



Children's Health Queensland

Research Annual Report 2021



Queensland
Government

Acknowledgement of Country

Children’s Health Queensland Hospital and Health Service pays respect to the Traditional Custodians of the lands on which we walk, talk, work and live. We acknowledge and pay our respects to Aboriginal and Torres Strait Islander Elders past, present and emerging.

We acknowledge the historical and contemporary impacts of Queensland’s history of colonisation on the health and wellbeing of Aboriginal and Torres Strait Islander peoples. We recognise the ongoing intergenerational trauma and racism experienced by members of the community.

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An electronic version of this document is available at www.childrens.health.qld.gov.au/research/our-research/strategy-reports



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Message from the Chief Executive and Board Chair

It is our great pleasure to present the *Children's Health Queensland Research Annual Report 2021*, highlighting the key achievements of our researchers and clinicians over the past year.

2021 was another challenging year for people across the globe. As our organisation entered the second year of the COVID-19 pandemic, our research teams' focus on keeping research and evidence-based practice at the forefront of the care we provide remained firm.

We have been proud to see our people continue to boldly explore and innovate options for addressing known and persistent healthcare and wellbeing challenges faced by children and young people across Australia and the world, as well as respond to emerging issues, not least COVID-19.

When the COVID-19 pandemic unfolded in early 2020, telehealth proved vital in enabling the continuation of safe, high-quality care. Thanks to our world-first research into the feasibility and reliability of completing paediatric feeding assessments via telepractice, the concerns of both patients and practitioners who were new to the technology were allayed. The studies showed the in-person and telehealth assessments were comparable and the latter also resulted in significant time and cost savings for families.

Our researchers' pioneering 2020 COVID-19 Unmasked survey into the impact of the pandemic on the mental health and wellbeing of pre-school aged children and their caregivers continued into 2021 and expanded into a global collaboration involving more than 6000 participants from nine countries.

Published findings to date indicate that the challenges very young children are facing during the pandemic should not

be underestimated, and that targeted intervention is needed to support young children and their caregivers in learning to cope with the challenges and in building resilience.

Children's Health Queensland researchers also led the development of the first global guidelines for bronchiectasis in children (European Respiratory Society guidelines for the management of children and adolescents with bronchiectasis).

The guidelines, published in January 2021, were accompanied by the first international study involving parents, patients and clinicians on the clinical needs and research priorities of children with bronchiectasis. The new guidelines have also been referenced in the World Health Organisation's latest *Operational Handbook on Tuberculosis* (Module 5: Management of tuberculosis in children and adolescents).

These are just a handful of examples of the transformational impact Children's Health Queensland research is having on the health of children everywhere.

Since the appointment of our first Board Research Committee and Research Council last year, we've galvanised our resolve to strengthen our research capabilities and further integrate research into the delivery of clinical services across the organisation. We're also pleased to report that Children's Health Queensland secured Administering Institution status with The National Health and Medical Research Council (NHMRC) in 2021.



This achievement reflects the maturity of our research systems, capabilities and potential, and supports our vision to positively change the lives of Queensland children through the translation of health and medical research into better care, treatments and health outcomes. We look forward to taking you all on the next phase of this journey with us.

Everything we've achieved in 2021 was only possible because of the dedication, expertise and passion of our staff and partners, and the vital support and trust of the children, young people and their families who participate in our research. Thank you for your contribution and for continuing to help us lead the way in life-changing care for kids today – and tomorrow.

Frank Tracey

Chief Executive

Children's Health Queensland
Hospital and Health Service

David Gow

Board Chair

Children's Health Queensland
Hospital and Health Service

2021 at a glance


Projects and approvals

 **153** research projects*

194 human research ethics approvals

Clinical trials

 **55** new clinical trials

 **3,821** patients recruited to clinical trials

Grants and research income

\$2.7 million+ grant funding contributed or led by Children's Health Queensland Chief Investigators**

\$3.6 million clinical trial income

\$39.6 million grant funding received***

Publications and collaborations

545  published research articles and book chapters in 2020

802  international collaborations with leading institutions

* Total projects authorised by the Children's Health Queensland Research Governance Office.

** Funding includes grants administered by partner organisations.

*** Funding income received at Children's Health Queensland as awarded grants or a proportion of grants administered by partner organisations.

Message from the Director of Research and Board Research Committee Chair

The discovery and innovation showcased in this year's report reflects the broad scope of expertise we're fortunate to have at Children's Health Queensland.

It also tangibly demonstrates the impact our teams' shared commitment to finding better ways to prevent and treat illness, injuries and other health conditions, has had on the health and wellbeing outcomes of children and young people across the country and internationally.

While COVID-19 continued to challenge our communities and health systems in 2021, our dedicated researchers and clinicians have diligently progressed our research vision to positively change the trajectory of the life of every Queensland child by making valuable contributions across our priority research themes: prevention and early detection, better care, and health services and systems research.

This included pioneering work in virtual surgery planning and 3D printing techniques to improve orthopaedic surgeries and outcomes, delivering a better healthcare experience for children through paediatric-specific guidelines for intravenous catheters, and a retrospective study of all babies born in Queensland in the past 15 years to identify the latest risk factors for childhood hearing loss.

Children's Health Queensland investigators authored more than 500 articles and book chapters in 2021,



many in the world's leading medical journals, including *The Lancet*, *Critical Care Medicine*, *Cell* and *Nature Communications*. Overall, our researchers published across 24 National Health and Medical Research Council Fields of Research.

One hundred and fifty-three new research projects, including 55 clinical trials, commenced at Children's Health Queensland in 2021, and our researchers secured \$39.6 million in grant funding.

Most importantly, this impressive activity translates to helping more children, young people and their families benefit from the excellence and expertise that Children's Health Queensland provides.



Please join us in congratulating all the researchers and health professionals who contributed to our research endeavours in 2021. We look forward to sharing more of the results of your relentless drive to improve health outcomes for children and young people through clinically informed, impactful research.

Finally, thank you to our valued research partners and supporters. We could not do what we do without you.


Associate Professor Andy Moore,
 Director of Research


Heather Watson,
 Board Research Committee Chair

Our research strategy

Children's Health Queensland's research strategy is driven by our vision to lead life-changing care for children and young people – for a healthier tomorrow.

Our efforts are guided by the *Children's Health Queensland Research Strategy 2018-2025*, the *Children's Health Queensland Strategic Plan 2020-2024* and informed by the clinical needs of Queensland children, young people, and their families.

