Our Research Team
The Queensland Cerebral Palsy and Rehabilitation Research Centre (QCPRRC) is an internationally recognised multidisciplinary research centre based at the Lady Cilento Children’s Hospital, Royal Brisbane and Women’s Hospital, and in the Children’s Health Research Centre at The University of Queensland. The Centre has an impressive funding track record of national and international grants. Commenced in 2007 at UQ, post graduate students at QCPRRC have consistently achieved NHMRC funded scholarships (6), APA’s (5) and UQ PhD scholarships (3). Our PhD students have published between 5-9 publications during their PhD and have achieved numerous international travel scholarships (to USA) and prestigious international awards (Best paper at the American Academies of Cerebral Palsy and Developmental Medicine). Our honours students in Medicine and Physiotherapy have consistently achieved 1st class honours and 1-2 publications.

Our mission is to advance the health of infants, children with cerebral palsy and acquired brain injury, supporting them and their families across their lifespan. We are closely linked with clinical services provided at the Lady Cilento Children’s Hospital, providing research leadership to the state-wide Queensland Paediatric Rehabilitation Service (QPRS), and the Queensland Children’s Gait Laboratory (QCGL). The QCPRRC has close collaborations with the UQ Perinatal Research Centre, UQ Children’s Nutrition Research Centre, Advanced Magnetic Resonance Imaging group in CSIRO, Centre for Online Health, The School of Human Movement Science, the School of Health and Rehabilitation Sciences (Occupational, Physiotherapy and Speech Therapy) and the Neurosciences/Genetics group at Queensland Brain Institute and other national (CP Alliance) and international collaborations (The University of Pisa, The University of Virginia).

The QCPRRC has research themes reflecting the key areas of need for investigation in infants and children with cerebral palsy and acquired brain injury including:
1) Early brain development and the impact of early interventions;
2) Novel therapies: including the potential of stem cells and neuroprotection strategies (Sulphate, EPO);
3) Neuroscience: Advanced brain structure, outcomes & measuring neuroplasticity in response to therapy;
4) Neuro-rehabilitation including very early rehabilitation for infants at high risk of CP (REACH);
5) Muscle Mechanics and the impact of interventions (intramuscular BoNT-A, Orthopaedic Surgery);
6) Growth, Nutrition, Oropharyngeal Dysphagia , Physical activity and Bone Health in children with CP;
7) Psychological interventions to enhance family outcomes (Parenting, Acceptance & Commitment Therapy);
8) Translational research: Implementation of evidence based clinical interventions

PhD, MPhil Opportunities at QCPRRC
All PhD, MPhil and Honours students select topics imbedded in current clinical trials and population based cohort studies. They are closely supported by senior staff and postdoctoral fellows, and have the opportunity for practical clinical data collection, clinical experience linked to the relevant studies or a program embedded in our clinical teams in our the state-wide QLD Paediatric Rehabilitation Service. All postgraduate students have the opportunity to involved in our annual training course on systematic reviews and meta-analysis (8 sessions), which will assist them in developing skills for their literature search and systematic review of the literature or the psychometric properties of measures that they will use.
**Available Projects**

**PREDICT:** Implementation of comprehensive surveillance to predict outcomes for children with CP.

Prospective population-based study of school-aged children with cerebral palsy (NHMRC Partnership grant NHMRC 1077257 - $1,593,519)

Chief Investigators: Roslyn N Boyd, Peter Davies, Jenny Ziviani, Stephen Rose; Stewart Trost, Rob Ware, Lee Barber, Koa Whittingham, Jennifer Whitty, Leanne Sakzewski, Kristie Bell.

The **Predict CP study** will investigate the relationship between brain structure (at 3T), body composition, dietary intake, oropharyngeal swallowing, habitual physical activity, musculoskeletal development, and muscle performance on gross motor function, cognition, executive function, communication, participation, QOL, child sleep, pain, child psychological adjustment, parental psychological adjustment and health resource use costs in an population based cohort of 245 children with CP at 8-9 years. Earlier preschool age (2-5 years) data from two longitudinal NHMRC cohorts will be combined to build prediction models of outcome to inform parents and health care providers (Disability Care, Australia).

