vaccination program and the overhaul of Australia's National Cervical Screening Program.

Lead Researcher Professor Suzanne Garland AO said the group's latest studies, published in the journal *Vaccine*, reveal the school and community-based HPV vaccine program is not only resulting in significantly reduced HPV infection in the community, but significantly reduced cervical disease.

"The group looked at more than 700 cases of cervical disease from pre- and post-vaccine periods. In 18 to 25-year-olds, the proportion of HPV attributable cervical lesions decreased from 69 per cent in 2001–2005 (pre-vaccine), to 62 per cent in 2011–2012 (post-vaccine), to 47 per cent in 2013–2014," she said.

"Our data suggests that for vaccine-eligible women aged 18–25 at the time of biopsy, the proportion of HPV attributable lesions is significantly declining post-vaccination."

In a second study, the group developed a new mathematical model to better monitor HVP genotypes in prevalence studies.

"To make accurate determinations regarding impact of HPV vaccine programs, precise estimates of the role of specific HPV genotypes in the disease are required for pre- and post-vaccine populations."

Professor Garland said most prevalence studies use mathematical algorithms to adjust for multiple genotypes being detected; however they can produce estimates with a wide range of variability.

"We have developed a technique that defines the causal HPV genotype of a lesion where multiple genotypes are found in a whole tissue biopsy cervical specimen. This is using a technique called laser microdissection to cut out a small number of cells within the biopsy and finding the one HPV type that causes the lesion. These new algorithms will be very useful for future monitoring of the HPV vaccine program," she said.

Cervical cancer is one of the most preventable cancers and Professor Garland is hopeful the group's work will one day contribute to the elimination of cervical cancer in this country.

Fighting antibiotic resistant STIs

Lead Researchers: Dr Gerald Murray, Kaveesha Bodiyabadu

Mycoplasma genitalium is a sexually transmitted bacterial infection affecting the cervix, urethra, and rectum. Many people infected with mycoplasma have no symptoms, but if not treated it can lead to infertility in women.

Antibiotics have been widely used to fight infections, including sexually transmitted infections (STIs), for more than 75 years. However, over time the bacteria that cause some STIs have adapted so that a growing number of antibiotics are ineffective.

Antibiotic resistance is also complicating the treatment of *M. genitalium*. While the basis of resistance for first line antibiotic (azithromycin) is known, resistance to second-line antibiotics (fluoroquinolones) is less understood.

To address this, diagnostic samples from more than 300 patients undergoing treatment were studied.

Dr Gerald Murray, Lead Researcher, said detecting mutations at the point of diagnosis would better inform treatment pathways and improve outcomes.

"Understanding the mechanisms of antibiotic resistance is important to provide more targeted treatment, which in turn will reduce the use of antibiotics," he said.

"Our study identified that a specific mutation in the *parC* gene is strongly linked with treatment failure; and that this mutation when combined with a second mutation in *gyrA* gene increased the likelihood of failure."

The study, published in *The Journal of Infectious Diseases*, also found sitafloxacin (a type of fluoroquinolone) was more likely to cure an infection carrying the resistance mutation than an alternative fluoroquinolone, moxifloxacin.

The World Health Organization has labelled antibiotic resistance one of the biggest threats to global health, food security, and development.

Women's Cancer Research Centre

2020 figures

21	14	$2.5 million	$0.5 million
Clinical trials	Publications	Grants held	Grants spent

Behind the work in the Women's Cancer Research Centre is the philosophy that every woman should be given the opportunity to take part in research at every stage of her care journey.

As a multidisciplinary team, research at the centre considers the different gynaecological cancers: uterine; ovarian/fallopian tube; cervical; and vulval. Translational research (laboratory and clinical) into rare cancers occurs across a range of clinical trials.

Researchers and clinicians also focus on the conditions which may lead to these cancers, as well as the genetic variations which put women at increased risk of gynaecological cancers. With this in mind, women are recruited where possible to clinical trials at the Women's, and collaboratively through the Victorian Comprehensive Cancer Centre (VCCC) Parkville Clinical Trials Unit, exploring all aspects of the clinical journey.

Associate Professor Orla McNally
Director Gynaecology Tumour Stream, Victorian Comprehensive Cancer Centre (VCCC)

Unlocking mystery of rare ovarian cancer

Lead Researchers: Associate Professor Orla McNally, Professor Clare Scott, Associate Professor Kylie Gorringe

Mucinous ovarian carcinomatosis (MOC) is a rare women's cancer that responds poorly to conventional chemotherapy regimens. Although long overall survival outcomes can occur with early detection and successful surgery, recurrent and advanced disease is associated with extremely poor survival.

With no current guidelines for the management of recurrent MOC, researchers have set out to characterise the cancer at the genomic (DNA) level in order to develop new treatments.

Using tumour tissue donated by almost 200 women having surgery for this disease, researchers were able to grow MOC cells (organoids) in the laboratory using special 3D growth conditions that more closely represent what happens in the body. The genetic findings were published in the international journals *Gynecologic Oncology* and *Nature Communications*, and will inform testing on the tumour organoids of existing and new cancer medicines.

"Women with advanced MOC have previously not had good treatment options, because there hasn't been enough evidence to choose a particular therapy," said Associate Professor Orla McNally, one of the Lead Researchers.

"With the generosity of women willing to donate their tumour tissue, we now have a good understanding of the genetic events in MOC and can create these new patient-derived models to discover the chemotherapies and new targeted therapies that will benefit future women with this deadly disease."

The Women's is collecting tumour tissue to continue testing therapies in lab-grown organoids and investigating the origins of rare ovarian cancers.

Next great 'LEEP' in cervical biopsy method

Lead Researchers: Mr David Wrede, Associate Professor Orla McNally, Dr Sophie Bittinger

Adenocarcinoma in situ (AIS) of the cervix is a precursor to cervical adenocarcinoma – a less common type of cervical cancer that is more difficult to diagnose due to its location higher in the cervix.

In Australia, women with AIS are usually treated by cold knife cone biopsy (CKC) – a surgical procedure to remove a large cone-shaped piece of the cervix to look for precancerous cells, or cancerous material.

But this established method may be soon replaced with a procedure using a wire loop heated by electric current to remove cells and tissue.

