NEW ZEALAND
TE ARA TIKA O TE HAUORA HAPORI
MEDICAL JOURNAL

PUBLISHED BY:
PMA PASIFIKA MEDICAL ASSOCIATION Group

Vol. 139 | No. 1643 | 9 October 2026

IN THIS ISSUE:

ARTICLE:
Is self-efficacy after spinal cord injury associated with hospital re-admissions or length of stay in Aotearoa New Zealand? A cross-sectional analysis

ARTICLE:
A retrospective observational study of on-call hospital pharmacist activities in a rural setting in Aotearoa New Zealand

VIEWPOINT:
Highlighting the push and the pull: a comparison of New Zealand and United Kingdom resident doctor contracts

EDITORIAL

Election 2026 and health: promises, priorities and delivery

NEW ZEALAND
TE ARA TIKA O TE HAUORA HAPORI
MEDICAL JOURNAL

PMA PASIFIKA MEDICAL ASSOCIATION Group

Publication information

published by the Pasifika Medical Association Group

The *New Zealand Medical Journal* (*NZMJ*) is the principal scientific journal for the medical profession in New Zealand. The *Journal* has become a fundamental resource for providing research and written pieces from the health and medical industry.

The *NZMJ*'s first edition was published in 1887.
It was a key asset of the New Zealand Medical Association (NZMA) up until July 2022.

It is owned by the Pasifika Medical Association Group (PMAG).

The PMAG was formed in 1996 by a group of Pasifika health professionals who identified a need for an association with the purpose of "providing opportunities to enable Pasifika peoples to reach their aspirations".

ISSN (digital): 1175-8716

Editorial Board

Editor in Chief

Professor Frank Frizelle: Colorectal Surgeon | University of Otago, Christchurch

Sub Editors

Professor David McBride: Preventative and Social Medicine | University of Otago, Dunedin
Dr Kiki Maoate: Paediatric Surgeon, Urologist | Associate Dean Pacific, University of Otago, Christchurch
Professor Roger Mulder: Psychiatrist | University of Otago, Christchurch
Professor Mark Weatherall: Geriatrician | University of Otago, Wellington
Professor Cameron Lacey: Psychiatrist | Adjunct Professor, University of Canterbury, Christchurch; Elimbias Health
Professor Suzanne Pitama: Psychologist | Dean and Head of Campus, University of Otago, Christchurch
Associate Professor Janak de Zoysa: Nephrologist | Clinical Campus Dean Faculty of Medical and Health Sciences, Faculty of Medical and Health Sciences Administration, The University of Auckland, Auckland
Professor Mark Elwood: Honorary Professor of Cancer Epidemiology | The University of Auckland, Auckland; Honorary Professor | University of Waikato, Hamilton
Dr Etuini Ma'u: Psychiatrist | The University of Auckland, Hamilton

NZMJ Production Editors
Stephanie Batt | Tara Malone

NEW ZEALAND
TE ARA TIKA O TE HAUORA HAPORI
MEDICAL JOURNAL

PMA PASIFIKA MEDICAL ASSOCIATION Group

Publication information

published by the Pasifika Medical Association Group

Further information

ISSN (digital): 1175-8716
Publication frequency: bimonthy
Pubication medium: digital only

To contribute to the *NZMJ*, first read:
nzmj.org.nz/contribute

© PMA 2022

Other enquiries to

PMA Group
7a Pacific Rise
Auckland 1060
New Zealand

To subscribe to the *NZMJ*, email:

nzmj@pmagroup.co.nz

Full access is available to individual subscribers and does not incur a fee. Institutional subscription is available at the rates below.

All access to the *NZMJ* is by login and password, but IP access is available to institutes.

Further information is available on the *NZMJ* website:
http://www.nzmj.org.nz

If you are a member or a subscriber and have not yet received your login and password, or wish to receive email alerts, please email: nzmj@pmagroup.co.nz

Subscription rates for 2026

Individual		Institute	
New Zealand	Free	New Zealand	$680
International	Free	International	$700

New Zealand rate includes GST. No GST is included in the international rate.

Contents

Editorial

9 **Election 2026 and health: promises, priorities and delivery**
Frank Frizelle

Articles

15 **Contemporary outcomes and restorative pathways following colectomy for inflammatory bowel disease: a tertiary centre cohort from Aotearoa New Zealand**
Angad Vraich, Ella Nicholas, Andrew McCombie, Tim Eglinton, Tamara Glyn

24 **Longer-term outcomes of intravitreal therapy for neovascular age-related macular degeneration at a peripheral centre (Palmerston North eye clinic)**
Brandon Nunns, Aqeeda Singh, John Ah-Chan

32 **Is self-efficacy after spinal cord injury associated with hospital re-admissions or length of stay in Aotearoa New Zealand? A cross-sectional analysis**
Bensy Mathew, Mitchell Wolden, Rachelle Martin

42 **Effectiveness of selective laser trabeculoplasty for glaucoma and ocular hypertension in a large real-world cohort in New Zealand**
Patchara Jirapanyayut, William Shew, John Ah-Chan

51 **Māori notified with tuberculosis in one public health region of Aotearoa New Zealand: a document review**
Ihāpera Esson, Susan McAllister, Amy Jones, Darelle Toki, Nina Scott, Philip C Hill

62 **A retrospective observational study of on-call hospital pharmacist activities in a rural setting in Aotearoa New Zealand**
Lisa Kremer, Brianna Fisk, Simone Hutchinson, Susannah Rice, Caitlin Wade, Carolyn Coulter

Viewpoint

75 **Highlighting the push and the pull: a comparison of New Zealand and United Kingdom resident doctor contracts**
Alexander Bell, Alicia Schwarzenbach

Clinical correspondence

82 **Porta hepatis schwannoma: case report of a rare benign neoplasm in a patient with chronic hepatitis B**
Jonathan J Sheu, Judy C Huang, Adam SR Bartlett

86 **Sporadic late-onset nemaline myopathy associated with monoclonal gammopathy: a case report with review of literature**
Desmond Lim, Fouzia Ziad, James Cleland, Peter Wright

Letter

90 **A call to all parties: protect our children—regulate sugary drinks in schools**
Gerhard Sundborn, Simon Thornley, Bodo Lang, Loma Veatupu

Research letter

93 **Improving uptake of routine antenatal anti-D prophylaxis: completion of the audit cycle in Capital & Coast**
Maria Wojcik, Judy Ormandy

100 years ago in the *NZMJ*

97 **A Case of Abdominal Torsion of the Omentum**
NZMJ, 1926

Summaries

Election 2026 and health: promises, priorities and delivery

Frank Frizelle

The editorial reviews the various parties' health policies and has four main messages:

Promises are not outcomes: Election health policies should be judged not by the size of the announcement or expenditure, but by whether they can actually be implemented and produce measurable improvements.

Workforce is the major constraint: Almost every proposal—free general practitioner visits, shorter waiting lists, expanded screening, cancer treatment and new medical school places—depends on having sufficient trained people in the right places and specialties.

Health policy needs a long-term, whole-system approach: Primary care, prevention, cancer, mental health, aged care and workforce planning cannot sensibly be addressed within repeated 3-year political cycles. In cancer particularly, medicines alone are not enough: screening, diagnosis, surgery, radiotherapy, research, trials and survivorship all need to function together.

We need to measure whether policies actually work: The key questions are: What problem are we trying to solve? What evidence supports the intervention? Can it be delivered? And how will we know whether it worked? The editorial argues that this last question may be the most important.

In very short form, the four take-home messages are: deliverability, workforce, long-term planning and measurable outcomes.

Contemporary outcomes and restorative pathways following colectomy for inflammatory bowel disease: a tertiary centre cohort from Aotearoa New Zealand

Angad Vraich, Ella Nicholas, Andrew McCombie, Tim Eglinton, Tamara Glyn

Surgery to remove the large bowel is sometimes necessary for patients with inflammatory bowel disease when medication fails. In 50 such operations at Christchurch Hospital, there were no deaths and most complications were minor. Keyhole surgery resulted in fewer post-operative complications than open surgery. Many patients had ongoing problems from their retained rectum, and only one in four eligible patients opted for restorative pouch surgery.