The **PREDICT study offers a range of opportunities suitable for MBBS students to engage in formal research at Honours or MPhil/PhD** from a range of backgrounds who seek a future career in Paediatrics, Neurology, Rehabilitation, Orthopaedic Surgery, Radiology, Health Economics, Ear Nose and Throat surgery and General Practice.

**Project 1: Topic specialty Area: Orthopaedics/ Paediatrics**

Title: Muscle Mechanics and Walking Capacity/ Performance in children with CP: Supervisors: Dr Lee Barber and Professor Roslyn Boyd.

1. Relationship between muscle mechanics of the lower limb muscles (3DUS), on functional capacity and performance, and health outcomes in a representative population of school age children with CP (aged 8-9 years).

2. Relationship between muscle mechanics of the lower limb muscles (3DUS), on functional capacity, performance, habitual physical activity, sedentary behaviour and health outcomes in a representative population of school age children with CP (aged 8-9 years).

3. Impact of Interventions (such as Intramuscular injections of Botulinum Toxin A, (BoNt-A) to reduce spasticity, Orthopaedic Surgery) on these relationships.

**Project 2: Paediatrics/ Pharmacy/ Health Economics/Translation**

Cost and Consequences of Medical and Allied Health Resource use in a population of children with Cerebral Palsy. Supervised by A/Professor Jenny Whitty and Professor Roslyn Boyd

1. To examine the relationship between the costs of medical and Allied Health Resource use and outcomes (QoL, Gross Motor Capacity, Functional performance, Social and cognitive abilities of children with CP across all levels of Gross Motor Function Classification system (GMFCS), Manual Ability Classification System (MACS)). The student will work with a
qualified Health Economist and the PREDICT team to examine these relationships in a large population cohort (n=245).

2. To examine the association between QoL and the “utility” of different health states, for both children with Cerebral Palsy and their carers, assessed using a range of different QoL instruments (CHU-9D and CPQoL-Child for children; EQ-5D-5L, CPQoL-Parent and CES for parents).

Project 3: Paediatrics/ ENT/ Nutrition
Relationship between the severity of Oromotor dysfunction, Dysphagia on Growth, Nutrition and Health
Supervision by Ds Katherine Benfer, Dr Kelly Weir; Dr Kristy Bell, Professor Roslyn Boyd
Feeding and swallowing problems are common in children with cerebral palsy, often adversely impacting growth and nutrition, and may cause children to require tube feeding to meet their nutrition and hydration needs. Little is known about the prevalence of feeding and swallowing problems in children with milder motor impairments or, at which severity level of oral-motor/swallowing dysfunction starts to affect a child's ability to meet their nutritional requirements orally.

Project 4: Topic Area: Paediatrics and General Practice.
Relationship between Pain, Sleep and Quality of Life in children with Cerebral Palsy
Supervision by Dr Koa Whittingham, Professor Roslyn Boyd
1. Examining relationships between sleep, pain, psychological functioning and quality of life in this population.
2. Exploring the relationships between child outcomes and parental and family functioning.
Cerebral Palsy (CP) is the most common physical disability in childhood and is caused by an early brain lesion. Chronic pain, fatigue and sleeping difficulties are common (3 in 4 children with CP are in pain; 1 in 5 have a sleep disorder). Pain is linked to emotional difficulties and quality of life. Yet, pain is often unrecognised and untreated in this population and more research needs to be done. In the context of an NHMRC-funded state-wide cohort study examining outcomes at 8-9 years (PREDICT), we still be collecting data on pain, sleep, psychological functioning, quality of life, and family functioning as well as brain structure, mobility, and cognition. Opportunities exist to scope out student research projects examining these variables.