In the first randomized controlled trial of its kind, CKC has been compared with loop electrosurgical excision procedure (LEEP) in patients at seven hospitals across Australia and New Zealand, to determine if LEEP can achieve the same results without compromising safety.

The trial was led by the Women's and King Edward Memorial Hospital in Perth.

"When treating AIS it is very important that the excision is done in one piece and that the dimensions are reasonable to encompass the whole area of the cervix where the AIS abnormality may arise," explained Mr David Wrede, Lead Researcher from the Women's.

"The trial showed that whether the excision is completed with a scalpel or a loop the dimensions can be similar and the likelihood of positive margins is similar. The latter is important as positive margins can increase the likelihood of leaving abnormal cells behind."

Published in the international journal *Gynecologic Oncology*, Mr Wrede said the trial also revealed fewer post-operative problems when using LEEP.

"Patients in the CKC group had more post-operative complications – 64.3 per cent compared to 15.4 per cent for LEEP. CKC requires a general anaesthetic whereas LEEP does not, raising the possibility of doing many more effective treatments with less complications under local anaesthetic in future."

LEEP, also called LLETZ, has been used for over two decades to treat the more common squamous pre-cancer CIN2/3.

Centre for Family Violence Prevention

2020 figures

20	$3.1 million	$0.9 million
Publications	Grants held	Grants spent

The Centre for Family Violence Prevention focuses on improving the safety, health and wellbeing of women and their families.

Many women attending hospital are experiencing abuse and violence and feel afraid of their partner or family. To help women and their children feel safer, the Women's is assisting other health services to improve access to safe and appropriate support and prevent the harm caused by family violence.

The centre conducts practical research, working with women who have lived experience, as well as practitioners, to test health interventions (including the use of technologies) for identification, early intervention and response for women of all ages and backgrounds.

The centre also supports hospital staff in their clinical work by providing evaluation of effective, evidence-based models of care within the context of family violence.

Professor Kelsey Hegarty
Director

Associate Professor Laura Tarzia
Deputy Director

Rates of family violence high among nurses

Lead Researchers: Dr Elizabeth McLindon, Professor Kelsey Hegarty, Associate Professor Kristin Diemer

Family violence is a major health and social issue in Australia. It affects people of all ages and walks of life, predominantly women and children, and is associated with a range of harms.

Nurses and midwives are often on the frontlines responding to family violence and trauma, but as a gendered profession they are also at risk of experiencing it themselves.

Building on a previous study at the Women's, a cross sectional survey was undertaken with 11,451 Victorian nurses, midwives and carers in collaboration with the Australian Nursing and Midwifery Federation (Vic Branch) to investigate the prevalence and impact of family violence.

"Our survey found that family violence, including child abuse and intimate partner violence, was common in the lives of nurse participants," said Lead Researcher Dr Elizabeth McLindon.

"Furthermore, on every measure of health and wellbeing, survivor nurse participants reported worse health than their colleagues who had not experienced violence."

The survey also revealed that family violence had affected survivor participants at work in several ways – including having to take leave; working while injured, distracted or unwell; and in some cases being abused while at work.

"This research indicates the importance of greater awareness about the prevalence and impact of family violence against nurses and midwives and the need to strengthen resources and supports in the workplace for survivors," said Dr McLindon.

Breaking the shroud of silence

Lead Researcher: Associate Professor Laura Tarzia

Intimate partner sexual violence (IPSV) is a serious and prevalent form of violence against women. One in 10 Australian women have experienced sexual violence by a male partner and for many victims the effects can be wide-ranging and lifelong.

Despite its prevalence, IPSV remains poorly understood. To explore its complex dynamics, in-depth interviews were conducted with 38 victim survivors. The qualitative research informed papers published in the *Journal of Family Violence* and *Qualitative Health Research* that looked at the invisible impacts of IPSV and emotional responses and coping strategies.

"Sexually abusive behaviours such as rape, assault, coercion and threats within relationships are shrouded in silence," said Lead Researcher Associate Professor Laura Tarzia.

"This research revealed that sexual violence impacts women quite differently from physical or psychological violence. Women reported feeling betrayed and dehumanised; constructing barriers to self-awareness by minimising the abuse and emotionally detaching; and the long-term trauma impacting their sexuality and future relationships."

The qualitative research was conducted as part of the Beyond Silence project, which aims to understand women's experiences and help-seeking needs in order to develop and deliver a world-first trauma-informed support website.

"It is critical that we raise awareness in the community and within health settings about this hidden form of violence and provide evidence-based resources to assist women," said A/Prof Tarzia.

Midwifery and Maternity Services Research Unit

2020 figures

3	7	$1.4 million	$0.3 million
Clinical trials	Publications	Grants held	Grants spent

The Midwifery and Maternity Services Research Unit is committed to making sure the care provided to women in pregnancy and childbirth is evidence-based and of the highest possible quality.

The main focus is on exploring how care is provided so the best outcomes are achieved for mothers and babies.

This includes work on midwifery-led models of care, breastfeeding, and perinatal mental health.

Integral to the work is actively exploring the views and experiences of women, as well as those of the midwives who care for them. The unit also works to build research capacity among midwives and nurses.

Professor Della Forster
Director

Evaluating care starts with families

Lead Researchers: Rebecca Hyde, Professor Della Forster, Associate Professor Sue Jacobs

Every year, more than 2,000 babies who are sick or born too early are cared for by the Women's specialist team in the Newborn Intensive Care Unit (NICU).

Research has found that parents with an infant in the NICU experience feelings of stress, strain, separation, depression, despair, disappointment, ambivalence, and lack of control over the situation.

In order to better understand the experiences of families, almost 1,000 parents whose baby/babies had been admitted to the Women's NICU were invited to participate in a survey co-designed by researchers, clinicians and consumers.

"Measuring satisfaction levels can enable meaningful changes to be made to care delivery," said Rebecca Hyde, Research Midwife and Lead Researcher.

"But we also set out to measure experiences relating to different aspects of care – to provide a more comprehensive understanding so that improvements can be more targeted."

The overall response rate to the survey was 32 per cent (314/990). Overall satisfaction with 'infant care' was extremely high – with 98 per cent of respondents rating infant care as 'Good' or 'Very Good'.