Longer-term outcomes of intravitreal therapy for neovascular age-related macular degeneration at a peripheral centre (Palmerston North eye clinic)

Brandon Nunns, Aqeeda Singh, John Ah-Chan

Neovascular (wet) age-related macular degeneration (nAMD) is a leading cause of vision loss in older adults and is predicted to become more common with an ageing population. nAMD is treated with intravitreal injections (injections of a medication into the eye) and early treatment is important to achieve the best possible outcome for patients. We found that most people either maintained or improved vision with treatment, but around 40% stopped treatment during the study, most often because their eye disease had already become too advanced to benefit from further treatment. This highlights the importance of early recognition of symptoms and referral to specialist services to initiate treatment.

Is self-efficacy after spinal cord injury associated with hospital re-admissions or length of stay in Aotearoa New Zealand? A cross-sectional analysis

Bensy Mathew, Mitchell Wolden, Rachelle Martin

This study investigated how "self-efficacy"—a person's confidence in their ability to cope with and manage daily life challenges—changes for individuals with spinal cord injuries as they transition from inpatient rehabilitation back to their homes. By analysing data from the New Zealand Spinal Cord Injury Registry, we found that this vital confidence significantly erodes over the first 18 months of living in the community. Furthermore, individuals who suffered an unplanned hospital return (readmission) had much lower confidence at the 18-month mark than those who stayed out, regardless of how many days they actually spent in the hospital. These findings show that returning to non-specialist acute hospitals can be deeply disruptive to a patient's independence, highlighting the urgent need for targeted, long-term community support to protect both mental and physical wellbeing.

Effectiveness of selective laser trabeculoplasty for glaucoma and ocular hypertension in a large real-world cohort in New Zealand

Patchara Jirapanyayut, William Shew, John Ah-Chan

This study looked at the real-world success of an office base laser treatment called selective laser trabeculoplasty (SLT) for patients managed at Palmerston North Hospital for glaucoma and ocular hypertension. While major clinical international trials show that this laser works exceptionally well as first-line therapy instead of eye drops, this study evaluated how it performs in a regional New Zealand public hospital setting. We have found that the lasers successfully lower eye pressure even in those that are already heavily reliant on multiple daily prescription eye drops.

Māori notified with tuberculosis in one public health region of Aotearoa New Zealand: a document review

Ihāpera Esson, Susan McAllister, Amy Jones, Darelle Toki, Nina Scott, Philip C Hill

Endemic tuberculosis (TB) disproportionately impacts Māori in Aotearoa New Zealand, with rates over five times higher than those of Aotearoa New Zealand–born Europeans. We reviewed current practices for contacting and following up Māori notified with TB, and their contacts, in the Waikato Region of Aotearoa New Zealand. This was part of a wider study investigating a new model of care to end the Māori TB epidemic. Achieving TB elimination for Māori—which is both essential and possible—requires an approach that addresses individual and whānau wellbeing, expands contact tracing and ensures high-trust, culturally safe relationships between health providers, whānau and communities.

A retrospective observational study of on-call hospital pharmacist activities in a rural setting in Aotearoa New Zealand

Lisa Kremer, Brianna Fisk, Simone Hutchinson, Susannah Rice, Caitlin Wade, Carolyn Coulter

There is a paucity of published information on pharmacist on-call activities. Rural healthcare settings have been largely overlooked in previous research. We conducted a retrospective analysis of data entered by on-call pharmacists at Timaru Hospital between January 2021 and December 2023. The results demonstrate the importance and impact of rural hospital pharmacist on-call activities, and the need for improved training and optimised after-hours medicine management.

Highlighting the push and the pull: a comparison of New Zealand and United Kingdom resident doctor contracts

Alexander Bell, Alicia Schwarzenbach

This viewpoint article argues that the challenges facing United Kingdom (UK) resident doctors are not just about pay, but also about working conditions, burnout and a lack of workplace support. The authors compare the resident doctor contracts in the UK and New Zealand: New Zealand doctors have greater flexibility over leave, stronger staffing support, better reimbursement for training and exam costs and clearer employment protections. We suggest that these workplace benefits help explain why doctors report higher satisfaction when working in New Zealand. The article concludes that improving working conditions, professional development opportunities and work–life balance, alongside fair pay, could help the UK retain more doctors and improve morale.

Porta hepatis schwannoma: case report of a rare benign neoplasm in a patient with chronic hepatitis B

Jonathan J Sheu, Judy C Huang, Adam SR Bartlett

We report a rare benign tumour near the liver that was discovered during routine liver cancer surveillance in a patient with hepatitis B. Although scans suggested the possibility of cancer, a tissue sample showed that the mass was actually a schwannoma, a rare non-cancerous tumour arising from Schwann cells, which surround and support nerves. The patient underwent an operation to remove the tumour and recovered well afterwards. This case demonstrates that rare benign tumours can sometimes appear like cancer on imaging. In these situations, it is essential to obtain a tissue sample and develop a management plan by working together with the patient and a multidisciplinary team of health professionals.

Sporadic late-onset nemaline myopathy associated with monoclonal gammopathy: a case report with review of literature

Desmond Lim, Fouzia Ziad, James Cleland, Peter Wright

This paper discusses a rare case of sporadic late-onset nemaline myopathy (SLONM) associated with monoclonal gammopathy of undetermined significance (MGUS). This is a disease where a patient will develop symptoms as an adult, which include worsening weakness of muscles, particularly muscles such as the neck, shoulders and thighs. A blood test can help doctors think about this disease because we can check for an elevated protein level (MGUS) that often occurs with SLONM. A muscle biopsy is needed for diagnosis to identify the nemaline rods that are characteristic of this disease. Treatment options are available, so this paper aims to increase awareness of this disease.

Improving uptake of routine antenatal anti-D prophylaxis: completion of the audit cycle in Capital & Coast

Maria Wojcik, Judy Ormandy

Routine antenatal anti-D is recommended for pregnant people who are Rhesus negative to prevent Rhesus sensitisation and its associated complications. Following targeted interventions at Capital & Coast, the proportion of eligible people receiving anti-D as recommended increased substantially from 41% to 76%. Although inequities related to the model and place of maternity care were reduced, people living further from hospital remained less likely to receive anti-D. This paper demonstrates the value of clinical audit as a tool for driving meaningful improvements in healthcare delivery and equity.

Election 2026 and health: promises, priorities and delivery

Frank Frizelle

Health will be an important issue in New Zealand's 2026 general election. The problems are familiar: difficulty accessing general practice, workforce shortages, pressure on emergency departments (EDs) and elective services, an ageing population, rising costs of medicines and technology, persistent inequities and hospital infrastructure requiring substantial investment.

There is also the unavoidable question of money. Surveys suggest New Zealanders support increased health expenditure, but support for greater spending in principle does not necessarily translate into willingness to pay higher taxes personally. Health expenditure will continue to rise as the population grows and ages and new treatments become available. The political questions are therefore how much more should be spent, where it should be directed, how it should be raised and what measurable outcomes should be expected in return.

Election campaigns produce promises that are easier to make than to implement. Smaller parties can promise what they like, as they are unlikely to have to deliver on these promises. Parties likely to influence the formation of a government should expect their commitments to be scrutinised for realism, funding and deliverability. New Zealand health policy has never lacked plans, targets, strategies or reorganisations. Successive governments have promised better primary care access, shorter waiting lists, more timely cancer treatment, stronger mental health services, improved workforce planning and reduced inequities. Many of these problems persist.

Comparisons are difficult because parties express health policies differently: additional expenditure, consultations or operations, new institutions, or access and outcome targets. These are not equivalent. Making a service free does not make it accessible without a workforce; more screening requires diagnostic and treatment capacity; new buildings require clinicians, nurses and operating funding; and targets without adequate resources may simply document failure more accurately.

The appropriate perspective on the 2026 health promises is therefore not simply what is offered or how much it costs but whether each proposal has a credible implementation plan, adequate funding, sufficient workforce and infrastructure, and a realistic prospect of measurable improvement in health outcomes.

National Party

The National Party (National) enters the election largely proposing a continuation of the direction established during its current term rather than another major restructuring of the health system. Its emphasis is on frontline capacity, health targets, workforce, access to treatment and increased use of both public and private capacity.