We acknowledge research has the potential to create life-changing advances in treatments, prevention, and outcomes for all. That's why our mission is to deliver statewide translational research to drive evidence-based care, service improvement and innovation.

It is through research that we can prioritise care that matters most. We are doing this across three strategic research themes:

- prevention and early detection
- better care, and
- health services and systems research.

We use data insights including population and clinical statistics to track emerging trends and ensure our research is clinically informed, clinically relevant, and clinically impactful. We embed research into day-to-day clinical care through clinical trials and evidence-based interventions and share our clinical insights to translate research into practice.

Our research strategy is evolving as our research programs mature. We are growing our funding and investment, and collaborating widely to build our research capacity and capability. Our strategic priorities continue to be developed and refined to foster the growth of our expanding pool of nationally and internationally renowned clinician researchers.

Our research aim

To inform the development of a statewide integrated, sustainable children's healthcare system that is responsive to contemporary needs and driven by research, evidence and innovation.

Our research vision

To positively change the trajectory of the life of every child throughout Queensland.

Our research mission

In partnership, deliver statewide paediatric translational research that drives evidence-based care, and service improvement and innovation for children, young people and their families.

Children's Health Queensland Research Strategy 2018-2025

Prevention and early detection	Better care	Health services and systems research
Building our research leaders, profile and culture		
Consumer and community involvement in health and medical research		
Prevent disease and create healthcare for the future – building Queensland generations	Take our child health research and health services expertise to the world	Rapidly translate our research into better health outcomes using contemporary approaches including health economics, biostatistics and evaluation techniques

Research at Children's Health Queensland

At Children's Health Queensland, we seek to improve the health and wellbeing of all children through life-changing care, supported by world-leading research.

Our researchers investigate risk and protective factors, treatments and outcomes through collaborations with a range of strategic partners across government, health and social services, education and research institutions, and private and non-government organisations.

While our clinical work is focused primarily on improving outcomes for children in Queensland, our research is aimed at increasing health outcomes for children and young people globally.

To support research priorities our Board Research Committee provides strategic oversight, with insights, engagement and leadership from the Children's Health Queensland Research Council.

Children's Health Queensland Board Research Committee

The Children's Health Queensland Board Research Committee provides oversight and recommends strategies to the Children's Health Queensland Board in relation to building long-term collaborations in research and enhanced clinical service delivery founded on sustainable and trusting partnerships with shared vision and value. The Committee helps build expertise and guide engagement to ultimately position Children's Health Queensland as a world-class health service of national and international significance.

Board Research Committee Membership 2021

- Heather Watson, Children's Health Queensland Board member (Chair)
- David Gow, Chair of the Children's Health Queensland Board
- Cheryl Herbert, Children's Health Queensland Board member
- Suzanne Cadigan, Children's Health Queensland Board member
- Associate Professor Frank Tracey, Children's Health Queensland Chief Executive
- Associate Professor Steven McTaggart, Children's Health Queensland Executive Director of Medical Services
- Associate Professor Andy Moore, Children's Health Queensland Director of Research
- Associate Professor Simon Denny (from July 2021)
- Professor Allan Cripps (from Nov 2021)
- Dr Sandra Pavey, Children's Health Queensland Business Manager Research

Children's Health Queensland Research Council

The Children's Health Queensland Research Council is an advisory body, providing senior Children's Health Queensland research clinicians with an opportunity to inform and help deliver our strategic research priorities, in line with the overall health service strategy.

The group is made up of 124 senior clinician researchers representing the full spectrum of clinical services and departments, and members of the Children's Health Queensland's executive leadership team.

Centre for Children's Health Research

The Centre for Children's Health Research was Queensland's first integrated research facility dedicated to generating internationally competitive research for advances in child and adolescent health.

Co-located with the state's only tertiary and quaternary paediatric hospital – the Queensland Children's Hospital – the nine-level centre houses wet and dry laboratories, pathology services and clinical research facilities to allow close collaboration between researchers, scientists and clinical staff, as well as consumers involved in clinical research projects and trials.

The centre promotes collaboration and partnership between Queensland Health, Children's Health Queensland, Queensland University of Technology, The University of Queensland, the Translational Research Institute and Pathology Queensland.

Children's Health Research Alliance

The Children's Health Research Alliance is a joint venture between Children's Health Queensland and the Children's Hospital Foundation to identify research priorities for funding that align to childhood disease burden in Queensland and the research and service capabilities of Children's Health Queensland and its partners.

The Alliance encourages and supports the undertaking of world-class

paediatric research in Queensland, and especially research that supports the delivery of paediatric services across the State by Children's Health Queensland. These research activities are focused on evidence-based research priorities determined by the Board of the Alliance in alignment with the *Children's Health Queensland Research Strategy 2018-2025*.

The Alliance aims to:

- transform health outcomes for children
- make a major contribution to global research
- build research capacity in the targeted research area; and
- reduce the burden of disease on the health system and broader economy.

Children's Health Research Alliance Board Membership 2021

- Prof Allan Cripps AO, Independent Chair
- Associate Professor Frank Tracey, Children's Health Queensland Chief Executive
- Associate Professor Andy Moore, Children's Health Queensland Director of Research
- Ms Cheryl Herbert, Children's Health Queensland Board Member
- Associate Professor Leanne Johnston, Children's Health Queensland nominee
- Dr Michelle Hannan, Children's Hospital Foundation Board member
- Sharon Houghton, Children's Hospital Foundation Board member
- Olivia Jary, Acting Chief Executive Officer Children's Hospital Foundation (from Dec 2021)

Previous members

- Kenneth Drysdale, Children's Hospital Foundation Board member (left Jun 2021)
- Dr Veronica McCabe, Children's Hospital Foundation Director of Research and Grants (left June 2021)
- Ms Rosie Simpson, Children's Hospital Foundation Chief Executive Officer (left Sep 2021).

Our research enablers

Person-centred care



We consider children, young people and their families as true partners in their care, and place individual social, emotional, cultural, mental and physical care needs at the heart of a healthcare journey. This approach underpins our clinical activity drives our research pursuits.

Our people



Our translational research capability is powered by the clinical expertise of our people who strive to be at the forefront of research, innovation, education and the application of evidence-based practice to improve health outcomes for children and young people. In 2021, 155 staff members held higher research degrees, and 81 supported 138 higher degree students.