However, in relation to 'parent care', parents rated the care they received lower with 89 per cent of respondents rating their care as 'Good' or 'Very Good'. When considering this by the gestation at which their baby was born, parents of infants born at term (from 37 weeks onwards) had the lowest ratings – 86 per cent 'Good' or 'Very Good' vs 92 per cent for very preterm (under 32 weeks), and 91 per cent for preterm (32 to 37 weeks).

"We found differences in the rating of care by these three gestation-based subgroups across a range of factors, with positive ratings of care from parents of term infants being lower in many instances. This included being less likely to be encouraged to participate in their infant's care, and less likely to feel that they were considered the expert in their infant's care."

Ms Hyde said the results can be used to work on gaps in care delivery and provide a baseline for future evaluations of care.

Peer support for new mums during COVID

Lead Researchers: Professor Della Forster, Dr Touran Shafiei, Professor Helen McLachlan

A randomised controlled trial assessing the benefits of peer support for women at increased risk of postnatal depression and anxiety was adapted during COVID to be offered to all new mums birthing at the Women's and Northern Health.

The DAISY trial is comparing wellbeing outcomes in a group of new mothers receiving standard hospital and community supports in the postnatal period, and a group receiving additional peer support over the phone from trained volunteers.

While in-hospital recruitment for the trial was paused due to COVID, researchers shifted to an opt-in model where any women could request telephone peer support from volunteers who have experienced and recovered from postnatal depression and/or anxiety.

"We knew COVID was making expectant parents anxious and their expectations of pregnancy, birth and introducing baby to their loved ones was being impacted by restrictions. We wanted to ensure all new mums could access peer support over the phone given the difficulties and isolation many were facing," said Professor Della Forster, one of the Lead Researchers.

More than 200 mothers have been recruited to the main randomised trial, and almost as many peer support volunteers have been trained. An additional 30 women requested support during COVID. The trial will continue recruiting to 2022.

"Peer support has been shown to have positive effects on many health conditions, but to date there is limited evidence that it might help postnatal depression or anxiety," explained Professor Forster.

"If our trial reveals positive outcomes for new mums who receive six months of peer support via phone, we can be hopeful of rolling out an intervention that can reduce the burden of disease and suffering for women with postnatal depression or anxiety."

Approximately 310,000 women give birth each year in Australia, and more than one in five (an estimated 68,000 women) experience postnatal depression and/or anxiety.

Centre for Women's Mental Health

2020 figures

5	13	$0.5 million	$41k
Clinical trials	Publications	Grants held	Grants spent

The Centre for Women's Mental Health provides clinical services, undertakes research and provides education and training across the hospital.

The centre's research focuses on the psychological aspects of physical health issues, pregnancy and early parenting. Specific areas of interest include support for women with a cancer diagnosis, promotion of healthy ageing and psychological interventions for women impacted by trauma. Programs in early parenting and postnatal mood disorder and anxiety are also being evaluated.

The centre offers support where social factors such as family violence, substance misuse and refugee status impact wellbeing and psychological health.

Professor Louise Newman
Director
(January–May 2020)

Associate Professor Lesley Stafford
Acting Director
(June–December 2020)

Coping with cancer during pregnancy

Lead Researcher: Associate Professor Lesley Stafford

A cancer diagnosis can be devastating news at any stage of life. A cancer diagnosis during a pregnancy can seem particularly incomprehensible and cruel.

Affecting approximately one in 1,000–1,500 pregnancies, gestational cancer is relatively rare; however, the incidence is increasing.

In only the second study of its kind, researchers have explored the unique healthcare experiences of women navigating both oncology and obstetric care.

"This study represents an important step in furthering our understanding of the needs and experiences of women with gestational cancer, their partners and the health professionals who care for them," said Associate Professor Lesley Stafford, Lead Researcher.

Interviews were conducted with 23 women diagnosed with cancer during pregnancy to determine factors contributing to a positive healthcare experience. The study was published in the *European Journal of Cancer Care*.

Positive health experiences were described when women reported a sense of control in treatment scheduling; trust in their treating clinician/facility; well-coordinated care within and between clinicians including prompt and consistent clinical liaison and communication; priority care across departments; facilitating allied health access and support around postnatal challenges.

"Findings from this innovative project will increase our knowledge base and begin to inform an evidence-based model of service delivery that facilitates improvement in the coordination, consistency and quality of care for this small but vulnerable group," A/Prof Stafford said.

Bonding program helps beat distress

Lead Researcher: Dr Susan Nicolson

The Newborn Behavioural Observations (NBO) system was developed by the Brazelton Institute at Boston Children's Hospital, a Harvard Medical School teaching hospital. The Women's is the only accredited training body for the program in Australia and New Zealand.

Since 2013, more than 1,300 health professionals across Australia and New Zealand have been trained in NBO to help new parents observe and bond with their baby and support successful growth and development.

A study set out to examine the effectiveness of the NBO system for mothers who experienced distress during pregnancy and who were at increased risk of developing postnatal depression, and their infants.

"Being a first-time parent can be incredibly challenging and we know as many as one in six new mothers and one in 10 new fathers experience postnatal depression or anxiety," said Lead Researcher Dr Susan Nicolson.

A randomised controlled trial involving 111 families found the NBO program led to positive relationships between mothers and infants and reduced distress among new mothers.

"Having an effective support like the NBO program that healthcare professionals can use in hospital and in the community has potential to reduce the harm that untreated distress can cause mother, baby and family. The more evidence-based supports we can provide to new parents to help them on their parenting journey the better," Dr Nicolson said.

Allied Health Research

2020 figures

2	11	13
Clinical trials	**Clinical trials supported**	**Publications**

Allied health and clinical support services research involves work relating to single allied health disciplines as well as collaboration with other Women's research centres and services.

There are four major departments that contribute to allied health research: pharmacy; nutrition and dietetics; social work; and physiotherapy. Each of these areas is concerned with exploring various clinical conditions and participates in clinical research to determine evidence-based interventions and treatment for the women and babies in our care. The Women's pharmacy department and the Pauline Gandel Women's Imaging Centre also play a pivotal role in research conducted by other services.