Primary and hospital care: National has expanded urgent and after-hours services and introduced online general practice care. It reports 40,000 procedures delivered through the Elective Boost programme, using both public and private capacity. *Budget 2026* provides funding intended to support a further 24,000 planned-care treatments, 42,000 additional inpatient episodes, 26,000 additional ED events and 53,000 additional general practice enrolments. It has also restored explicit health targets as a mechanism for measuring system performance.

Workforce and medical education: National has increased medical training places at The University of Auckland and the University of Otago and has established the New Zealand Graduate School of Medicine at the University of Waikato. The latter is arguably its most significant long-term health-workforce initiative. The Waikato medical school is now under construction, with the first cohort of 120 graduate-entry students planned for 2028 with a regional and rural clinical focus. The Labour Party (Labour) previously questioned whether expanding Auckland and Otago was preferable but has said it would not stop the project. The ACT Party (ACT) now supports the approved model after seeking a cost–benefit analysis. The Green Party (Greens) have criticised the decision but have not committed to cancellation; the New Zealand First Party (NZ First) and Te Pāti Māori have not published a clear position on its

future. The issue now is how Auckland, Otago and Waikato fit within a national workforce strategy: how many doctors New Zealand needs, whether there are sufficient placements and supervisors, and whether graduates ultimately work in the specialties and communities where shortages are greatest.

Cancer, screening and medicines: Cancer is a prominent component of National's health record. It reports funding 66 additional medicines, including 33 cancer treatments, and *Budget 2026* provides capacity for additional cancer treatment. National has progressively lowered the National Bowel Screening Programme starting age, initially from 60 to 58 and from September 2026 to 56. More than 200,000 additional people are expected to become eligible through the latest expansion. It has also progressively extended breast screening to women aged 70–74 and has now adopted free cervical screening. The unanswered question is how far screening should ultimately extend. Australia provides access to population bowel screening at 45. New Zealand has an increasing burden of early-onset colorectal cancer, and Māori develop colorectal cancer younger on average. Screening age, participation, equity, faecal immunochemical test thresholds and colonoscopy capacity therefore need to be considered together. Cancer policy must also extend beyond medicines and screening to diagnostic capacity, surgery, radiotherapy, genomics, clinical trials, survivorship, palliative care and research.

Mental health, maternity and aged care: National has developed a 10-year *Mental Health and Wellbeing Strategy 2026–2036*. *Budget 2026* also provides for 3-day postnatal stays, specialist paediatric palliative care and additional aged-care bed capacity.

Māori health and equity: National abolished Te Aka Whai Ora – Māori Health Authority and favours an integrated national health system. Whatever structure is used, the relevant question is whether measurable disparities in access, screening, stage at cancer diagnosis, treatment and mortality narrow.

National's proposition is therefore predominantly one of continuity: targets, increased capacity, workforce expansion, medicines and service delivery, while maintaining its broader commitment to fiscal restraint.[1]

Labour Party

Labour's health programme places affordability and access to primary care at its centre.

Primary care: Its headline proposal is three free general practitioner (GP) consultations each year for every person entitled to publicly funded healthcare, delivered through a Medicard. It would also restore universally free prescriptions from July 2027. Cost is only one barrier to primary care. Removing patient charges will increase demand. Labour therefore proposes the "Family Doctor Loan Scheme" intended to support doctors entering practice ownership and increase primary care capacity.

Workforce: Labour proposes guaranteeing employment to eligible New Zealand–trained graduate nurses from 2027. Although it previously questioned the Waikato medical school, Chris Hipkins has said a Labour government would not stop it now construction is underway.

Cancer and screening: Labour's primary care proposals may facilitate earlier presentation of symptomatic cancers by reducing financial barriers, although benefit depends on timely access to appointments and subsequent investigation. Labour advocated for universal free cervical screening, now also adopted by the Government. Its published programme is less detailed on the remainder of the cancer pathway, including bowel screening, diagnostic waiting times, surgery, radiotherapy, medicines, genomics, trials and research.

Women's and maternity health: Labour proposes free maternity scans and additional trainee sonographer positions to increase capacity.

Mental health and prevention: Further detail about Labour's 2026 mental health and population prevention programme would be useful, particularly given the scale of unmet need.

Funding: Labour proposes funding its additional health commitments through a 28% capital gains tax on profits from specified residential investment and commercial property, with specified exclusions, and says the revenue would be ring-fenced for health. Labour's proposition is consequently one of reducing the direct cost of accessing healthcare, particularly primary care, while using additional taxation to fund expanded services.[2]

Green Party

The Greens propose a broader expansion of publicly funded healthcare and place greater emphasis on prevention, equity and the social determinants of health.

Primary and dental care: The Greens propose moving towards fully publicly funded primary care

and dental care. Adult dental care is particularly significant because it remains one of the conspicuous gaps in New Zealand's publicly funded health system.

Workforce and rural health: The Greens' policies emphasise safe staffing, improved conditions and pay parity for primary care nurses and hauora providers. Mobile healthcare, mental health and dental services form part of its approach to rural access. The Greens criticised the decision to establish the Waikato medical school rather than expand Auckland and Otago, but they have not published a 2026 commitment to cancel it.

Cancer and medicines: The Greens support greater emphasis on cancer screening, and earlier diagnosis and increased Pharmac funding for medicines and devices. Their wider preventive policies also potentially influence cancer incidence through tobacco, alcohol, nutrition, housing and environmental interventions.

Mental health and prevention: The Greens place considerable emphasis on community mental health services and factors outside the conventional health system. Housing, income, food, transport and the environment are treated as health issues because of their effects on morbidity and life expectancy.

Disability: Disability is explicitly included in the Greens' manifesto, with an emphasis on autonomy and accessible services, transport and housing. This is an important area that can be overlooked when health debates concentrate predominantly on hospitals and general practice.

Māori health and equity: The Greens support Kaupapa Māori health provision and greater Māori participation in designing and delivering services.[3]

ACT Party

ACT approaches health from a different philosophical position, emphasising individual clinical need, measurable outcomes, efficiency, professional scope and greater use of public, private and community providers. Its programme also contains two substantial cancer-related proposals.

Primary and community care: ACT proposes allowing pharmacies and other health professionals to provide a greater range of everyday healthcare, increasing effective capacity by enabling professionals to work closer to the limits of their scopes of practice.

Hospitals and elective care: ACT supports greater use of private providers to reduce public waiting lists and places considerable emphasis on measuring outcomes and productivity.

Workforce and Waikato: ACT sought a full cost–benefit analysis of the Waikato medical school before supporting it. Following revision of the business case, it now supports the project and argues that its scrutiny reduced the Crown's contribution.

Medicines: ACT's "Closing the Medicines Gap" policy proposes progressively increasing the proportion of the health budget spent on medicines until it approaches Australia's level. ACT estimates this could ultimately produce a medicines budget of approximately NZ$5–6 billion.

Comprehensive cancer centres: ACT proposes a national cancer centre with comprehensive campuses in Auckland and Christchurch, integrating complex treatment, research, clinical trials and specialist expertise. Such centres could strengthen trials and translation of research into practice, but questions remain about capital and operating costs, workforce, governance and integration with universities and regional services. The proposal builds on substantial existing clinical and academic capability in both cities.

Māori health: ACT opposes ethnicity-based prioritisation and supports allocation according to individual clinical need. This is one of the clearest philosophical differences between ACT and Te Pāti Māori.[4]

New Zealand First Party

New Zealand First's (NZ First) programme combines major proposals for medicines and waiting list reduction with a new emphasis on prevention. Its September 2026 "Make NZ Healthy" policy identifies prevention, metabolic health and nutrition as priorities and is described as the first announcement in a broader health plan.

Medicines: NZ First proposes replacing Pharmac with a new medicines agency and providing an additional NZ$1.3 billion for medicines—a substantially greater change than simply increasing Pharmac's budget.

Waiting lists: It proposes an NZ$925 million annual GP-controlled "Waitlist Reduction Fund", allowing GPs to purchase approved specialist consultations and operations for patients on waiting lists. This would move purchasing closer to primary care but raises questions about eligibility, prioritisation, pricing, quality assurance and public–private relationships.

Workforce and primary care: NZ First estimates about 2,000 additional doctors are required and

would prioritise their international recruitment. It also proposes easier pathways for appropriately registered doctors into general practices, nurse practitioner-led "Digital Health Clinics" in difficult-to-staff areas, less administrative burden, greater GP autonomy and health coaches in primary care.