Our partners



We collaborate with strategic partners across government, health, social services, education, research, private and non-government organisations to develop, share knowledge and translate innovation into practice. Our valued partnerships are integral to influencing and driving investment in sustainable health services that deliver significant clinical outcomes.

Infrastructure



Our purpose-built infrastructure across the Queensland Children's Hospital precinct in South Brisbane encompasses the state's largest and only dedicated tertiary and quaternary paediatric hospital and the Centre for Children's Health Research. This infrastructure enables a unique opportunity to integrate the translation of paediatric research from the laboratory to the patient bedside.

Statistical support and consultancy service



Children's Health Queensland researchers have access to a biostatistics clinic and consultancy service provided by QFAB Bioinformatics, where researchers can access assistance in all aspects of project design, analyses and reporting as well as support for grant applications.

Ethics and governance

Human Research Ethics Committee and research governance

Children's Health Queensland's Human Research Ethics Committee (HREC) reviews the ethical and scientific validity of proposed research within the Children's Health Queensland Hospital and Health Service and in partner agencies across Australia. Together with researchers, the HREC works to ensure valid research studies are conducted ethically for the benefit of the wider community. This involves protecting the mental and physical welfare, rights, dignity and safety of participants, and promoting high-quality and responsible research.

The HREC is certified with the NHMRC to conduct paediatric clinical trials (Phases I to IV), involving drugs and devices, interventional research, other health and medical research, mental health, justice health and paediatric population health research.

The Children's Health Queensland Research Governance Office assists researchers with site-specific assessment application forms and the application processes for site authorisation, negotiation of research contracts, guidance regarding legislation, policies and standards, education and training for new and experienced researchers and monitoring of research.

Of the studies authorised to commence at Children's Health Queensland in 2021, approximately one-third were clinical trials.

Through enrolment of participants for national and international clinical trials, Children's Health Queensland has made a significant contribution to the development and testing of novel treatments. These trials have included new drug therapies, surgical procedure innovations, the use of new medical devices or different ways to use existing equipment, treatment combinations, and other adaptations to existing care models.

Human Research Ethics Committee

Summary of approved projects

Single centre	85
Multi-centre	61
Ethics waiver	48
Total approved	194

Post-approval monitoring

Amendments	459
Safety reporting	119
Annual/final reports	211

Research governance 2021

Summary of authorised projects

Clinical trials	55 (36%)
Research projects (excluding clinical trials)	98 (64%)
Total of Research Governance Office authorisations*	153

*Reported through Children's Health Queensland Research Governance Office submissions.

Prevention and early detection

AT A GLANCE

60 publications **\$4,578,555** in grants

Children's Health Queensland has a strong focus on primary and secondary prevention of injury and illness, as well as improving the social determinants of health.

Our areas of study include physical activity, child development including social and emotional wellbeing, nutrition and growth, family health, injury prevention, sun safety, oral health and immunisation, as well as boosting investment in population research and sustainable services. Our research and findings are shared with Queensland Health's Preventative Health Branch, to embed the enhancements in clinical practice.

2021 highlights

- A study of 149 infants found that a shorter initial stay in a neonatal intensive care unit (NICU) was the best predictor of earlier home oxygen cessation. The study, published in *Pediatric Pulmonology* (February 2021, (56) 5) revealed that at NICU discharge, infants with hypercarbia or a higher corrected gestational age may require more home oxygen and experience more respiratory-related hospital admissions in the first two years of chronological age.
- Professor Amanda Ullman and her team implemented The Michigan Appropriateness Guide for Intravenous Catheters in Paediatrics (miniMAGIC) across the Queensland Children's Hospital (see page 10).

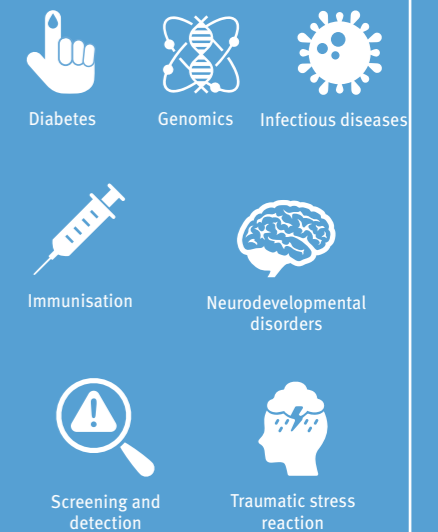
- The Queensland Paediatric Sepsis Program's introduction of the Paediatric Sepsis Pathway in 12 emergency departments across Queensland resulted in increased sepsis bundle compliance and improved time to treatment, particularly in the sickest kids admitted to the intensive care (see page 12).

- A comparative study of the diagnostic accuracy of the nurse-administered visual acuity screen and the Spot Vision Screener in identifying amblyogenic risk factors and decreased visual acuity found that one in ten of the of 2,237 preschool children screened failed one or both screens. It also found several children who needed ophthalmic intervention were missed if only one screening method was utilised.

- A study, led by Children's Health Queensland physiotherapist Joanne George, found MRI and neurological assessment prior to term equivalent age while a child is still in hospital can provide earlier identification of children at highest risk of adverse outcomes and guide follow-up screening and intervention services. *Paediatric Research* (December 2021) Vol. 90, No.6, pp1243-1250.

- A collaborative study demonstrated a 75 per cent reduction in the infant mortality (between the ages of 28 days and 6 months) in the Queensland areas where the Pèpi-Pod® Program achieved the highest level of community participation with the target population. It also demonstrated a 22 per cent significant reduction in the infant mortality rate statewide since the implementation of the Pèpi-Pod® Program.

Areas of research



Best-practice IV guidelines deliver better healthcare experiences and outcomes

Children's Health Queensland researchers and clinicians are leading the world on best-practice guidelines for the implementation and management of intravenous catheters (IVs).

IVs are the tools of the trade in hospitals, with 90 per cent of children at Queensland Children's Hospital receiving some form of IV during their stay so they can receive essential therapies, like antibiotics and pain relief.

But these essential medical devices can cause children distress and pain, and can lead to serious infection and blood clots if used inappropriately.

Up to 50 per cent of peripheral IVs and 25% of central venous catheters will stop working during treatment. Central venous catheters are also the most common cause of healthcare-associated sepsis.

Dr Amanda Ullman, Professor and Chair in Paediatric Nursing at Children's Health Queensland and The University of Queensland, led an international panel in Michigan, US, in 2019 to define the safe and appropriate use of intravenous catheters across paediatric healthcare.