Supervisory Team at the Queensland Cerebral Palsy and Rehabilitation Research Centre
Professor Roslyn Boyd
Scientific Director, QCPRRC
Email: r.boyd@uq.edu.au
Phone: 07 3069 7372

Dr Kristie Bell
Postdoc Fellow, Dietician,
Email: k.bell@uq.edu.au

Dr Lee Barber /Dr Steve Obst
Postdoc Fellows, Physiotherapist Ex Scientist
Email: l.barber@uq.edu.au; s.obst@uq.edu.au
Phone: 0449968804

Dr Katherine Benfer,
NHMRC Early Career Research Fellow
Speech Pathologist, QCPRRC,
Email: k.benfer@uq.edu.au;

Dr Koa Whittingham
Senior Lecturer, Psychologist
Email: koawittingham@uq.edu.au
1. Early Detection of Cerebral Palsy and Interventions to optimise neuroplasticity in infants at risk of cerebral palsy

Opportunities exist for PhD students to be involved in studies of early detection of cerebral palsy in infants born preterm (PREMO/PREBO study NHMRC funded) and infants born at term (NEMO: Neonatal encephalopathy motor outcomes) and very early interventions for infants at high risk of CP. These projects involve collaboration between QCPRRC, Perinatal Research Centre at UQ Centre for Clinical Research, Royal Brisbane and Women’s Hospital, the Mater Mothers Hospital, and Australian e-Health Research Centre, CSIRO. Research methods include use of General Movements Assessments (GMA) trained by our international partners at the University of Pisa; Advanced Brain Imaging to study the effects of early brain injury on motor and behavioural development. Novel very early neurorehabilitation models designed to optimise neuroplasticity are being developed ready for testing of efficacy in randomised controlled trials in (i) Infants with early asymmetric brain injury (REACH, NHMRC funded); and (ii) bilateral Cerebral Palsy with Goal directed Active Motor Training (GAME) and (iii) Parenting to enhance environmental enrichment.

Student Opportunities:
1. Rehabilitation Early for Upper Limb therapy in Congenital Hemiplegia (REACH, NHMRC funded). (see below)
2. Early Detection of Cerebral Palsy using General Movements and biomarkers of brain development in infants at risk of cerebral palsy (Early detection of Cerebral Palsy in High risk Term Born infants NEMO Trial (Neonatal Encephalopathy Motor Outcomes).
3. Relationship between advanced brain structure and function school age children with cerebral palsy including diffusion imaging, quantitative brain structure classification, Functional Connectivity (FC) and specific motor, sensory and executive function outcomes.

Supervisory Team
Professor Roslyn Boyd  Professor Paul Colditz  Professor Stephen Rose
Scientific Director, QCPRRC  Director, Perinatal Research Centre  Science Leader, CSIRO
Email: r.boyd@uq.edu.au  Email: p.colditz@uq.edu.au  Email: stephen.rose@csiro.au
Phone: 07 3069 7372  Phone: 07 3346 6014  Phone: 07 3253 3620
Mobile: 0434 608 443

2. Neuroimaging projects with the Australian e-Health Research Centre (CSIRO) and UQ

One exciting area of research currently underway at the QCPRRC is the use of advanced neuroimaging technology to measure brain injury and neuroplasticity in newborn babies at high risk of abnormal neurodevelopment and in children with cerebral palsy. Within the next few months there will be a new state-of-the-art Herston Imaging Research Facility (HIRF) dedicated to clinical imaging research.

PhD Opportunities
1. Integrating functional MRI (fMRI) with diffusion MRI and tractography to measure brain plasticity using advanced connectivity analyses in preterm babies and children with cerebral palsy.
2. Develop a novel, automated brain MRI classification program (iAssess CP) for cerebral palsy based on structural and connectivity MRI information.

Supervisory Team
Professor Stephen Rose  Professor Roslyn Boyd
Science Leader, CSIRO  Scientific Director, QCPRRC
Email: Stephen.Rose@csiro.au  Email: r.boyd@uq.edu.au
Phone: 07 3253 3620  Phone: 07 3069 7372;  Mobile: 0434 608 443