METRO NORTH CLINICIAN RESEARCH FELLOW 2021-2025

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ADVANCED SPEECH PATHOLOGIST (PAEDIATRICS)

Standardisation of swallowing sounds to provide better access to safer, more accurate and improved reliability for the detection of swallowing disorders in neonates and children

Aspiration (when food/fluids enter the airway) can lead to serious long-term lung disease in preterm neonates. Current assessments for aspiration are limited by reduced accuracy, availability and/or involve radiation. My fellowship aimed to establish novel swallowing sounds in pre-term neonates to progress towards use of automated cervical auscultation (i.e. swallow sounds) to accurately detect swallowing impairment; and standardise cervical auscultation training for Speech Pathologists to accurately detect swallowing impairment. Improving access to aspiration detection will help with earlier identification and prevent avoidable acute and chronic lung disease in pre-term neonates.

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metronorth.health.qld.gov.au/ research/support/grants/crf

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Research Impact

My Metro North Health funded Fellowship led to knowledge impact through: (a) quantifying the current state of evidence for cervical auscultation through a world-first meta-analyses in the field; (b) establishing a world-first normative and atypical swallow sound profiles in preterm neonates; and (c) improving the objectivity of interpreting swallow sounds by applying machine learning (a key barrier to cervical auscultation uptake reported by Speech Pathologists (end-users)).

The clinical impact of the establishment normative and atypical swallow sound profiles is reflected in a patent citation and annual invitations to attend national and international workshops to provide training for speech pathologists (e.g. New Zealand, Perth) since 2018. Additionally, the machine learning algorithms discovered during my Fellowship has resulted in an Australian provisional patent where co-invention is recognised across Metro North Health and Griffith University. Once commercialised, use of my foundational algorithms have the potential to save Queensland Health systems costs through the adoption of a digital app to diagnose aspiration, reducing the need for x-ray swallows that are expensive, involve radiation and are difficult to access for children located in regional and rural areas where there are known shortages in specialty staff capable of performing these procedures.

Reflections

I am grateful for the dedicated two days per week of protected research time afforded to me during my Fellowship. This time allowed me to focus on pursuing my passion in the field of paediatric dysphagia. In addition to the traditional research outputs expected, my Fellowship allowed me flexibility and time to:

- Receive mentoring sessions that helped me develop my clinician researcher pathway further
- Provide supervision to novice researchers through PhD supervision and support for clinicians to their first publication / successful grant application
- Advance my career through clinical and research leadership roles within Queensland Health
- Foster professional and academic relationships that have led to national/international speaker invitations and research projects with new collaborators in academia
- Build research capability and capacity at Caboolture Hospital through the establishment of temporary and permanently funded research officer position/s supported through 4 years of continuous successful external grant funding

My future research program will focus on the development of a digital cervical auscultation app using the foundational algorithms discovered during my Fellowship. Once developed, there are opportunities for implementation of the app across a variety of clinical populations, workplace settings and use for diagnostic and interventional purposes.

Key Fellowship Publications

- So S, Tadj T, Schwerin B, Chang AB, Humphries S, **Frakking TT** (2025). Use of machine learning for the automated segmentation and detection of swallows via digital cervical auscultation in preterm neonates. Dysphagia
- So S, Tadj T, Chang AB, Schwerin B, **Frakking TT** (2025). Use of machine learning for the automated segmentation and detection of swallows via digital cervical auscultation in children. Dysphagia
- **Frakking TT**, Humphries S, Chang AB, Schwerin B, Palmer M, David M, Kyriakou A, So S & SUPERB Collaborative (2025). Acoustic and perceptual profiles of swallowing sounds in preterm neonates: a cross-sectional study cohort. Dysphagia
- Cron A, David M, Orbell-Smith J, Chang AB, Weir KA, **Frakking TT** (2024). Cervical auscultation for detecting oropharyngeal aspiration in pediatric and adult populations: A systematic review and meta-analysis. Clinical Otolaryngology
- **Frakking TT**, Chang AB, Carty C, Newing J, Weir KA, Schwerin B, So S. (2022). Using an automated speech recognition approach to differentiate between normal and aspirating swallowing sounds recorded from digital cervical auscultation in children. Dysphagia

Selected funding that has arisen during the Fellowship

- 2024 Caboolture and Kilcoy Hospitals and Woodford Corrections Health Research Grant (CIA, 1 year) funded by The Common Good. Use of artificial intelligence in the development of a classifier for the detection of aspiration in premature babies ($19,884).
- 2023 GCHHS Clinician Research Fellowship (CIA, 3-years) funded by Gold Coast Health. Application of machine learning to swallowing sounds for the accurate detection of aspiration in critically ill children ($235,203).
- 2023 Medical Research Future Fund (MRFF) - Assessment of High-Cost Gene Treatments and Digital Health Interventions (CIA, 2 years). External validation of a classifier for the detection of aspiration in children ($156,265).
- 2022 Children's Hospital Foundation Mary McConnel Career Boost Grant (CIA, 1 year). Standardisation of swallowing sounds in infants and children ($49,814).
- 2022 Caboolture and Kilcoy Hospitals and Woodford Corrections Health Research Grant (CIA, 1 year) funded by The Common Good. Swallowing sounds in premature babies ($19,010).