The guidelines clarified the huge amounts of evidence on each device's risk profile and delivered a fit-for-

purpose framework the clinicians could tailor to any patient profile.

"The safety guidelines cover everything from the simplest, previously well child that comes in to get their tonsils out, all the way to the most complex child requiring nutrition for the rest of their life," Professor Ullman said.

"They mainly tell you what not to do and what's not safe, but also allow for a lot of excellent clinical decision making in that green safety area. It puts us all on a safe platform."

The *Michigan Appropriateness Guideline for Intravenous Catheters in Paediatrics* (miniMAGIC) was published in American Academy of Paediatrics in June 2020.

The 734 evidence-based criteria were synthesized into an app so clinicians could easily enter the patient's details and find out what to do and what not to do.

Professor Ullman's team, including project lead and clinical nurse Tricia Kleidon, successfully implemented

the guidelines across Queensland Children's Hospital in 2021.

Professor Ullman said clinician education was crucial throughout the implementation process.

"Tricia is an excellent clinician and advocate for vascular access practice locally and internationally," Professor Ullman said.

"IVs cross all the disciplines in healthcare. If we do it right, we can really change a child's health experience..."

"She was consistently educating people and challenging opinions about what IV success looked like and how much better it could be."

Professor Ullman said it was important to reduce the negative outcomes of IVs, which some surveys demonstrate are often the only thing a child remembers about their healthcare experience.

"They often don't remember the nicer experiences of being in hospital, like entertainment and clowns, but they do remember that painful, repetitive IV insertion procedure," she said.

"IVs cross all the disciplines in healthcare. So, if we do it right, we can really change a child's health experience and health outcomes."

The guidelines have also been implemented into practice in other Hospital and Health Services across Queensland.

Professor Ullman is also working with clinicians from other Australian states, the United States, the United Kingdom, China and Brazil to tailor the recommendations of her research for local practice.

The miniMAGIC guidelines were implemented at the Queensland Children's Hospital with the support of the Children's Hospital Foundation.



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Professor Amanda Ullman

Amanda was appointed as the inaugural Professor and Chair in Paediatric Nursing, conjoint between Children's Health Queensland and the University of Queensland, in March 2021.

Her research journey started while working in paediatric intensive care at the Royal Children's Hospital in Herston. She recognised that her patients were battling infections caused by the insertion and management of their central venous catheter.

She completed her PhD focusing on paediatric central venous catheters at Griffith University and has spent 15 years developing and implementing evidence-based practice for IV management into everyday clinical settings.

Since the completion of her PhD, Professor Ullman and her team have received continual funding from the NHMRC to support her program of work. This has included fellowship, investigator, project, partnership and centre of research excellence grants. She is now globally the highest ranked researcher in central venous catheters (ExpertScape).

In 2021, Professor Ullman was awarded a Fulbright Future Scholarship to research IV-associated harm prevention, in collaboration with the Children's Hospital of Philadelphia and the University of Pennsylvania.

Cerebral palsy screening program adapted for Aboriginal and Torres Strait Islander children and families

Aboriginal and Torres Strait Islander families are engaging more with a cerebral palsy early surveillance program due to a culturally adapted program developed by The University of Queensland (UQ) researchers working with clinicians at Children's Health Queensland.

Cerebral palsy (CP) is the most common physical disability in childhood, affecting 1 in 700 young Australians. The diagnosis of CP may be up to five times more common in Aboriginal and Torres Strait Islander infants.

The 'LEAP-CP' (Learning through Everyday Activities with Parents) program, led by Dr Katherine Benfer and Professor Roslyn Boyd from the Queensland Cerebral Palsy Research Centre at The University of Queensland, is an early surveillance and early intervention program for Aboriginal and Torres Strait Islander infants at a high chance of CP.

The program was successfully developed, trialed, and implemented in Kolkata, India in 2020 with 142 babies at a high risk of CP recruited to a randomised controlled trial.

Indigenous PhD candidate Leeann Mick-Ramsamy is leading the cultural adaptation and co-design of LEAP-CP for Aboriginal and Torres Strait Islander families in Queensland and the Northern Territory.

An early screening study, led by Children's Health Queensland paediatric physiotherapist and UQ PhD scholar Carly Luke and published in *BMJ Open*, started recruiting families at Queensland Children's Hospital, Townsville University Hospital, and across Cairns and Hinterland Hospital and Health Service in July 2021.

More than 135 families and infants have been recruited across northern Queensland and Brisbane, with baby movement checks occurring at two

time-points (birth to five months, and four to nine months). Final movement and learning checks are completed when the infants are 12 months old.

A peer-delivered support program was offered to families with infants identified as a high chance of CP, starting before 12 months of age and continuing until 24 months.

"There were a lot of words that we were using that we didn't realise were quite disengaging language, so we've changed completely how we present the concept of early screening to families," Ms Luke said.

"We also changed the way we provided care, so instead of having families come back to the hospital or to the clinic, we offer family home visits, whether that be at their own home or a family member's house.

"Offering that flexibility has really helped maintain engagement with families."

The adapted LEAP-CP model led to a significant improvement in retention, with 98 per cent of Aboriginal and Torres Strait Islander families, up from 50 per cent, remaining in the surveillance program.

Dr Boyd said the LEAP program had successfully provided culturally safe and engaging support for Aboriginal and Torres Strait Islander families, fast-tracking them to holistic, evidence-based early intervention delivered by an First Nations health worker.

The LEAP-CP Program is funded by the NHMRC through an EU Horizon grant, in addition to Children's Hospital Foundation and Cerebral Palsy Alliance grants.



Dr Amanda Harley

Amanda is the clinical nurse consultant for the Queensland Paediatric Sepsis Program.

At the time of her appointment at Children's Health Queensland in 2018, she was Australia's only paediatric sepsis clinical nurse consultant.

She has worked with the Australian Commission on Safety and Quality in Health Care in developing the clinical care standard for sepsis, including the creation of a clinical care coordinator for sepsis.

Dr Harley's interest in sepsis research began in 2016 while working as an emergency nurse on the Gold Coast, where she identified a gap in the evidence and literature around nurses' role in recognising and managing sepsis. Since then, she has secured dedicated funding for sepsis research and presented at numerous international and national conferences securing many invited speaker positions.

In September 2021, Dr Harley was appointed as the nursing representative and the paediatric representative for the Global Sepsis Alliance Advance Program.

She was also appointed as a committee representative of the Global Sepsis Alliance World Sepsis Day Committee.