It has not published an explicit position on the Waikato medical school. Its emphasis on recruiting substantially more doctors raises the wider question of how international recruitment and domestic training should fit together.

Prevention, nutrition and research: "Make NZ Healthy" proposes nutrition education from primary school through medical school, review of dietary guidelines and vitamin D levels, research into nutritional interventions in mental health, changes relating to access to what it calls "recognised safe nutrients", and hospital trials of perioperative intravenous vitamin C. Raising the profile of prevention and research is welcome, but policy should distinguish plausible hypotheses from interventions supported by robust evidence. Trials are the appropriate way to answer uncertain questions; implementation should follow convincing evidence of benefit, safety and cost effectiveness.

Māori health: NZ First supported abolition of Te Aka Whai Ora – Māori Health Authority and favours provision according to clinical need rather than separate ethnicity-based structures.[5]

Te Pāti Māori

Te Pāti Māori places Māori health equity, Te Tiriti o Waitangi and tino rangatiratanga at the centre of its approach.

Māori health: Its principal structural proposal is to rebuild and strengthen a Māori-led health authority and Māori-led health services. It proposes shifting resources towards prevention and whānau wellbeing and making services accessible, culturally safe and accountable to Māori communities. This is fundamentally different from the approaches of ACT and NZ First and, to a lesser degree, National. The disagreement is not simply about expenditure but about governance and how best to achieve equity.

Workforce: Te Pāti Māori has not published a specific position on the Waikato medical school. Any expansion of medical training should be assessed not only by graduate numbers but by Māori participation, specialty choice and subsequent geographic distribution.

Primary care and prevention: The party emphasises community- and whānau-centred healthcare and regards housing, income, food security and other determinants as integral to health.

Cancer and screening: Cancer is an important test of this approach because Māori develop several cancers younger and experience poorer outcomes from a number of malignancies. Screening participation, stage at diagnosis, treatment timeliness and survival provide measurable outcomes. The younger age distribution of colorectal cancer among Māori makes the bowel screening starting age an equity as well as a cancer-policy question.[6]

Opportunity Party

Opportunity takes a different approach again, concentrating on the instability created by repeated changes in health policy. Its central proposal is a cross-party 10-year health plan *Healthy People*. It proposes progressively increasing public health expenditure towards 9% of gross domestic product while increasing the proportion directed towards primary care.

Primary care and prevention: Opportunity proposes greater investment in primary, community and preventive care, restoration of a pathway towards a smoke-free New Zealand and other population health interventions.

Long-term workforce planning: Medical schools, specialist training and clinical placements cannot sensibly be planned on 3-year electoral cycles. Waikato and expanded Auckland and Otago intakes should form part of a national medical-education strategy.[7]

What should we expect from the next government?

The parties offer materially different approaches. National emphasises continuity, targets, capacity, medicines and workforce; Labour—primary care affordability; the Greens—publicly funded primary, dental and preventive care; ACT—medicines, efficiency, provider choice and comprehensive cancer centres; NZ First—medicines, waiting lists, international recruitment and prevention; Te Pāti Māori—Māori governance and delivery; and Opportunity—a 10-year cross-party approach.

Several common challenges remain. Workforce may be the greatest constraint on almost every promise, extending beyond doctors and nurses to radiologists, pathologists, radiation therapists,

pharmacists, laboratory scientists, allied health professionals and carers.

The Waikato medical school illustrates the difficulty of short political cycles. Whatever the merits of the original debate over a third medical school versus expanding Auckland and Otago, substantial resources are now committed, and construction and clinical-placement planning are underway.

The better question is New Zealand's total medical workforce requirement over the next 10–20 years and how the three schools can collectively meet it. More students also require placements and supervisors, and increased numbers will not by themselves produce more GPs, psychiatrists or rural doctors. Where graduates ultimately practice, and in which specialties, matters.

Primary care requires both affordability and capacity. Making consultations free without having clinicians available will not solve access, while increasing workforce without addressing financial barriers will not solve it either.

Mental health continues to generate considerable demand yet receives less detailed attention in many of the 2026 programmes than primary care or medicines.

Aged care and disability deserve greater prominence. Expected changes in population demographics means residential and community aged care are an increasingly important component of health planning, while disability services should not disappear within a debate dominated by hospitals and GP access.

Prevention often receives less attention than treatment, although NZ First now makes it a central theme. Tobacco, alcohol, obesity, vaccination, physical activity, nutrition, housing and screening influence future outcomes and expenditure. Their benefits often extend beyond an electoral cycle, requiring long-term planning and rigorous evaluation rather than adoption of interventions before effectiveness and safety are demonstrated.

Cancer is a useful test of whether policy is coherent. Better survival requires prevention and screening, earlier diagnosis, timely imaging and pathology, high-quality surgery and radiotherapy, systemic therapy, molecular diagnostics, trials, survivorship and palliative care. Medicines alone are not a cancer service. Research also deserves greater attention: participation in clinical trials should be part of high-quality care, while investment in genomics, precision oncology, immunotherapy, cell therapies and translational research will influence whether New Zealand helps develop future treatments or mainly purchases them later. Comprehensive cancer centres bring this issue directly into the election debate.

Promises are not outcomes

The central lesson from recent health policy is that announcing policy and improving outcomes are different things. Governments have increased expenditure, reorganised services, changed targets and announced workforce initiatives, yet New Zealand still struggles with primary care access, workforce shortages, emergency departments, elective waiting lists, mental health access, ageing infrastructure and inequities.

Announcements should therefore be judged by what is required to deliver them. Free GP consultations require GPs; lower bowel-screening ages require colonoscopy, pathology and treatment capacity; more cancer medicines require oncology capacity; waiting list funding requires staff, theatres and beds; comprehensive cancer centres require specialist staff, research infrastructure and sustainable operating funding; and more medical school places require clinical placements, postgraduate training and appropriate career pathways.

Ultimately, New Zealand must decide what health system it wants and what it is prepared to pay for it. Ageing, chronic disease, workforce costs and new medical technologies mean expenditure will continue to increase, and no government can avoid choices about priorities.

The useful question in the 2026 election is therefore not simply which party promises to spend the most, but what problem each policy is intended to solve, what evidence supports it, whether it can be delivered and how we will know whether it has worked. After successive restructures, strategies, targets and promises, that last question may be the most important of all.

COMPETING INTERESTS
Frank Frizelle is the Editor-in-Chief of the *New Zealand Medical Journal* and the *Pacific Health Dialog*, a professor of surgery at Otago University, the president of the Colorectal Surgical Society of Australia and New Zealand, chair of the Christchurch Cancer Foundation, chair of the governance committee for the Prostate Cancer Outcomes Registry for Australia and New Zealand, deputy chair of the Bowel Cancer Outcomes Registry for Australia and New Zealand, chair of the clinical governance committee for Southern Cross Hospital Christchurch and chair of the clinical governance committee for Mobile Health NZ Ltd.

CORRESPONDING AUTHOR INFORMATION
Frank Frizelle: Department of Surgery and Critical Care, University of Otago, Christchurch, New Zealand. E: Frank.Frizelle@cdhb.health.nz

URL
https://nzmj.org.nz/journal/vol-139-no-1643/election-2026-and-health-promises-priorities-and-delivery

CITATION
Frizelle F. Election 2026 and health: promises, priorities and delivery. N Z Med J. 2026 Oct 9;139(1643):9-14. doi: 10.26635/6965.e1643.

REFERENCES

1. National Party. Quality, Timely Healthcare [Internet]. [cited 2026 Sep 27]. Available from: https://www.national.org.nz/healthcare
2. Labour Party. Our Policies [Internet]. [cited 2026 Sep 27]. Available from: https://www.labour.org.nz/policy
3. Green Party. Read Our 2026 Policy Announcements [Internet]. [cited 2026 Sep 27]. Available from: https://www.greens.org.nz/
4. ACT Party. Health [Internet]. [cited 2026 Sep 27]. Available from: https://www.act.org.nz/policies/health
5. New Zealand First Party. New Zealand First Policy [Internet]. [cited 2026 Sep 27]. Available from: https://www.nzfirst.nz/policy
6. Te Pāti Māori. Health [Internet]. [cited 2026 Sep 27]. Available from: https://www.maoriparty.org.nz/health
7. Opportunity. Health People [Internet]. [cited 2026 Sep 27]. Available from: https://www.opportunity.org.nz/healthy_people

 ©PMA

Contemporary outcomes and restorative pathways following colectomy for inflammatory bowel disease: a tertiary centre cohort from Aotearoa New Zealand

Angad Vraich, Ella Nicholas, Andrew McCombie, Tim Eglinton, Tamara Glyn

ABSTRACT

AIMS: The aim of this study was to determine 30-day mortality and morbidity following colectomy for inflammatory bowel disease (IBD) at a tertiary New Zealand centre and to establish rectal stump–related outcomes and rates of restoration for intestinal continuity.

