

Summer Studentships 2026/2027

PROJECT TITLE:

The Clinical Impact of CT Head Imaging in Older Adults Presenting with Head Trauma to New Zealand Emergency Departments: A Multi-Site Retrospective Cohort Study

AIM:

To determine the rate at which computed tomography of the head (CTH) results in a clinically meaningful change in management for adults aged 65 years and over presenting to New Zealand emergency departments following head trauma, and to assess the concordance between current imaging practice and established clinical decision rules.

METHODS:

Multi-site retrospective cohort study across Christchurch Hospital ED, Hutt Regional Hospital ED, and Wellington Regional Hospital ED, with potential additional sites. This application covers the Wellington & Hutt ED data collection component. All adults aged 65 years and over who underwent CTH for acute head trauma during the calendar year January 2025 to December 2025 are eligible for inclusion. Ethical approval and REDCap database configuration will be completed by the supervisory team before data collection commences. All data will be de-identified and stored on the University of Otago REDCap server in accordance with data confidentiality policies.

The primary objectives are to characterise the proportion of CTH examinations yielding: (i) no acute intracranial abnormality; (ii) an incidental acute finding unrelated to the presenting trauma; or (iii) an acute finding directly attributable to the head injury, with sub-classification of trauma-related findings according to a pre-specified framework. For each CT result category, subsequent management decisions will be systematically documented: hospital admission and its primary indication (head injury-related versus other medical or social factors); modification of anticoagulant or antiplatelet therapy; neurosurgical referral or operative intervention; and any other clinically significant change attributable to the imaging result. A secondary objective is to describe concordance between actual imaging practice and Canadian CT Head Rule and NICE Head Injury guideline criteria, including which specific criteria were met where applicable.

The following variables will be extracted from electronic health records for each eligible presentation: patient age and biological sex; prioritised ethnicity (Statistics NZ classification); GCS score on ED arrival; baseline GCS where ascertainable from medical records or residential care documentation; presence of visible external signs of head trauma; use of anticoagulant or antiplatelet medications or any documented bleeding disorder; whether Canadian CT Head Rule inclusion criteria were satisfied and which specific criteria were met; whether concurrent CT imaging of an adjacent region was performed (e.g. facial bones, cervical spine); adjudicated CTH result; and all downstream management decisions as described above.

Patient characteristics and primary outcome variables will be reported as frequencies and proportions with 95% confidence intervals. ED length of stay will be described as median and interquartile range. Rates of clinically significant management change will be reported stratified by CT result category. Between-group comparisons will use chi-square or Fisher's exact tests for categorical outcomes and the Mann-Whitney U test for continuous variables. A two-sided p-value of less than 0.05 will be considered statistically significant.

RESEARCH SIGNIFICANCE:

With 11–13% of the population currently aged over 65 years and this proportion projected to double within a decade, emergency departments across Aotearoa New Zealand face growing demand from older adults presenting after head injury, predominantly following low-energy falls. Existing clinical decision rules, the Canadian CT Head Rule, the Nexus II Rule, and the New Orleans Criteria, all acknowledge that clinically significant intracranial injury cannot be reliably excluded by history and examination alone in older patients, and all exclude patients taking antiplatelet or anticoagulant agents. The NICE guidelines recommend CTH for all patients over 65 years with any loss of consciousness or amnesia. These overlapping thresholds have produced a default of near-universal CTH imaging in this population, with substantial downstream consequences for ED length of stay, patient transport, and resource use. The ACEM position on high-value care and the Health Quality and Safety Commission's patient experience framework both identify avoidable investigations and prolonged ED attendances as priorities for quality improvement; routine CTH in older adults who are unlikely to require any change in management sits squarely within this frame.