Dr Harley recently completed her PhD in recognition and management of paediatric sepsis in emergency departments at The University of Queensland.

Sepsis pathway improves time to treatment for sickest kids

The Queensland Paediatric Sepsis Program (QPSP), hosted by Children's Health Queensland, continues to drive national change in raising awareness and education of sepsis, the leading cause of death and disability for Queensland children.

In 2021, the QPSP released the results of the introduction of the Paediatric Sepsis Pathway (PSP) in 12 emergency departments across Queensland.

The study assessed the process and outcome measures of 523 children aged under 18 years who were diagnosed with suspected sepsis on the PSP over a 17-month period.

The cohort were compared to a retrospective baseline sample of children with sepsis admitted to intensive care units (ICU) in participating hospitals.

The study, published in *Critical Care Explorations* in November 2021, found introducing a standardised pathway increased sepsis bundle compliance and improved time to treatment, particularly in the sickest children admitted to ICU.

This included improved empirical antibiotic choice according to suspected sepsis source and dosing.

It also recommended future initiatives should focus on barriers to bundle compliance, facilitating standardised resources and education and promoting digital solutions for paediatric sepsis care.

A knowledge translation study was also conducted after the introduction of that pathway and identified 96 per cent of nurses used the pathway to manage sepsis. Results also identified key factors and variables associated with increased sepsis knowledge within the participating statewide emergency departments.

The QPSP together with Pathology Queensland and The University of Queensland have commenced a pilot

study to evaluate feasibility of Point of Care (POC) C-Reactive Protein (CRP) in rural and remote settings.

The implementation of POC CRP devices will support a diagnostic approach to patients presenting to sites without advanced laboratory support. This study is being funded by the Queensland Technology Future Fund.

QPSP is also working directly with universities across Australia to improve student's knowledge and understanding of sepsis with the aim to introduce paediatric sepsis education into the curriculum.

The program is also expanding and tailoring education to primary health clinics, the broader community and families, including Aboriginal and Torres Strait Islanders. A statewide model of care is being developed to support families and their child after a diagnosis of sepsis.



Photo iStock.com

Better care

AT A GLANCE

413 publications \$28,380,400 in grants

Children's Health Queensland seeks continuous improvement in the care provided to our state's children and young people.

Through our research and clinical trials, we are helping deliver better care and outcomes through improved diagnosis, novel treatments, and strategies to prevent complications of injury and illness.

2021 highlights

- A Children's Health Queensland and Griffith University partnership is pioneering virtual surgery planning and 3D printing techniques to improve surgical accuracy, reduce surgery times and enhance functional outcomes. See page 14.
- Queensland Children's Hospital clinicians participated in the first randomised controlled trial to investigate the optimal duration of antibiotic treatment for wet cough and bacterial bronchitis in children. Published in *The Lancet Respiratory Medicine* (May 2021, (9) 1121-1129), the study found a 4-week course of amoxicillin-clavulanate confers little advantage compared with a two-week course in achieving clinical cure by 28 days. However, as a four-week duration led to a longer cough-free period, identifying children who would benefit from a longer antibiotic course is a priority.
- Queensland Children's Hospital's neurologist and head of the Mild Traumatic Brain Injury (mTBI) and Complex Concussion Clinic, Dr Karen Barlow is participating in a four-year, Trans-Tasman project to deliver the first combined clinical practice guidelines for mTBI and post-concussion syndrome. See page 15.
- Evaluated the effectiveness of a clinical pathway in achieving antibiotic administration in less than 60 minutes for children with cancer presenting with fever and neutropenia. The study published in the *European Journal of Cancer Care*, May 2021, 30 (3) found clinical pathways improved fever management in this patient cohort.
- Queensland Children's Hospital to continue its world-leading program of paediatric burns research through an NHMRC Partnerships Project collaboration with The Children's Hospital at Westmead, Perth Children's Hospital and Royal Children's Hospital, Melbourne to assess the implementation and clinical efficacy of negative pressure wound therapy. The results of this study will transform policy and practice to improve outcomes for Australian paediatric burns patients. See page 16.

Areas of research



Virtual planning and 3D guides improve surgical accuracy

Children's Health Queensland is collaborating with Griffith University to pioneer cutting-edge virtual surgery planning and 3D printing techniques to improve surgical accuracy, reduce surgery time and enhance functional outcomes for young Queensland patients.

The three-year medical device trial led by Associate Professor Chris Carty, a clinical research consultant in orthopaedics at Queensland Children's Hospital, and Principal Research Fellow at Griffith University, and Dr David Bade, Director of Orthopedics at the Queensland Children's Hospital, aimed to assist with the planning and correction of complex lower limb deformities.

The research has since been implemented into clinical practice, with 10 surgical procedures being guided by virtual design and 3D printed surgical guides at the Queensland Children's Hospital in 2021, as well as one surgery at both Mater Private Hospital and Gold Coast University Hospital.

The initial clinical trial was funded by a \$300,000 grant from the Queensland

Government Advance Queensland Fellowship scheme. The team implemented multiple software packages to virtually plan surgery for children with deformities in their lower limbs and to 3D print surgical guides to allow the surgeon to efficiently perform the surgery in the operating theatre.

Associate Professor Carty said the workflow helped overcome the limitations surgeons faced in planning surgery based on static medical images such as X-rays and MRI.

"The difficulty for the surgeon is that their ability to visualise the deformity in the operating theatre is obstructed by skin, muscles and blood. Furthermore, their field of view is narrow in an effort to keep the incision small," he said.

"We developed a method in collaboration with the surgical team to virtually assess the functional consequences prior to the actual surgery that allowed an optimal surgery to be selected for the operating theatre."

That collaboration resulted in the design of a 3D-printed cutting guide to sit on the bone during surgery. The guide has slots for where to saw and drill and dictates where the implant sits and how the bone is repaired.

Queensland (UQ) in 2009.

Associate Professor Carty has held various positions at Children's Health Queensland since 2012 while carrying out research with both UQ and Griffith University.

In 2017, he was awarded a Churchill Fellowship by the Winston Churchill Trust to further his research on 3D printing solutions for the treatment of children with bone deformities.

The guide was trialed in 12 surgeries at the Queensland Children's Hospital between 2019 and 2020 to assess safety, accuracy, and patient functional outcomes. The surgical procedures aimed to address deformity of the proximal femur for children who had a previous slipped capital femoral epiphysis or children with cerebral palsy.