METHODS: A retrospective cohort study of all colectomies performed for IBD at Christchurch Hospital between 1 January 2019 and 31 December 2023 was conducted. Demographic, operative and outcome data were extracted from patient records. Descriptive statistics and univariate analyses were performed.

RESULTS: Fifty patients were included (31 ulcerative colitis, 17 Crohn's disease, two indeterminate colitis). There were no 30-day deaths. Sixty-four percent of patients experienced at least one complication. Open surgery was associated with significantly higher rates of major complications compared with laparoscopic surgery (odds ratio 5.1, p=0.02). Complication rates varied between rectal stump management strategies, although sub-group numbers were small. Among patients potentially eligible for restoration, 26% underwent ileal pouch formation; patient preference was the most cited reason for not proceeding.

CONCLUSIONS: Contemporary colectomy for IBD in this cohort was associated with zero short-term mortality and acceptable morbidity. Laparoscopic surgery was associated with fewer major complications, although selection bias cannot be excluded. Given small sample size, findings regarding rectal stump management should be cautiously interpreted. Restorative surgery occurred in a minority, reinforcing need for clear restorative pathways and longitudinal specialist follow-up.

Inflammatory bowel disease (IBD) is a complex immune-mediated condition primarily affecting the gastrointestinal tract. Classically diagnosed as Crohn's disease (CD), ulcerative colitis (UC) or indeterminate colitis (IC), IBD involves the rectum (with or without colon) in all cases of UC and IC and is predominantly colonic in 14–32% of CD.[1] New Zealand has a high prevalence of IBD, with rates of 30.1 per 100,000 person-years,[2] consistent with many areas in the Western world.

Despite improvements in medical therapies, surgery remains an important treatment option for medically refractory or complicated disease.[3] In contemporary studies, rates of colectomy for medically refractory UC sit at around 10% at 10 years.[4] Just over 20% of patients experiencing acute severe episodes will undergo colectomy in the following 5 years.[5] However, medical management of IBD has become increasingly complex, with greater use of corticosteroids, immunomodulators and biologic or small-molecule therapies, often in sequence or as rescue therapy before surgery. This makes contemporary data on surgical outcomes particularly relevant, as multiple attempts at conservative management and cumulative immunosuppressive exposure may influence the condition in which patients present for colectomy and their post-operative outcomes.[3,6,7]

Recent population-based studies from Scandinavia and Scotland have demonstrated substantial reductions in colectomy rates following the introduction of biologic therapies. Högden et al. reported a reduction in 5-year colectomy rates from UC from 16.2% to 5.8%,[8] while colectomy numbers in Lothian, Scotland declined from 42 cases annually in 2004 to seven cases in 2023.[9] These trends have implications for maintenance of surgical expertise and regional IBD surgical services.

Subtotal colectomy involves the removal of the abdominal colon with retention of a "rectal stump". This allows for staged proctectomy

with or without reconstruction when the patient is physiologically stronger and more likely to heal. Subtotal colectomy is frequently performed in acutely unwell patients with severe colitis, malnutrition, sepsis and treatment-related immunosuppression. Despite these challenges, following the introduction of minimally invasive approaches, peri-operative optimisation strategies and more proactive involvement of surgeons, modern series report low mortality and acceptable morbidity rates.[10] Contemporary institution-level data are an important resource needed to inform current patient counselling and benchmarking.

Many patients with UC undergoing subtotal colectomy proceed at some point to completion proctectomy and ileal pouch anal reconstruction; some patients with CD and relatively preserved rectums may undergo ileorectal anastomosis. However, evidence suggests that a substantial proportion of patients (estimated at between one-third and one-half) do not proceed to restoration, instead opting to retain a permanent ileostomy with either completion proctectomy or a rectum left *in situ*.[11,12] This question is increasingly relevant because recent Australasian population-level data suggest that although reconstruction rates remain relatively high overall, they may be decreasing in the contemporary era.[13] Contemporary local data are therefore needed not only on peri-operative morbidity and mortality, but also on longer-term restorative outcomes following colectomy for IBD.

Aims

The primary aim of this study was to determine 30-day mortality and morbidity in a contemporary cohort of patients undergoing colectomy for IBD. The secondary aim was to establish rectal stump–related outcomes, including post-operative complications and subsequent definitive management including rates of restoration of intestinal continuity.

Methods

Population

The study included all colectomies performed for IBD in Christchurch Hospital, Canterbury, New Zealand between 1 January 2019 and 31 December 2023. The study was registered with Health New Zealand – Te Whatu Ora research ethics as low risk. Cases were identified using a combination of coded and free-text searches of the Scope database for colectomy operations and IBD diagnoses, then cross-referenced with the Canterbury Crohn's Colitis Care (CCCare) database colectomy list. Patient records were manually reviewed via Health Connect South to extract demographic, disease, operative and outcome data from operation notes, admission/discharge summaries, anaesthetic records and medical correspondence.

Inclusion criteria

Patients undergoing total abdominal colectomy, subtotal colectomy or proctocolectomy indicated primarily for IBD (Crohn's colitis, UC or IC) at Christchurch Hospital between 1 January 2019 and 31 December 2023 were included.

Outcomes of interest

The primary outcome was 30-day morbidity and mortality post-colectomy. A master sheet of data points was created and data points extracted from the medical record (including information on demographics, disease, treatment and outcomes). Medical complications included urinary tract infection, pneumonia, and cardiac and thromboembolic events; surgical complications included wound infection, post-operative ileus (identified by the insertion of post-operative nasogastric tube), bowel obstruction and intra-abdominal collections. Additional complications were captured from free-text records. Longer-term follow-up was calculated from surgery to analysis, or to last known follow-up when applicable.

Data analysis

Descriptive statistics and univariate analyses were performed to identify predictors of adverse outcomes.[14] Odds ratios and Fisher's exact test p-values were used to quantify associations between risk factors and post-operative complications.[15] Multivariate analysis was considered but not performed because of the limited sample size and event numbers, which would risk model overfitting.

Results

Pre-operative details

The study cohort comprised 50 patients meeting inclusion criteria, with a near-equal gender distribution (24 males, 26 females) and predominantly NZ European ethnicity (84%), alongside European, Māori and Indian representation. Patient age at surgery ranged from 17 to 72 years, with a median of 47.5 years. Thirty-one cases (62%) were diagnosed

as UC, 17 (34%) as CD and two as indeterminate (4%). Most cases involved pancolitis (58%) or distal colitis (30%).

Pre-operatively, 10 (20%) patients reported extraintestinal manifestations, most commonly arthropathy (6%) and erythema nodosum (6%). Fourteen cases (28%) had undergone previous abdominal or gastrointestinal surgery and 18 (36%) had been hospitalised within 3 months prior to surgery. Medication exposure in the 3 months preceding surgery included mesalazine in 23 patients (46%), immunomodulators in 25 (50%) and anti-tumour necrosis factor (anti-TNF) biologics in 28 (56%). Steroids were used in 28 cases (56%) within 6 weeks pre-operatively, with 18 patients (36%) having high-dose therapy (intravenous [IV] or >10mg oral [*per os*]).

Surgery details

Of the 50 colectomies, 31 (62%) were performed acutely and 19 (38%) electively. Laparoscopic approaches were used in 37 cases (74%), open surgery in 12 (24%) and one case was converted from laparoscopic to hand assisted. Median time from IBD diagnosis to colectomy was 8 years (range <1–36 years).