Sandra Gates
Director

Earlier contraception discussion may facilitate patient decision-making

Lead Researchers: Christine Gilmartin, Oran Milman, Laura Leung

It has been estimated that up to 35 per cent of Australian women consume alcohol and 2.3 per cent use illicit drugs during pregnancy.

Women with substance use disorders may face numerous challenges, including complex mental health issues, poor physical health, financial struggles and homelessness.

Studies have shown a lower use of contraception in women with substance use disorders, with substance use often persisting into pregnancy increasing the risk of severe health consequences for infants.

To explore the practices and challenges of postnatal contraceptive planning, the medical records of 93 maternity patients at the Women's with substance use disorders were reviewed.

"The postpartum period can be a challenging time to facilitate contraception planning for these women," said Research Pharmacist Christine Gilmartin.

"While facing the complex demands of caring for a newborn, and still engaged with healthcare services, women may be more driven to prevent a rapid repeat pregnancy. But there is an overwhelming amount of information and events for patients to process during the postpartum period, so contraception decisions might get deferred. Discussion about postpartum contraception could be more effective if initiated earlier, during the antenatal period."

On reviewing the records, researchers found postnatal contraceptive planning was documented as discussed for 87 of the 93 (93.5 per cent) patients. Of the 62 women who expressed interest in a pharmaceutical or medical device method of contraception, 42 (67.7 per cent) had prescriptions written from the site. Multiple patients were still undecided about postpartum contraceptive methods when they were discharged.

"To improve contraceptive management and potentially reduce the risk of unplanned pregnancies, there is a need for an earlier decision-making process; clinical pharmacists are well placed to assist in these discussions in the antenatal outpatient setting," Ms Gilmartin said.

The study was published in the *International Journal of Clinical Pharmacy*.

Recommendations for clot prevention found lacking

Lead Researchers: Christine Gilmartin, Briony Cutts, Huda Ismail

Venous thromboembolism (VTE) refers to a blood clot that starts in a vein. When a clot breaks free from a vein wall and travels to the lungs a pulmonary embolism occurs. VTE is the third leading cause of maternal deaths in Australia.

Obesity is known to increase the risk of VTE in pregnant women, regardless of delivery mode and for up to six weeks after birth (postpartum). But despite consensus that obesity correlates with elevated VTE risk, there is limited evidence to guide postpartum prevention of VTE.

"Recommendations vary between guidelines and have been criticised for being based on case-control studies, expert opinion, and extrapolated data from non-obstetric obese patients," said Research Pharmacist Christine Gilmartin.

"The aim of our study was to investigate actual postpartum pharmacological venous thromboembolism preventative practices using low-molecular-weight heparin (LMWH) for obese patients."

LMWH is a class of anticoagulant medications.

Of the 7,558 postpartum women discharged during the study period, 108 eligible women with a body mass index (BMI) greater than 30 kg/m^2 were reviewed and included. LMWH prescribing was compared to Royal College of Obstetricians and Gynaecologists (RCOG-UK) guideline recommendations.

"We found the use of LMWH in obese postpartum patients, including weight-adjusting doses and extended-course prescribing, was variable. Given the limited literature, recommendation discrepancies, and varied awareness of recommendations, we think further education and research regarding this high-risk cohort is warranted," Ms Gilmartin said.

The study was published in the *Australian and New Zealand Journal of Obstetrics and Gynaecology*.

Anaesthetics Research Centre

2020 figures

3	1	$0.2 million	$11k
Clinical trials	Publications	Grants held	Grants spent

The goal of the Anaesthetics Research Centre is to reduce maternal suffering and death by achieving optimal maternal health before, during and after birth.

The centre's work addresses the problems of high blood pressure, obstetric critical illness, and improving anaesthesia and analgesia for pregnant women, especially in the perioperative period. Research at the centre also aims to increase understanding of heart function and structure in pregnant women and the cause of pre-eclampsia.

Professor Alicia Dennis
Director

More to be done to tackle post-op pain

Lead Researchers: Dr Michael D'Silva, Dr Maxine Worboys, Professor Alicia Dennis

A caesarean section is a common surgical procedure where a baby is directly removed by an incision through the mother's abdominal wall and uterus. A caesarean section may be planned (elective) or unplanned (emergency) if there are problems during the antenatal period or labour.

One in five women who have a caesarean section develop chronic postsurgical pain.

"Studies have previously examined the incidence of chronic postsurgical pain after all caesarean section surgeries, but have failed to distinguish between elective and emergency caesarean sections," said Dr Maxine Worboys, one of the Lead Researchers.

"We wanted to determine the incidence of acute and chronic postsurgical pain in women undergoing elective caesareans and women undergoing emergency caesareans."

Of the 50 participants recruited to the study, 31 had an elective caesarean while 19 required an emergency caesarean. Pain levels were evaluated in person or over the phone at various time points, including a preoperative baseline and post-surgery surveys at day one, week two, week six and week 12.

"In the elective caesarean group, 100 per cent of women reported acute postsurgical pain on day one, 93 per cent at week two and 65 per cent at week six," said Dr Michael D'Silva, another Lead Researcher.

"In women who had an emergency caesarean, 100 per cent of women reported acute pain on day one and at week two, reducing to 82 per cent at week six. However, pain at the 12-week mark, considered to be chronic pain, was higher in the elective caesarean group – reported by 39 per cent of women compared to 25 per cent who had an emergency caesarean."

Dr D'Silva said more research into risk factors and interventions to treat chronic pain following caesarean sections could ameliorate what is a significant health burden affecting the lives of many women.

C-sections linked to complications for women with pre-eclampsia

Lead Researchers: Dr Busra Sara Unal, Professor Alicia Dennis

In severe cases of pre-eclampsia, the most common serious medical complication of pregnancy, the only cure is to deliver the baby and placenta. This is usually by caesarean section surgery yet there is limited research detailing perioperative complications in this group.

To understand the prevalence and types of complications during and post-surgery, data from eight months of caesarean section surgeries at the Women's were reviewed. The total number of participants included in the study was 72 and they ranged from 34 to 41 years of age.