Patient function outcomes were assessed by comparing each patient's walking patterns pre-surgery to a 12 month post-surgery walking assessment in the Queensland Children's Motion Analysis Laboratory in the Centre for Children's Health Research. Overall, patients showed significant improvements in their walking pattern.

Associate Professor Carty said the research showed that the virtual planning workflow and 3D printed guides were effective in assisting planning and the surgical execution.

"The surgical guides can enable accuracy in surgical execution comparable to expert surgeons," he said.

"The technology could also assist in orthopaedic training to ensure that every child that gets treated for this condition gets a similar outcome."

Translation of the research results into clinical service has been funded by the Queensland Department of Health, Office of Precision Medicine.

The implementation was also funded by the Australian Research Council Centre for Medical Devices Technologies, with a \$4 million grant shared by Griffith University, Melbourne University and Flinders University.

Associate Professor Carty said the plan was to make the virtual surgery planning more efficient and cost effective to enable accessibility to other sites across Australia and possibly internationally.

Guidelines to support better diagnosis of post-concussion syndrome

Multidisciplinary experts from Australia and New Zealand are collaborating on the first combined clinical practice guidelines for mild Traumatic Brain Injury (mTBI) and post-concussion syndrome.

Dr Karen Barlow (pictured), lead of the mild TBI and complex concussion clinic at Queensland Children's Hospital and Professor at The University of Queensland, is among the more than 25 doctors, healthcare professionals and researchers taking part in the two-year project.

The guidelines will cover children, adults and the elderly, as well as people who play sport, which has been the main cohort in the public spotlight on concussion in recent years.

"People's knowledge of what concussion is varies and is driven a lot by the media and the sports profession," Dr Barlow said. "We're trying to inform that voice a bit more clearly."

Head injury is one of the most common reasons for children to present to the emergency department and recent research suggests that those over the age of 12, particularly girls, are at a distinct risk of prolonged post-concussive symptoms.

Dr Barlow was part of the Paediatric Research in Emergency Departments International Collaborative (PREDICT) that established the Australian and New Zealand Guideline for Mild to Moderate Head Injuries in Children.

The guidelines, which were published in *Emergency Medicine Australasia* in February 2021, provided evidence-based and locally applicable guidance for



the care of children with mild to moderate head injuries presenting to acute care settings in Australia and New Zealand.

The new project, due to be completed in March 2024, will be the first comprehensive approach for all patient sectors.

"It's about the assessment, diagnosis and acute management and how to assess and manage people when their symptoms haven't resolved," Dr Barlow said.

"These guidelines won't just be a piece of paper. We're developing a website with clear tools for GPs and parents to download.

The project, funded in part by a \$497,834 grant from the Medical Research Future Fund and conducted in collaboration with Clinical Excellence Queensland, will be informed by a consumer advisory group, including Aboriginal and Torres Strait Islander people.

Associate Professor Chris Carty

Chris is a clinical research consultant in orthopaedics at Queensland Children's Hospital and a Principal Research Fellow at Griffith University.

His Australian-first research into virtual surgery planning and 3D printed surgical guides has been implemented into clinical practice in the Queensland Children's Hospital.

Associate Professor Carty's project allowed surgeons to accurately plan for patients with lower limb deformities, including children with cerebral palsy, and to assess the functional consequences of surgical choices.

Following his undergraduate studies in human movement science, Chris undertook a PhD focused on movement analysis of children with disabilities. He completed his PhD in orthopaedic biomechanics at The University of

Study set to improve childhood burns treatment across Australia

Queensland Children's Hospital is participating in a four-year study to assess the implementation of negative pressure wound therapy (NPWT) for acute paediatric burns.

The study, led by Children's Health Queensland researcher and Griffith University Associate Professor Bronwyn Griffin, is being run in collaboration with The Children's Hospital at Westmead, Perth Children's Hospital and The Royal Children's Hospital Melbourne.

NPWT, also known as vacuum-assisted closure, uses a sealed dressing to gently suck the air from around the wound to help it heal.

This non-invasive therapy, applied soon after the burn injury, uses a portable machine allowing the patient to be cared for in the hospital or at home.

In 2019, Queensland Children's Hospital led a world-first randomised controlled trial on the clinical effects of applying NPWT to small- to medium-sized paediatric thermal burns on children.

While the benefits of NPWT as a means of wound-bed preparation prior to skin grafting and graft immobilisation were well established, there was little research into the therapy's benefits for paediatric burns.

The study's findings, which were published in the *British Journal of Surgery* in December 2020, looked at

the treatment of 114 children and found applying NPWT within 72 hours of a child's injury accelerated their healing and decreased the need for long-term scar management.

A cost-effectiveness study from this trial found that NPWT resulted in significantly lower overall health costs including dressing, labour, medication, scar management and theatre operations.

More than 1,200 children present to the Queensland Children's Hospital with

a new burn injury every year, requiring multiple appointments and procedures.

Co-researcher and Director of Paediatric Surgery, Urology, Burns and Trauma at the Queensland Children's Hospital Professor Roy Kimble said the development of a NPWT Pathway would help improve outcomes for childhood burns nationally.

The study assessing the implementation and clinical efficacy of NPWT is funded by a \$1.4 million grant from the National Health and Medical Research Council.



Professor Roy Kimble

Roy is Director of Paediatric Surgery, Urology, Burns and Trauma at the Queensland Children's Hospital.

He began his career in medicine in 1985 in Glasgow, Scotland and has worked in the field of paediatric burns and trauma across five countries for 37 years.

In 1999, Professor Kimble became the founding head and director of the Center of Children's Burns and Trauma Research at The University Queensland.

He has been a Professor of Paediatrics and Child Health at UQ for more than 23 years and continues to supervise doctoral candidates.

Professor Kimble's award-winning research focuses on prevention and rehabilitation from traumatic injuries, and the development of new methods in the management of burns.

He has helped thousands of children and young people through their treatment and recovery from serious burns and trauma injuries.

His recent research has focused on the implementation of negative pressure for acute paediatric burns, burn first aid in Australian pre-hospital environments, and the use of laser treatment to reduce the appearance of burns scars and improve function.

Professor Kimble is Vice Patron of Kidsafe Queensland, a not-for-profit organisation working across Australia to reduce incidences of unintentional child and youth deaths and injury.

Health service and systems research

AT A GLANCE

72 publications \$4,010,595 in grants

Children's Health Queensland aims to translate our impactful research into better health outcomes across disciplines.