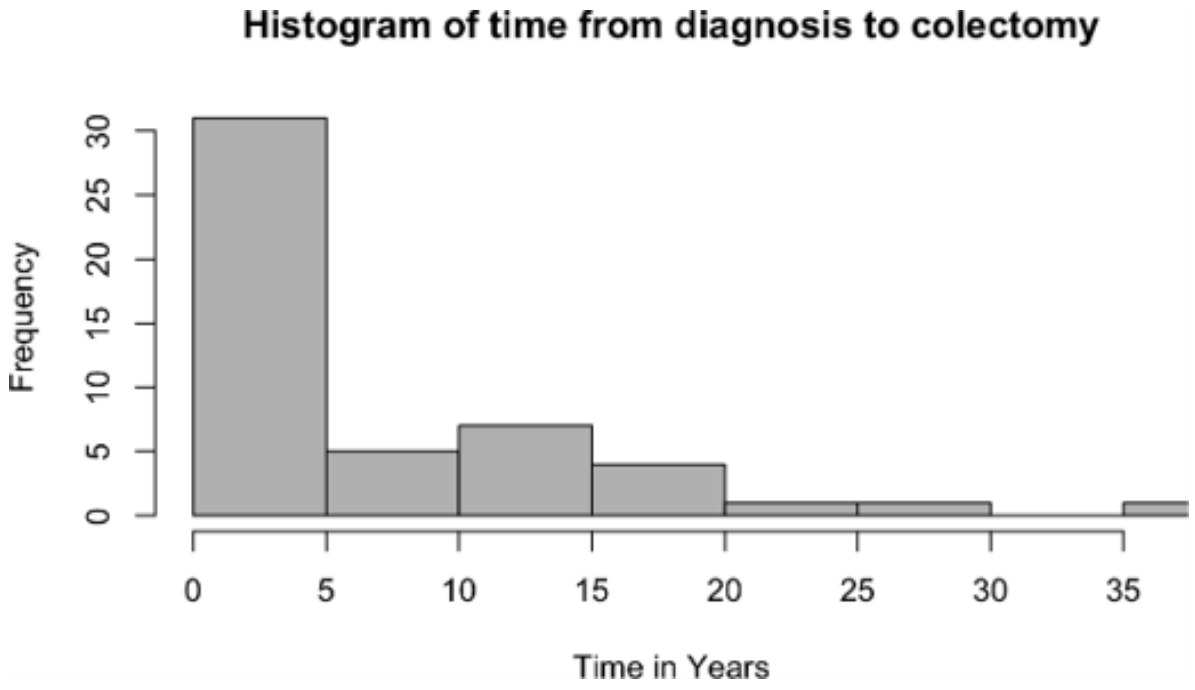
Thirty-eight patients (76%) underwent total abdominal colectomy with end ileostomy and a retained rectum. Management of the rectal stump was most commonly via exteriorisation, including subcutaneous and extrafascial stump placement (23/38, 61%), followed by mucous fistula (10/38,

Table 1: Diagnosis and extent of inflammatory bowel disease in colectomy cases, Christchurch Hospital, 2019–2023.

	Pancolitis	Proctitis	Distal colitis	Non-contiguous	Total
UC	17	1	13	0	31
CD	11	1	1	4	17
Indeterminate	1	0	1	0	2
Total	29	2	15	4	50

UC = ulcerative colitis; CD = Crohn's disease.

Figure 1: Time taken in years from the diagnosis of inflammatory bowel disease to colectomy.



26%) and intra-abdominal placement (5/38, 13%). Nine patients (18%) underwent a proctocolectomy with end ileostomy, and three patients (6%) underwent subtotal colectomy with ileorectal anastomosis (IRA).

The mean operative time across all procedures was 237 minutes (range 130–497 minutes). Pelvic drains were inserted in 17 cases (54%).

Post-operative morbidity

Median length of hospital stay following colectomy was 10 days (range 4–63), 11 acute days vs 7 elective days. There were no deaths within 30 days post-operatively. At the time of reporting, one patient had died 2 years after surgery due to cardiac disease unrelated to IBD or the index operation.

Within the 30-day follow-up period, 32 patients (64%) experienced one or more of the specified complications. Surgical complications were the most common, with the majority being from post-operative ileus (36%), followed by infective complications, primarily urinary tract infection (14%). Complication severity was delineated using Clavien-Dindo classification outlined in Table 3.

Patients with open surgery were 5.1 times as likely to develop post-operative complications (Clavien-Dindo ≥III) than those with laparoscopic surgery in a statistically significant association (p-value 0.02). This finding should be interpreted cautiously, as patients selected for open surgery plausibly may have had greater disease severity or operative complexity.

No statistically significant association between pre-operative medical therapy and post-operative complications was identified. However, the study was not powered to detect modest differences between treatment groups.

Among the 38 colectomy patients with a retained rectal stump, complication rates varied between stump management strategies, although interpretation is limited by very small sub-group numbers, particularly for intra-abdominal (n=5) and extrafascial (n=5) stump placement. A descriptive summary of complications according to stump management strategy is presented in Table 6.

Follow-up for the cohort, calculated as specified in the method, ranged from <1 month to 59 months, with a median of 28 months. Beyond the 30-day post-operative period, 24 of the 38 with retained rectal stumps reported symptoms attributable to the retained rectum. These included discharge in 16 (42%), rectal bleeding

Table 2: Urgency and indication of inflammatory bowel disease colectomy cases, Christchurch Hospital, 2019–2023.

	Acute severe colitis	Failed medical therapy	Perforation	Strictures	Toxic megacolon	Dysplasia	Total
Acute	24	1	3	0	3	0	31
Elective	0	16	0	2	0	1	19
Total	24	17	3	2	3	1	50

Table 3: Post-operative 30-day complications by surgical urgency and approach (Clavien-Dindo).

	n	None/Grade I	Grade II	Grade III–V	Any complication
Surgical urgency					
Elective	19	9	4	6	10 (53%)
Acute	31	9	13	9	22 (70%)
Surgical approach					
Laparoscopic	37	16	13	8	21 (57%)
Open	12	2	3	7	10 (83%)

Please note, single “hand assist” approach case in cohort not included in this table.

in 13 (34%) and pelvic discomfort in eight (21%). Symptomatic management primarily involved mesalazine and proctofoam enemas.

Proctectomy and restorative surgery

As of August 2025, 26 patients (52%) of the cohort had undergone completion proctectomy for removal of the rectal stump, including 18 patients with UC, six with CD and two with IC. Institutional policy for restorative surgery at Christchurch Hospital is to only perform ileal pouch surgery for UC patients. Therefore, we can consider the 31 UC patients of the cohort potentially eligible for restoration. At the time of reporting, eight patients (26%) had undergone functional restoration with ileal pouch formation. Among the remaining 23 potentially eligible patients who did not undergo restoration, the most frequently cited reason was

Table 4: Comparative analysis of complications.

Comparison	Outcome (Clavien-Dindo)	Odds ratio	p-value
Acute vs elective	Any complication (≥II)	2.2 (0.67–7.2)	0.19
Acute vs elective	Major complication (≥III)	0.89 (0.26–3.1)	0.85
Open vs laparoscopic	Any complication (≥II)	3.8 (0.73–19.9)	0.11
Open vs laparoscopic	Major complication (≥III)	5.1 (1.3–20.4)	0.02

Table 5: Pre-operative medical therapy with complication rates.

Pre-operative therapy	n (%)	None/Grade I	Grade II	Grade III–V	Any complication
None	7 (14%)	2	2	3	5 (71%)
5-ASA	23 (46%)	8	6	9	15 (65%)
Immunomodulators	25 (50%)	10	9	6	15 (60%)
Biologics/ anti-TNF	28 (56%)	12	11	5	16 (57%)
Steroids	28 (56%)	12	8	8	16 (57%)

5-ASA = 5-aminosalicylic acid; anti-TNF = anti-tumour necrosis factor.

Table 6: Post-operative 30-day surgical complications by rectal stump location.

Rectal stump placement	n	None/Grade I	Grade II	Grade III–V	Any complication
Subcutaneous stump	18	6	9	3	12 (67%)
Mucous fistula	10	3	3	4	7 (70%)
None (proctectomy)	9	3	4	2	6 (67%)
Intra-abdominal	5	1	0	4	4 (80%)
Extrafascial	5	4	1	0	1 (20%)
Ileorectal anastomosis	3	1	0	2	2 (67%)

patient preference (68%). In five patients (23%), treating clinicians advised against restorative surgery because of age, comorbidity, disease characteristics or anticipated functional outcomes.