For most women (79.2 per cent) it was their first caesarean section. Six women (8.3 per cent) suffered from preoperative complications – with five women suffering from antepartum haemorrhage and one woman suffering from acute pulmonary oedema.

Another 32 women (44.4 per cent) suffered intraoperative complications, the most common of which was obstetric haemorrhage. And 18 women (25 per cent) suffered from postoperative complications. Thirty women (41.7 per cent) also suffered from complications post discharge.

"Women with pre-eclampsia are high-risk patients who suffer significant perioperative complications. There are significant complications for these women intraoperatively and postoperatively, as well as for the babies born to these women," said Dr Busra Sara Unal, one of the Lead Researchers.

Babies of these women were also found to experience significant complications, with 28 babies (38.9 per cent) admitted to the Neonatal Intensive Care Unit or Special Care Nursery.

"Our findings highlight the need for larger case-controlled studies in this overlooked surgical population. By focusing on this field of research it is hoped that we may optimise perioperative outcomes for both mother and baby," said Dr Unal.

Organisational chart

Board Research Committee

Professor David Copolov AO
Board Director and Committee Chair (retired June 2020)

Associate Professor Marie Bismark
Board Director and Committee Chair (joined July 2020)

Ms Rosie Batty AO
Committee member

Professor Lisa McKenna
Committee member

Professor David Vaux AO
Committee member

Ms Margaret Lodge
Consumer Representative

Chief Medical Officer
Dr Mark Garwood

Director of Research
Professor Peter Rogers

Associate Directors of Research
Professor Lex Doyle
Professor Della Forster

Research and Ethics Sectretariat
Arthur Hui
Dr Megan Cock

Newborn Research Centre
Professor Peter Davis

Gynaecology Research Centre
Professor Martha Hickey
Professor Eva Dimitriadis

Centre for Women's Infectious Diseases
Professor Suzanne Garland AO

Pregnancy Research Centre
Professor Shaun Brennecke AO

Women's Cancer Research Centre
Associate Professor Orla McNally

Centre for Family Violence Prevention
Professor Kelsey Hegarty

Midwifery And Maternity Services Research Unit
Professor Della Forster

Centre for Women's Mental Health
Professor Louise Newman
Associate Professor Lesley Stafford

Anaesthetics Research Centre
Professor Alicia Dennis

Allied Health Research
Sandra Gates

Student completions

Doctor of Philosophy

Abdulaghnai N. PhD, La Trobe Uni. *Exploring Skin-to-Skin Contact Practices after Vaginal Birth in Saudi Arabia: A Mixed Method Study.* Supervisors: Amir L, Cooklin A, Edvardsson K.

Cuzzilla R. PhD, Uni Melb. *Predicting preterm outcomes using cranial ultrasound biometry.* Supervisors: Spittle A, Doyle L, Cheong J.

Dawson K. PhD, La Trobe Uni. *Exploring the introduction, expansion and sustainability of caseload midwifery in Australia.* Supervisors: Forster D. McLachlan H, Newton M.

Fitzgerald T. PhD, Uni Melb. *Physical activity participation in preschool age children born very preterm.* Supervisors: Doyle L, Cheong J, Spittle A, McGinley J.

Kwong A. PhD, Uni Melb. *Can spontaneous infant movements that later predict cerebral palsy or motor delay be observed by means of a parent-operated smartphone application?* Supervisors: Spittle A, Doyle L, Cheong J.

Tinn Teh W. PhD, Uni Melb. *Determinants for Uterine Receptivity.* Supervisors: Rogers P, McBain J.

Doctor of Psychology (Clinical)

Bean H. DPsych (Clinical), Monash Uni. *Light Enhanced Cognitive Behavioural Therapy (CBT+) for Sleep and Fatigue: A Randomized Controlled Trial during Chemotherapy for Breast Cancer.* Supervisors: Stafford L, Wiley J, Bei B.

Masters

Shaw E. Mpsych, Uni Syd. *Psychological factors and decision making in risk reducing mastectomy.* Supervisors: Stafford L, Juraskova I, Kirsten L.

Whitby S. MSc, Uni Melb. *Restoration of downstream microRNA protein targets improves endometrial epithelial cell adhesion.* Supervisor: Dimitriadis E.

Wijaya JC. MPhil, Uni Melb. *The Role of Decidual Mesenchymal Stem Cell Ageing in Labour.* Supervisors: Kalionis B, Georgiou H, Brennecke S.

Wilson V. Mpsych, Uni Melb. *Sexuality in ovarian cancer.* Supervisor: Stafford L.

Bachelor (Honours)

Chua TP. BSc(Hons), Uni Melb. *Fluoroquinolone resistance in Mycoplasma genitalium.* Supervisors: Murray G, Machalek D, Garland SM.

McDonald L. BSc(Hons), Uni Melb. *Impact of coordinated oncofertility.* Supervisors: Allingham C, Peate M, Jayasinghe Y.

Rajiv P. BMedSci (Hons), Monash Uni. *Predictors of fetal growth restriction.* Supervisors: Brennecke S, Jones G, Cade T.

Salib D. BSc(Hons), Uni Melb. *Priorities and needs of women living with advanced cancer.* Supervisors: Marino J, Peate M.

Taffs L. BSc(Hons), Uni Melb. *EndoNeeds Phase Two: Identifying and exploring the unmet needs of young adults with endometriosis.* Supervisors: Peate M, Marino J, Girling J.

Waters N. BSc(Hons), Uni Melb. *EndoNeeds Phase Two: Exploring the physical, psychological and social needs of long-term endometriosis patients.* Supervisors: Peate M, Marino J, Girling J.

Xu V. BMedSci (Hons), Monash Uni. *Premature Labour after caesarean section.* Supervisors: Brennecke S, Shahan A.

Zadir S. BSc(Hons), Uni Melb. *The Role of MAML1 in endometrial receptivity and implantation.* Supervisor: Dimitriadis E.

Medical Degree Research Project (MDRP)

Bursa S. MDRP, Uni Melb. *Perioperative issues in pregnant women with hypertension.* Supervisor: Dennis A.

Collie E. MDRP, Uni Melb. *Barriers to parenthood in medicine: a qualitative study.* Supervisors: Lew R, Peate M.