Our work leverages into health economics, biostatistics, evaluation techniques, and consumer and community involvement using multidisciplinary approaches.

We use data-driven methods to assess and evaluate care, health and wellbeing, in order to improve health service innovation.

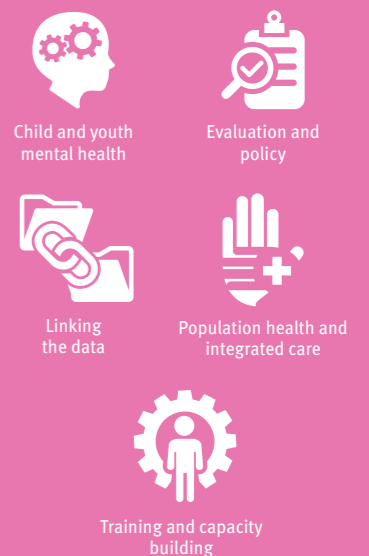
2021 highlights

- World-first research led by Children's Health Queensland speech pathologists proved the reliability and safety of performing paediatric feeding assessments by telehealth. See page 18.
- A study of child and youth mental health service client data in Brisbane and the Netherlands between 2013 and 2018 highlighted the importance of continued treatment, even when symptoms appear to subside. See page 19.
- Commenced a retrospective analysis of all children born in Queensland in the past 15 years to identify when a child is at risk of hearing loss and inform an updated evidence-based national newborn screening risk factor registry. See page 20.

- Children's Health Queensland Retrieval Service led an assessment of the accuracy of a novel triage tool designed to identify critically ill children at the time of referral for interhospital transport. Data collected for 1815 children referred consecutively for interhospital transport from 87 hospitals in Queensland and northern New South Wales, found the triage tool predicted the need for retrieval or intensive care admission with high sensitivity and specificity.

- Identified the need to reevaluate service planning, policy, and workforce development strategies alongside foundation level training to deliver effective interprofessional education for clinicians, interpreters, and translators in healthcare settings.
- Review of organisational learnings from the inter-agency Navigate Your Health integrated care pilot for children and young people in care found that system integration is achievable through strengthened and sustained partnerships to improve health outcomes for vulnerable/priority populations.

Areas of research



Delivering safe, effective feeding assessments via telehealth

When the COVID-19 pandemic unfolded in early 2020, telehealth proved vital in ensuring the continuation of care as well as the protection of families and clinicians' health.

International-first research by Children's Health Queensland's Dr Madeline Ratz into the feasibility and reliability of completing paediatric feeding assessments via telepractice was critical in allaying the concerns of both patients and practitioners who were new to the technology.

As part of her PhD studies, Dr Ratz looked at whether telepractice assessments were comparable to assessments conducted in person.

Her initial survey of Australian speech pathologists in 2017 found that only a small number of clinicians offered telehealth appointments, and if they did, it was mostly for reviews.

The survey also revealed that, at the time, many speech pathologists reported concerns about the safety and reliability of telehealth.

Previous research had focused on the use of telepractice in adult dysphagia (swallowing disorders) but there was limited research in paediatrics.

Dr Ratz and her team used mannequins to develop and test a telepractice model, to determine adaptations needed for the telepractice environment such as required camera angles to optimise imagery of the child eating or drinking. This model was then pilot tested with 10 typically developing children and their mothers.

After the development of the telepractice system, the reliability of the model was then tested with a larger cohort of families who were accessing feeding care at Queensland Children's Hospital.

The trial assessed 30 bottle-feeding infants (aged 1 month to 2 years) and 40 children (aged 4 months to 7 years) who were cup drinking and/or eating solids.

The children's feeding skills were simultaneously assessed by two speech pathologists, one leading the assessment via telehealth from the hospital and the second observing the child's feeding in their home.

The assessments looked at the components typically included in a paediatric feeding assessment including a general developmental screen, assessment of positioning, oral motor assessment, assessment of pre-feeding respiratory status, observation of eating/drinking and assessment of parent-child interaction.

The studies showed the in-person and telehealth assessments were comparable in all measures except for assessment of the oral cavity and assessment of gagging during non-nutritive suck assessment. However assessment of the intra-oral cavity was noted to be difficult to achieve in the in-person consultations as well.

A survey of parents before and after the consultation found that although most were generally positive about the telehealth appointment before their appointment, their perception of telehealth improved after their telehealth appointment.

"Many indicated that they wanted to continue accessing telehealth and were very positive about it overall," Dr Ratz said. "It also resulted in significant time and cost savings for families."

Her established resources and information sheets for families allowed Queensland Children's Hospital to seamlessly transition the majority of its paediatric feeding consultations to telehealth throughout 2020 and 2021.

Telehealth is now embedded across several areas of clinical care at the Queensland Children's Hospital.

Dr Ratz's research has resulted in six publications, including in the *American Journal of Speech-Language Pathology*, *Journal of Telemedicine and Telecare*, *Children and Dysphagia*.

Her research was supported by the Queensland Children's Hospital speech pathology department and The University of Queensland and was funded, in part, by the Woolworths Centre for Childhood Nutrition Research and the Children's Hospital Foundation.



Dr Madeline Ratz

Madeline is a paediatric speech pathologist at the Queensland Children's Hospital and Logan Hospital, and an honorary fellow at The University of Queensland.

Dr Ratz's interest in using telehealth for children's feeding care was sparked during her early clinical work at Queensland Children's Hospital, when she identified the need for a solution for families who lived in areas with little to access to local specialist services.

Her PhD focused on investigating the use of telehealth for completing paediatric feeding assessments. Her papers investigating the feasibility and reliability of telehealth paediatric feeding assessments published in the *American Journal of Speech-Language Pathology and Children* in 2021.

For her work, Dr Ratz was awarded the Justine J Shepherd in IDD Award at the Dysphagia Research Society Annual Meeting in March 2021.

The award acknowledges researchers involved in clinical research that further enhances the understanding of dysphagia in people with intellectual and developmental disability.



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The right mental health care for the right length of time

A study of outpatients in child and youth mental health services has revealed the importance of continued treatment, even when symptoms appear to subside.

Research led by Children's Health Queensland child and adolescent psychiatrist and The University of Queensland Professor Christel Middeldorp compared the routine outcome measures of cohorts in Australia and the Netherlands.

Professor Middeldorp's team analysed clinician-based and parent-based surveys on children and adolescents who were receiving clinical care for complex mental health problems.