Discussion

This study describes contemporary outcomes following colectomy for IBD in a tertiary New Zealand centre, demonstrating no 30-day mortality and morbidity rates comparable with contemporary international cohorts. While post-operative complications were common, the absence of early mortality and predominance of low- to moderate-grade complications are reassuring, particularly in the context of modern IBD practice where patients often reach surgery after increasingly complex medical therapy and greater cumulative immunosuppressive exposure. Beyond short-term outcomes, the data highlight two clinically important themes: the impact of rectal stump management on post-operative morbidity and a relatively low rate of subsequent restorative surgery. Together, these findings provide valuable context for counselling patients undergoing subtotal colectomy and contribute region-specific data to a limited contemporary literature.[16–18]

Laparoscopic surgery accounted for 74% of procedures, aligning with the European Crohn's and Colitis Organisation's (ECCO's) 2021 guidelines that recommend laparoscopy due to lower morbidity and shorter hospital stay.[3] An open procedure was associated with higher complication rates (particularly surgical site infections), although this likely reflects selection bias with more complex cases warranting an open approach. This is consistent with findings from a Danish population-based study comparing laparoscopic and open colectomy in IBD and demonstrating a more favourable short-term morbidity from a minimally invasive approach.[8]

Pre-operative biologic therapy did not significantly affect post-operative outcomes, consistent with the current ECCO guidelines, which do not recommend stopping biologics peri-operatively.[3] This aligns with contemporary prospective data suggesting that disease severity and treatment response, rather than biologic exposure alone, are the main determinants of surgical outcomes in acute severe colitis.[19] A National Surgical Quality Improvement Program (NSQIP) based audit of over 5,000 patients showed that both rates of re-operation and surgical site infection were increased in the setting of steroid use.[20] It is likely that this study lacked the power to demonstrate this difference.

Rectal stump management following subtotal colectomy remains a clinically important and debated aspect of IBD surgery. In this cohort, intra-abdominal rectal stump placement was associated with the highest incidence of major post-operative complications, consistent with prior reports highlighting risks of stump blowout, pelvic sepsis and obstruction.[21,22] Although higher complication rates were observed among patients undergoing intra-abdominal stump closure, only five patients were managed in this manner. Consequently, these findings should be considered exploratory and interpreted with caution. Recent systematic reviews and contemporary guidelines have not demonstrated clear superiority of one stump management strategy over another.[23–25]

Beyond short-term morbidity, retention of rectal stump carries ongoing clinical implications. In our cohort, over half of patients with a retained rectum experienced chronic stump-related symptoms requiring medical management, and more than half proceeded to completion proctectomy. Additionally, the retained rectum represents a site of ongoing malignancy risk, particularly in patients with UC and long-standing disease. Broader principles of rectal cancer risk stratification and organ surveillance following colorectal surgery are well established.[26,27] In patients with IBD, current guidance recommends continued endoscopic surveillance of the rectal stump following subtotal colectomy, although interval adherence and feasibility in real-world practice remain variable.[27] These findings reinforce the need for structured follow-up pathways and early, shared decision making regarding definitive rectal management after subtotal colectomy.

The rate of restorative ileal pouch surgery among patients with UC in this cohort (26%) was lower than reported in some historical population-based series. However, this finding should be interpreted in the context of contemporary practice, where progression to pouch reconstruction is not inevitable and may be decreasing over time. Recent Australasian population-level data have shown high overall rates of reconstruction after colectomy for UC, but a significant reduction in the most recent treatment era.[13] In our cohort, the majority of eligible patients who did not proceed to restoration cited personal preference, suggesting that the low rate of pouch formation is likely multifactorial, reflecting not only patient choice but also age, comorbidity, case mix, geography

and the realities of staged decision making after urgent colectomy. Rather than supporting routine progression to permanent ileostomy, these findings emphasise the importance of maintaining clear restorative pathways within a regional pouch service, with structured follow-up and repeated opportunities for appropriate patients to consider restoration of intestinal continuity over time.

This study was not powered for comparative analyses of operative technique or rectal stump management. Small sub-group numbers increase this risk of both type I and type II error, [28] and observed associations may reflect confounding by indication, surgeon preference, urgency of surgery or case complexity. Consequently, findings regarding comparative outcomes should be regarded as hypothesis generating. Loss to follow-up is another limitation considering the ongoing clinical risks associated with retained rectal disease;[29] three patients relocated overseas shortly after discharge. The study only captured procedures performed in the public system. While this narrows the scope, it remains relevant given the concentration of complex and acute IBD cases in the public setting.[30]

Conclusions

Contemporary colectomy for IBD in this tertiary cohort was associated with zero 30-day mortality and acceptable morbidity, comparable with recent international series. Although laparoscopic surgery was associated with fewer major post-operative complications, this may be influenced by case selection. Differences in outcomes between rectal stump management strategies were observed but should be interpreted cautiously because of small sub-group numbers. Surgical urgency and pre-operative medical therapy were not clearly associated with outcomes. Rates of restorative ileal pouch surgery were lower than reported in some international cohorts, highlighting the importance of ongoing specialist follow-up and shared decision making regarding long-term reconstructive options.

COMPETING INTERESTS
Nil.

ACKNOWLEDGEMENTS
The authors thank all patients in this cohort for contributing to this research.

AUTHOR INFORMATION
Mr Angad Vraich: Medical Student, Department of Surgery and Critical Care, University of Otago Christchurch, New Zealand.
Dr Ella Nicholas: General Surgery Training Registrar, Department of General Surgery, Christchurch Hospital, New Zealand.
Dr Andrew McCombie: Research Officer and Data Analyst, Department of Surgery and Critical Care, University of Otago Christchurch, New Zealand; Department of General Surgery, Christchurch Hospital, New Zealand.
Professor Tim Eglinton: Colorectal Surgeon, Department of Surgery and Critical Care, University of Otago Christchurch, New Zealand; Department of General Surgery, Christchurch Hospital, New Zealand.
Ms Tamara Glyn: Colorectal Surgeon, Department of Surgery and Critical Care, University of Otago Christchurch, New Zealand; Department of General Surgery, Christchurch Hospital, New Zealand.

CORRESPONDING AUTHOR
Ms Tamara Glyn: 2 Riccarton Ave, Christchurch 8011, New Zealand. E: tamara.glyn@otago.ac.nz

URL
https://nzmj.org.nz/journal/vol-139-no-1643/contemporary-outcomes-and-restorative-pathways-following-colectomy-for-inflammatory-bowel-disease-a-tertiary-centre-cohort-from-

CITATION
Vraich A, Nicholas E, McCombie A, et al. Contemporary outcomes and restorative pathways following colectomy for inflammatory bowel disease: a tertiary centre cohort from Aotearoa New Zealand. N Z Med J. 2026 Oct 9;139(1643):15-23. doi: 10.26635/6965.7513.