D'Silva M. MDRP, Uni Melb. *Prevention of chronic postoperative pain in women.* Supervisor: Dennis A.

Enright K. Medical Degree (elective), ANU. *How Body Mass Index relates to endometriosis lesion location and phenotype.* Supervisor: Holdsworth-Carson S.

Jin W. MDRP, Uni Melb. *Antibiotic Treatment for Amniotic Fluid Sludge Study.* Supervisor: Sheehan P.

Li R. MDRP, Uni Melb. *Endometriosis Recurrence as a Novel Measure of Disease Severity.* Supervisor: Holdsworth-Carson S.

Monacha S. Medical Degree (elective), RCSI, Dublin. *Improving clinical management of pregnancy complications.* Supervisor: Brennecke S.

Neo Y. Medical Degree (elective), Monash Uni. *Time from surgery to start of chemotherapy for ovarian cancer patients who received surgical treatment at the Royal Women's Hospital. Retrospective audit.* Supervisors: McNally O, Vicario E.

Worboys M. MDRP, Uni Melb. *Prevention of chronic postoperative pain in women.* Supervisor: Dennis A.

Medical Degree Research Subject (MDRS)

Cocks R. MDRS, Uni Melb. *A Protocol to Establish a Relationship Between Food Hypersensitivity and Endometriosis.* Supervisor: Holdsworth-Carson S.

Crozier W. MDRS, Uni Melb. *Core outcome set for COVID 19 in pregnancy research.* Supervisor: Whitehead C.

Milanko N. MDRS, Uni Melb. *Detecting fetal oxygen levels in utero via MRI as compared to the gold standard US.* Supervisor: Whitehead C.

O'Mally J. MDRS, Uni Melb. *Is there a link between endometriosis, food allergies and food intolerances?* Supervisor: Holdsworth-Carson S.

Tomkins N. MDRS, Uni Melb. *Small molecule metabolite biomarkers of endometriosis: a narrative review with systematic approach.* Supervisor: Holdsworth-Carson S.

Vakkas A. MDRS, Uni Melb. *TOTEM (impacT Of anTi müllErian horMone testing) Study.* Supervisor: Peate M.

Publications 2020

A total of 206 papers were published in peer reviewed medical journals by the Women's in 2020.

The publications below have been selected to highlight the quality of our research at a national and international level. The papers have been selected based on the quality of the journal in which they are published. The journals selected are in the top two per cent of journals, as is indicated by an 'impact factor' greater than 10. Impact factor (as determined by InCites Journal Citation Reports) is a measure of the frequency with which the 'average article' in a journal has been cited in a particular year or period.

A full list of 2020 publications is available for each research centre on the Women's website at www.thewomens.org.au/research.

Australian Genomics Health Alliance Acute Care Flagship, Lunke S, Eggers S, Wilson M, Patel C, Barnett CP, Theda C, et al. *Feasibility of Ultra-Rapid Exome Sequencing in Critically Ill Infants and Children With Suspected Monogenic Conditions in the Australian Public Health Care System.* **JAMA.** 2020;323(24):2503-11.

Butler J, Finley C, Norell CH, Harrison S, Bryant H, Achiam MP, McNally O, et al. *New approaches to cancer care in a COVID-19 world.* **Lancet Oncol**. 2020;21(7):e339-e40.

Cho SX, Rudloff I, Lao JC, Pang MA, Goldberg R, Bui CB, Theda C, et al. *Characterization of the pathoimmunology of necrotizing enterocolitis reveals novel therapeutic opportunities.* **Nat Commun**. 2020;11(1):5794.

Dimitriadis E, Menkhorst E, Saito S, Kutteh WH, Brosens JJ. *Recurrent pregnancy loss.* **Nat Rev Dis Primers**. 2020;6(1):98.

Dior UP, Kathurusinghe S, Cheng C, Reddington C, Daley AJ, Ang C, Healey, M. *Effect of Surgical Skin Antisepsis on Surgical Site Infections in Patients Undergoing Gynecological Laparoscopic Surgery: A Double-Blind Randomized Clinical Trial.* **JAMA Surg**. 2020;155(9):807-15.

Foglia EE, Te Pas AB, Kirpalani H, Davis PG, Owen LS, van Kaam AH, et al. *Sustained Inflation vs Standard Resuscitation for Preterm Infants: A Systematic Review and Meta-analysis.* **JAMA Pediatr**. 2020;174(4):e195897.

He C, Levis B, Riehm KE, Saadat N, Levis AW, Azar M, Stafford L, et al. *The Accuracy of the Patient Health Questionnaire-9 Algorithm for Screening to Detect Major Depression: An Individual Participant Data Meta-Analysis.* **Psychother Psychosom**. 2020;89(1):25-37.

Jarde T, Chan WH, Rossello FJ, Kaur Kahlon T, Theocharous M, Kurian Arackal T, Donoghue JF, et al. *Mesenchymal Niche-Derived Neuregulin-1 Drives Intestinal Stem Cell Proliferation and Regeneration of Damaged Epithelium.* **Cell Stem Cell**. 2020;27(4):646-62 e7.

Levis B, Sun Y, He C, Wu Y, Krishnan A, Bhandari PM, Stafford L, et al. *Accuracy of the PHQ-2 Alone and in Combination With the PHQ-9 for Screening to Detect Major Depression: Systematic Review and Meta-analysis.* **JAMA**. 2020;323(22):2290-300.

Machalek DA, Tao Y, Shilling H, Jensen JS, Unemo M, Murray G, Garland SM, et al. *Prevalence of mutations associated with resistance to macrolides and fluoroquinolones in Mycoplasma genitalium: a systematic review and meta-analysis.* **Lancet Infect Dis**. 2020;20(11): 1302-14.

Pang KC, Peri AJS, Chung HE, Telfer M, Elder CV, Grover S, Jayasinghe Y. *Rates of Fertility Preservation Use Among Transgender Adolescents.* **JAMA Pediatr**. 2020;174(9):890-1.

Thompson DK, Matthews LG, Alexander B, Lee KJ, Kelly CE, Adamson CL, Cheong JLY, Doyle LW, et al. *Tracking regional brain growth up to age 13 in children born term and very preterm.* **Nat Commun**. 2020;11(1):696.