Emerging evidence calls this default into question. Mitra et al. (2025) conducted a retrospective cohort study of 3,833 patients aged 85 years and over presenting at or near baseline conscious state across two Australian tertiary referral EDs. Acute intracranial abnormalities were detected in 5.9%; neurosurgical intervention followed in just 5 patients. Of the 3,833 patients, 1,840 (48%) were discharged from the ED; those admitted spent a median of 6.6 hours (IQR 3.6–14.0) in the ED. Extrapolating from these figures, approximately 99.9% of patients in this age group gained no neurosurgical benefit from CTH, and nearly half were discharged regardless of the result, suggesting that imaging substantially prolonged ED stay and consumed resources without altering the disposition decision for most patients. Critically, the study did not examine whether CT results modified other management decisions such as anticoagulation adjustment, admission indication, or discharge planning, which remain the most clinically relevant questions for everyday practice.

New Zealand-specific data are sparse. This study extends the Mitra et al. evidence base in two important ways: it includes a broader age threshold (65 years and over rather than 85), capturing the larger and more clinically heterogeneous group most commonly presenting to NZ EDs; and it systematically examines the full spectrum of downstream management consequences for each CT result category, including the distinction between admission driven by head injury findings and admission attributable to social or residential factors. Where CTH is found to rarely change management in patients who would have been discharged or admitted regardless, the data will support a recalibration of imaging thresholds that could meaningfully shorten ED length of stay, reduce transport-related risk in a frail population, and release imaging capacity and clinical time for higher-yield use. This aligns directly with the Te Whatu Ora goal of reducing avoidable acute hospital attendances and the ACEM Choosing Wisely recommendations, which identify head CT in low-risk older patients as a target for reduction. The findings will also speak to the Health New Zealand system sustainability agenda, which seeks to maintain patient outcomes whilst reducing unnecessary resource consumption across the acute sector. Future work arising from this study could evaluate targeted decision-

support tools or modified clinical pathways for older patients with head trauma at or near baseline GCS, using this dataset to establish the pre-intervention baseline.

STUDENT'S ROLE AND EXPOSURE TO SCIENTIFIC METHOD:

The student will undertake systematic retrospective data extraction from electronic health records at the Wellington site, operating within the standardised extraction protocol and pre-specified data dictionary developed by the supervisor team. The role encompasses identification of all eligible presentations (adults aged 65 years and over who underwent CTH for acute trauma during the study year), application of inclusion and exclusion criteria, and extraction of the full variable set into the pre-configured REDCap database. CT result adjudication (negative, positive incidental, or positive trauma-related) will be performed according to the pre-specified classification framework; full training and ongoing guidance will be provided. No patient contact is involved. With supervision from Dr Rogan and Dr Joyce, and with access to biostatistical support, the student will participate in all stages of analysis: data cleaning, descriptive reporting, stratified outcome analysis by CT result category, and assessment of concordance with clinical decision rule criteria. They will be supported in interpreting findings within the international literature and in developing conclusions relevant to New Zealand imaging practice, ED length of stay, and resource use. The studentship concludes with preparation and presentation of a poster. There is a realistic prospect of contributing to a peer-reviewed manuscript arising from the multi-site study. Regular meetings with both supervisors will provide structured mentorship throughout the project.

RELEVANT PREVIOUS EXPERIENCE FOR STUDENTS (Education or Research):

Best suited to medical students, given the need to interpret clinical notes and apply a structured adjudication framework to health records. No prior research experience is required. The work is desk-based, the student will be based in an office alongside other summer students, and suits someone methodical and precise, as consistent data extraction is central to the role. An interest in emergency medicine, geriatric medicine, or evidence-based clinical decision-making would be an advantage. Some familiarity with the Glasgow Coma Scale and anticoagulation principles is helpful but not a prerequisite; the relevant clinical background and the CT result classification framework will be fully explained by the supervisory team. Training in REDCap and data management will be provided.

Main supervisor:	Dr Alice Rogan	
Email address:	alice.rogan@otago.ac.nz	
Other Supervisor/s:	Dr Laura Joyce, University of Otago, Christchurch	
Host Department:	Department of Surgery and Critical Care University of Otago, Wellington	
Location:	Wellington Regional Hospital Emergency Department	
	Can students work remotely?	Negotiable but need access to clinical systems which may better suit an in person role or Wellington base.