The main diagnosis for children was anxiety, depression, problems following adverse events, as well as attention-deficit hyperactivity disorder (ADHD) and autism spectrum disorder (ASD).

The data was collected between 2013 and 2018 from 2,715 outpatients under the care of child and youth mental health service (CYMHS) in Brisbane and 1,158 outpatients in Leiden, the Netherlands. The data suggested that for most children, on average, there was a substantial improvement over the course of treatment. This was consistent across clinician and parent ratings, although the response rate for the parent-based survey was quite low.

The analysis, which was published in *Epidemiology and Psychiatric Sciences* in November 2021, also showed improvement was less in children with externalising problems than children with internalising problems.

Professor Middeldorp said while the data didn't indicate why treatment had stopped, the results indicated it could have been extended to improve outcomes.

"If you treat a child or an adult, there can be some points that you think 'OK, this is as good as it gets' and you cease treatment because adding



further treatment is not going to improve the symptoms anymore," she said.

"But when you look at treatment duration, it does seem like there would have been room for further treatment to further improve symptoms.

"We know that transferring patients from one service to the other always has the risk of drop out, and in addition a lot of those services will be private and come with out-of-pocket costs that families can't afford."

Professor Middeldorp said the research showed the usefulness of routinely collecting outcome measures in clinical practice, particularly with an increased demand for mental health services in the post-COVID era.

"Because of the higher demand, how we ultimately treat these children has become an urgent question because only treating the acute part of it, it doesn't end there," she said.

"We need to make sure that we treat these children in the optimal way and that they have no mental health symptoms anymore."

Analysis to update the risk factors for childhood hearing loss

Children's Health Queensland researchers are looking at every baby born in the state in the past 15 years to help identify when a child is at risk of hearing loss.

The 'Expect the Unexpected' research series, led by Dr Rachael Beswick, Jane Fitzgibbons and Karen Liddle, is being run in partnership with The University of Queensland, and includes analysis in more than 700,000 records in the state-wide data system QChild.

Healthy Hearing Program director Rachael Beswick said the analysis would look at the relationship between newborn hearing screening outcomes, hearing loss diagnoses, risk factors and aetiologies.

The data, which covers births in both the public and private system since January 2007, includes demographic factors such as gender, date of birth, indigenous status and gestational age.

Dr Beswick said analysis of the data had already suggested there may be several risk factors that no longer need to be collected for congenital and postnatal hearing loss.

"From a value-based perspective, we're looking at where do we put our resources and we can probably cut somebody's case load," Dr Beswick said.

Evidence shows early intervention, such as hearing aids and cochlear implants, is

key in ensuring children with congenital hearing loss meet their appropriate speech and language outcomes.

Of the 60,000 babies born in Queensland every year, approximately one per cent are referred to an audiology service or hearing assessment after a Healthy Hearing Program's newborn hearing screening. From that cohort, about 180 children are diagnosed with hearing loss.

About 90 per cent of children born with hearing loss are born to parents who can hear.

"There's no easy indicator or predictor for a baby born with hearing loss; it's an asymptomatic profile most of the time," said Lauren McHugh, from the Queensland Children's Hospital's Childhood Hearing Clinic.

Research from the Expect the Unexpected project will contribute to an updated evidence-based newborn hearing screening risk factor registry in Australia.

To date, several papers have been published, including in the *Journal of Paediatrics and Child Health* and the *International Journal of Audiology*.



Dr Rachael Beswick

Rachael is the director of the Children's Health Queensland's Healthy Hearing Program, which provides free newborn hearing screening for infants born in Queensland.

She joined the program in 2009 while completing her PhD in audiology at The University of Queensland's School of Health and Rehabilitation Sciences.

For 15 years, Dr Beswick has been driven by her energy for evidence-based research in the audiology and hearing sector.

Her research has been published in the *International Journal of Pediatric Otorhinolaryngology*, the *Journal of Paediatrics and Child Health* and *Journal of the American Academy of Audiology*.

In July 2021, Dr Beswick was appointed co-chair of the Queensland Child and Youth Clinical Network, which champions the wellbeing of Queensland children, young people and families.

She is also chair of the Australasian Newborn Hearing Screening Committee, which is looking at a consensus statement for the detection of hearing loss beyond the newborn period.



Publications

The work of Children's Health Queensland researchers is contributing to better care, health and wellbeing outcomes for children across Australia and internationally

Global collaboration

with **802** institutions



Our research attracted

7,925 mentions

across academic, online and social media platforms

Our researchers published

545 articles and book chapters



Including:

- *The Lancet*
- *Critical Care Medicine*
- *Lancet Respiratory Medicine*
- *Thorax*
- *BMJ Open*
- *Medical Journal of Australia*
- *PloS Medicine*
- *Archives of Disease in Childhood*
- *Nature Communications*
- *Lancet Psychiatry*

in **24** National Health and Medical Research Council Fields of Research

Applied economics • Applied ethics • Biochemistry and cell biology • Biomedical engineering • Cardiovascular medicine and haematology • Clinical sciences • Cognitive science • Econometrics • Genetics • Human movement and sports science • Immunology • Medical biochemistry and metabolomics • Medical microbiology • Medical physiology • Neurosciences • Nursing Nutrition and dietetics • Oncology and carcinogenesis • Ophthalmology and optometry • Pharmacology and pharmaceutical sciences • Psychology • Public health and health services



World Health Organisation policy mention

WHO Operational Handbook on Tuberculosis. Module 5: Management of Tuberculosis in Children and Adolescents.

In the news



487 news items across **20** countries

Including

Medical biochemistry and metabolomics • Autism-related dietary preferences mediate autism-gut microbiome associations. *Cell* (24 November 2021)

174 news stories
1,828 social media mentions
30 citations

Patient safety: the value of the nurse

The Lancet (Vol. 397, Issue 10288, 11 May 2021)

9 news stories
234 social mentions

Survey of the impact of COVID-19 on pediatric orthopaedic surgeons globally

Journal of Pediatric Orthopaedics (1 September 2021)

31 news stories

Effect of infusion set replacement intervals on catheter-related bloodstream infections (RSVP): a randomised, controlled, equivalence (central venous access device)—non-inferiority (peripheral arterial catheter) trial.

The Lancet (Vol. 397, Issue 10283, 17 April 2021).

10 news stories
187 social media mentions
11 citations

Source: Altmetric.com

The best care for every Queensland child



www.childrens.health.qld.gov.au

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