Australian Government Grants 2020

Australian Research Council (ARC)

Guy R, Broom A, Whiley D, Bradshaw C, Applegate T, Treloar C, Wiseman V, Huston W, Williamson D, Kaldor J, Vallely A, Hocking J, Regan D, Donovan B, Kelly-Hanku A, Murray G. Industrial Transformation Research Program. *Research Hub to Combat Antimicrobial Resistance.* $10,000,000; 2020–2024

Spangaro J, Hegarty, K, Rutherford A, Zwi A, Man N, McMahon T, Perry A, Koziol-McLain J. Linkage Program. Screening and responding to domestic violence experienced by refugee women (SAHAR project). $449,514; 2020–2023

Tarzia L, Forbes-Mewett H, Tran L, Hegarty K, Segrave M, Humphreys C. Discovery Project. *International student's sexual and intimate partner violence experiences study (INVEST).* $356,916; 2019–2022

Tarzia L. Discovery Early Career Researcher. *Beyond Silence: Web-based help-seeking for intimate partner sexual violence.* $363,000; 2017–2021

Ussher J, Perz J, Hickey M, Chambers S, Dowsett G, Robinson K, Boydell K, Davis I, Parton C, Anazodo A, McDonald F. Linkage Program. *Out with Cancer: LGBTI experiences of cancer survivorship and care.* $369,960; 2018–2022.

National Health and Medical Research Council (NH&MRC)

Clinical Trials and Cohort Studies Grants

Palmer K, Wallace E, Groom K, Mol B, Davies M, Fahey M, Anderson P, Goergen S, Pannek K, Miller S, Whitehead C. *PROTECT Me: Assessing Antenatal Maternal Melatonin Supplementation in Fetal Growth Restriction to Improve Neurodevelopmental Outcomes.* $1,607,081; 2020–2024

Stark M, Collins C, Sullivan T, Andersen C, Morton R, Marks D, Owen L. *The effect of transfusion with washed versus unwashed red blood cells to modify neonatal morbidity and mortality: A randomised controlled trial.* $2,071,936; 2020–2024

Centre for Clinical Research Excellence

Canfell K, Brotherton J, Saville M, Castle P, Kaldor J, Garland S, Kelaher M, Guy R, Valley A, Simms K. *Centre for Research Excellence in Cervical Cancer Control (C4).* $2,486,382; 2018–2022

Cheong J, Doyle L, Davis P, Anderson A, Spittle A, Hunt R, Thompson D, Lee K, Manley B, Owen L. *Centre for Research Excellence in Newborn Medicine.* $2,496,997; 2019–2023

Hegarty K, Brown S, Humphreys C, Taft A, Arabena K, Sanci L, MacMillan H, Feder G, Glover K, Anderson P. *Centre for Research Excellence to promote Safer Families: tailoring early identification and novel interventions for intimate partner violence.* $2,497,801; Dec 2016–2021

Mishra G, Hickey M, Dobson A, Gannon B, Doust J, Fisher J, Cicuttini F, Huxley R, Tooth L, Brown H. *Centre of Research Excellence on Women and Non-communicable Disease (CRE WaND): Prevention and Detection.* $2,495,848; 2018–2023

Teede H, Norman R, Mishra G, Boyle J, Hart R, Mol B, Moran L, Hickey H, Laven J, Rodgers R. *Centre of Research Excellence – Women's Health in Reproductive Life (CRE WHiRL).* $2,499,056; 2020–2024

Development Grants

Theirry B, Warkiani ME, Zander-Fox D, Whitehead C. *Genome-Wide Non-Invasive Prenatal Testing based on Circulating Fetal Trophoblastic Cells.* $780,215; 2020–2022

Ideas Grants

Crossley K, DeKonick P, Hodges R, Thio M. *Reducing the risk of pulmonary hypertension in infants with a congenital diaphragmatic hernia.* $920,076; 2020–2023

Partnership Grants

McLachlan H, Forster D, Kildea S, Freemantle C, Browne J, Jacobs S, Oats J, Donath S, Newton M, Chamberlain C. *Improving the health of Aboriginal mothers and babies through continuity of midwife care.* $1,496,531; Dec 2015–2020

Spittle A, Novak I, Boyd R, Morgan C, Doyle L, Dale R, Scuffham P, Whittingham K, Colditz P, Pannek K. *Early diagnosis and early intervention for infants with cerebral palsy: implementation of international evidence-based guidelines into practice.* $1,196,361; 2018–2023

Taft A, Shiell A, Hegarty K, Feder G, Mazza D, Yelland J. *HARMONY: a cluster randomised controlled trial of a whole of general practice intervention to prevent and reduce domestic violence among migrant and refugee communities.* $595,288; 2018–2021

Program Grants

Hooper S, Davis P, Wallace E. *Improving perinatal outcomes.* $6,115,355; 2017–2021

Project grants

Anderson P, Halliday J, Elliott E, Penington A, Thompson D, Muggli E, Spittle A, Forster D, Lewis S, Hearps S. *Long-term effect on offspring of low to moderate or binge drinking during pregnancy.* $1,665,672; 2018–2021

Cheong J, Anderson P, Thompson D, Ranganathan S, Spittle A, Doyle L, Clark R, Burnett A. *Long-term impact of moderate and late preterm birth: effects on neurodevelopment, brain development and respiratory health at school age.* $1,467,294; 2019–2022

Craig J, Seal M, Silk T, Burnett A, Theda C, Scurrah K. *Quantifying the role of epigenetic factors in neurocognitive outcomes: a twin study.* $1,495,848; 2018–2021

Dimitriadis E, Gantier M, Menkhorst E, Rombauts L. *Critical regulators of endometrial receptivity.* $768,699; 2016–2020

Dimitriadis E, Menkhorst E, Koga K. *Critical regulators of placentation.* $907,092; 2016–2020

Dimitriadis E, Rombauts L. *Facilitating endometrial receptivity to improve pregnancy outcomes.* $734,252; 2017–2021

Forster D, McLachlan H, Dennis CL, Nicholson J, Shafiei T, Shiell A, Nguyen C, Nguyen T. *Preventing postnatal depression in new mothers using telephone peer support: a randomised controlled trial.* $850,069; 2018–2021

Grzeskowiak L, Amir L, Smithers L, Jacobs S, Ingman W, Grivell R, Knight E. *OPTimising Mothers' Own Milk supply in the neonatal unit – enhancing breast milk supply with Domperidone in mothers of preterm infants (OPTIMOM-D).* $980,000; 2019–2021

Hickey M, Peate M, Norman R, Hart R. *Eggsurance? A randomised controlled trial of a novel Decision Aid for women considering egg freezing.* $593,043: 2019–2021

Hyett J, Tarnow-Mordi W, Tong S, Morris J, Hannan N, Dekker G, Brennecke S, Walker S, da Silva Costa F, Poon C. *Can esomeprazole improve outcomes in women at high risk of pre-eclampsia? A Phase II placebo-controlled randomised, multi-centre clinical trial.* $1,597,124; 2018–2020

Kaldor K, Machalek D, Delany-Moretlwe S, Rees H, Chikandiwa A, Brotherton J, Petoumenos K, Cornall A, Vallely A. *Impact of 2-dose and 1-dose human papillomavirus (HPV) vaccination schedules on community level HPV prevalence in South African adolescent girls (The HOPE study).* $1,482,052; 2019–2023

Manley B, Kamlin CO, Davis P, Doyle L, McKinlay C, Schmolzer G, Jacobs S, Cheong J, Dargaville P, Donath S. *Intratracheal budesonide mixed with surfactant to reduce bronchopulmonary dysplasia in extremely preterm infants – the PLUSS Study.* $2,113,820; 2019–2023

Mol B, Askie L, Thangaratinam S, Brennecke S, Wang R, Hyett J, Gibson R, Stark M, Espinoza D. *Prediction and prevention of spontaneous preterm birth: an individual participant data meta-analysis comprising of prognostic and therapeutic data.* $1,103,273; 2018–2020

Nold C, Theda C, Nold M, King S. *Interleukin 37 – a Novel Cytokine Therapy for Necrotizing Enterocolitis in the Preterm.* $748,848; 2018–2020

Novak I, Morgan C, Badawi N, Boyd R, Spittle S, Dale R, Kirby A, Hunt R, Whittingham K, Pannek K. *Harnessing Neuroplasticity to Improve Motor Performance in Infants with Cerebral Palsy: a Pragmatic Randomized Controlled Trial.* $2,736,340; 2017–2021

Parkington H, Brennecke S. *Failure-to-progress in human labour results from a profound electrical negativity of the uterine cells: targeting the ion channels involved.* $564,540; 2017–2020

Phillips K, Friedlander M, Oza A, Brand A, Stewart C, Scott C. *STICs and STONes: a randomised, phase II, double-blind, placebo-controlled trial of Aspirin in chemoprevention of ovarian cancer in women with BRCA1 and BRCA2 Mutations.* $653,892; 2017–2021

Simmer K, Jacobs S, Strunk T, Tarnow-Mordi W, Patole S, Anderson P, Hague W, Inder T, Doherty D, Marlow N, Barrington K. *Can Pentoxifylline improve long-term outcomes in preterm infants with late-onset sepsis or necrotizing enterocolitis? A pragmatic, randomized, placebo controlled trial.* $2,972,803; 2016–2020

Skinner S, Marino J, Lymer S, Doherty D, Steinbeck K, Straker L, Kang M, Tait R. *The health, social and economic implications of risk-taking in adolescence over the life-course: a data linkage study of the Raine cohort.* $1,061,014; 2019-2023

Personal support

Davis PG. Practitioner Fellowship. *Generating and applying clinical research to improve the outcomes of neonatal intensive care.* $585,270; 2019–2023

Dimitriadis E. Senior Research Fellow. *Mechanistic and translational studies in female reproductive health.* $631,370; 2017–2021

Owen L. Career Development Fellowship. *Protecting premature lungs for life: supporting the first breath and every breath.* $305,924; 2019–2022

Spittle AJ. Career Development Fellowship. *Early detection and early intervention for infants born at high risk of neurodevelopmental impairments.* $483,404; 2019–2022

Whitehead C. Early Career Fellowship. *Placental function testing to prevent stillbirths.* $481,952; 2018–2022

Targeted call for Research

Kelaher M, Paradies Y, Ritte R, Nicholson J, Brown S, Hegarty K, Armstrong G, Water L. *Responding to Aboriginal and Torres Strait Islander family aspirations to foster self determination and social and emotional wellbeing.* $1,924,345; 2018–2022

Medical Research Future Fund (MRFF)

Abbott J, Rogers P, Montgomery G, Mishra G. *To establish the national endometriosis clinical and scientific trials network.* $2,500,000; 2018-2021

Emerging Priorities and Consumer Driven Research

Rogers R, Healey M, Holdsworth-Carson S, Donoghue J, Frawley H, Cheng C. *Improving treatment and diagnosis of endometriosis.* $3,929,234; 2020-2025

Teede H, Geelhoed G, Arnott L, Boyle J, Byles J, Chambers G, Clifton V, Frayne J, Glover K, Hickey M, Hart R, Larkins S, Loxton D, Makrides M, Mishra G, Nagle C, Nippita T, Perz J, Walker S, Zaman S. *National Women's Health Research, Translation and Impact Network (WHRTN).* $5,000,000; 2020-2024

Preventative and Public Health Research

McLachlan H, Forster D, Kane S, Sandall J, Shafiei T, Cuzzilla R, Shiell A, Nguyen C, Newton M, Kingsley M. *Exploring the impact of caseload midwifery on preterm birth among vulnerable and disadvantaged women: a multi-centre randomised controlled trial.* $1,598,496; 2020-2024

Spittle, A. Tele-rehabilitation for early intervention to improve neurodevelopmental outcomes of infants born preterm and their patients' wellbeing: a randomised controlled trial. $1,819,842; 2020–2024

Personal support

Cheong J. Next Generation Clinical Researcher. *Improving the health and development of high risk preterm newborns.* $333,709; 2018-2021

Manley B. Next Generation Clinical Researcher. *Optimising Respiratory Therapies to Improve Outcomes for Preterm Infants.* $306,000; 2019–2022

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