REFERENCES
1. Soucy G, Wang HH, Farraye FA, et al. Clinical and pathological analysis of colonic Crohn's disease, including a subgroup with ulcerative colitis-like features. Mod Pathol. 2012 Feb;25(2):295-307. doi: 10.1038/modpathol.2011.120.
2. Forbes AJ, Day AS, Frampton CMA, Gearry RB. Incidence of Inflammatory Bowel Disease in Canterbury, New Zealand, 2018-2023. Dig Dis Sci. 2025 Feb;70(2):719-727. doi: 10.1007/s10620-024-08811-0.
3. Spinelli A, Bonovas S, Burisch J, et al. ECCO Guidelines on Therapeutics in Ulcerative Colitis: Surgical Treatment. J Crohns Colitis. 2022 Feb 23;16(2):179-189. doi: 10.1093/ecco-jcc/jjab177.
4. Dai N, Haidar O, Askari A, Segal JP. Colectomy rates in ulcerative colitis: A systematic review and meta-analysis. Dig Liver Dis. 2023 Jan;55(1):13-20. doi: 10.1016/j.dld.2022.08.039.
5. Festa S, Scribano ML, Pugliese D, et al. Long-term outcomes of acute severe ulcerative colitis in the rescue therapy era: A multicentre cohort study. United European Gastroenterol J. 2021 May;9(4):507-516. doi: 10.1177/2050640620977405.
6. El Hechi MW, Lee JM, Naar L, et al. The Effect of Immunosuppression on Emergency Colectomy Outcomes: A Nationwide Retrospective Analysis. World J Surg. 2020 May;44(5):1637-1647. doi: 10.1007/s00268-020-05378-5.
7. Visser E, Luberto A, Heuthorst L, et al. The impact of advanced medical therapies on time to resection and colorectal cancer outcomes in ulcerative colitis patients undergoing colectomy. J Crohns Colitis. 2025 Feb 4;19(2):jjaf015. doi: 10.1093/ecco-jcc/jjaf015.
8. Högdén A, Perrin V, Adami HO, et al. Temporal trends in surgical treatment of inflammatory bowel disease following introduction of biological drugs in Norway and Sweden. BMJ Open Gastroenterol. 2025 Jun 19;12(1):e001828. doi: 10.1136/bmjgast-2025-001828.
9. Elford AT, Constantine-Cooke N, Jenkinson PW, et al. Twenty-Year Trends in Colectomy Rates and Advanced Therapy Prescribing in Lothian, Scotland. Aliment Pharmacol Ther. 2025 Oct;62(7):699-709. doi: 10.1111/apt.70240.
10. Mark-Christensen A, Troelsen FS, Tøttrup A, et al. Short-term outcomes following total colectomy for inflammatory bowel disease in Denmark after implementation of laparoscopy: a nationwide population-based study. Colorectal Dis. 2023 Sep;25(9):1802-1811. doi: 10.1111/codi.16691.
11. Nordenvall C, Myrelid P, Ekbom A, et al. Probability, rate and timing of reconstructive surgery following colectomy for inflammatory bowel disease in Sweden: a population-based cohort study. Colorectal Dis. 2015 Oct;17(10):882-890. doi: 10.1111/codi.12978.
12. Worley G, Nordenvall C, Askari A, et al. Restorative surgery after colectomy for ulcerative colitis in England and Sweden: observations from a comparison of nationwide cohorts. Colorectal Dis. 2018 Sep;20(9):804-812. doi: 10.1111/codi.14113.
13. Giddings HL, Ng KS, Solomon MJ, et al. High but

decreasing rates of reconstruction after total proctocolectomy for ulcerative colitis, and evidence of a direct volume outcome relationship. ANZ J Surg. 2024 Sep;94(9):1598-1609. doi: 10.1111/ans.18986.
14. Canova S, Cortinovis DL, Ambrogi F. How to describe univariate data. J Thorac Dis. 2017 Jun;9(6):1741-1743. doi: 10.21037/jtd.2017.05.80.
15. Hoffman JIE. Hypergeometric Distribution. In: Hoffman JIE, ed. Biostatistics for Medical and Biomedical Practitioners. Academic Press; 2015:179-182.
16. Baker DM, Folan AM, Lee MJ, et al. A systematic review and meta-analysis of outcomes after elective surgery for ulcerative colitis. Colorectal Dis. 2021 Jan;23(1):18-33. doi: 10.1111/codi.15301.
17. Olaiya B, Renelus BD, Filon M, Saha S. Trends in Morbidity and Mortality Following Colectomy Among Patients with Ulcerative Colitis in the Biologic Era (2002-2013): A Study Using the National Inpatient Sample. Dig Dis Sci. 2021 Jun;66(6):2032-2041. doi: 10.1007/s10620-020-06474-1.
18. Carpenter EL, Valdera FA, Chauviere MV, Krell RW. Outcomes of Partial Versus Total Colectomy in Ulcerative Colitis: A Propensity Score-Matched Analysis. J Surg Res. 2023 Jul;287:63-71. doi: 10.1016/j.jss.2023.01.014.
19. M Frasson, T Pinkney, JP Gisbert, et al. P447 Early predictors of the need for surgery in patients with acute severe ulcerative colitis: results of the prospective, observational, international ESCP MASC study. J Crohns Colitis. 2023 Jan 30;17(Supplement_1):i578-i579. doi: 10.1093/ecco-jcc/jjac190.0577.
20. Carter FM, McLeod RS, Cohen Z. Subtotal colectomy for ulcerative colitis: complications related to the rectal remnant. Dis Colon Rectum. 1991 Nov;34(11):1005-1009. doi: 10.1007/BF02049965.
21. Wøjdemann M, Wettergren A, Hartvigsen A, et al. Closure of rectal stump after colectomy for acute colitis. Int J Colorectal Dis. 1995;10(4):197-199. doi: 10.1007/BF00346218.
22. Bedrikovetski S, Liu J, Dudi-Venkata NN, et al. Rectal Stump Management After Subtotal Colectomy for Severe Colitis, In or Out? A Retrospective Cohort Study. Indian J Surg. 2020 Jan 8;82(4):585-591. doi: 10.1007/s12262-019-02004-0.
23. Bedrikovetski S, Dudi-Venkata N, Kroon HM, et al. Systematic review of rectal stump management during and after emergency total colectomy for acute severe ulcerative colitis. ANZ J Surg. 2019 Dec;89(12):1556-1560. doi: 10.1111/ans.15075.
24. Argyriou O, Ghersin I, Stravodimos G, et al. The Rectal Stump During and After Subtotal Colectomy for Ulcerative Colitis: A Narrative Review of Surgical Strategies, Medical Management Options, and Cancer Surveillance Recommendations. J Clin Med. 2026 Jan 30;15(3):1114. doi: 10.3390/jcm15031114.
25. Fleming C, Vendrely V, Rullier E, Denost Q. Organ preservation in rectal cancer: review of contemporary management. Br J Surg. 2022 Jul 15;109(8):695-703. doi: 10.1093/bjs/znac140.
26. Moran GW, Gordon M, Sinopolou V, et al. British Society of Gastroenterology guidelines on inflammatory bowel disease in adults: 2025. Gut. 2025 Jun 23;74(Suppl 2):s1-s101. doi: 10.1136/gutjnl-2024-334395. Erratum in: Gut. 2025 Oct 8;74(11):e20. doi: 10.1136/gutjnl-2024-334395corr1.
27. Brown KGM, Koh CE. Surgical management of recurrent colon cancer. J Gastrointest Oncol. 2020 Jun;11(3):513-525. doi: 10.21037/jgo-2019-ccm-09.
28. Derikx LAAP, de Jong ME, Hoentjen F. Short article: Recommendations on rectal surveillance for colorectal cancer after subtotal colectomy in patients with inflammatory bowel disease. Eur J Gastroenterol Hepatol. 2018 Aug;30(8):843-846. doi: 10.1097/MEG.0000000000001171.
29. Wilcox RR. HYPOTHESIS TESTING. In: Wilcox RR, ed. Applying Contemporary Statistical Techniques. Academic Press; 2003:141-172.
30. Rahal MA, Karaoui WR, Mailhac A, et al. Surgical outcomes among inflammatory bowel disease patients undergoing colectomy : results from a national database. Acta Gastroenterol Belg. 2018 Jul-Sep;81(3):387-392.
31. Parragi L, Fournier N, Zeitz J, et al. Colectomy Rates in Ulcerative Colitis are Low and Decreasing: 10-year Follow-up Data From the Swiss IBD Cohort Study. J Crohns Colitis. 2018 Jun 28;12(7):811-818. doi: 10.1093/ecco-jcc/jjy040.

Longer-term outcomes of intravitreal therapy for neovascular age-related macular degeneration at a peripheral centre (Palmerston North eye clinic)

Brandon Nunns, Aqeeda Singh, John Ah-Chan

ABSTRACT

AIM: The aim of this study was to evaluate long-term real-world outcomes of anti–vascular endothelial growth factor (anti-VEGF) therapy for neovascular age-related macular degeneration (nAMD) at a regional New Zealand centre, with a primary focus on treatment duration and reasons for cessation.

METHODS: A retrospective cohort study was conducted at Palmerston North eye clinic, including all newly diagnosed eyes with nAMD initiating anti-VEGF therapy between November 2017 and August 2023. Demographic data, visual acuity, treatment duration and documented reasons for cessation were extracted from a prospectively maintained database and validated against electronic health records.

RESULTS: Among 527 eyes from 446 patients, 39.8% ceased treatment. The most common reasons were end-stage disease (44.8%), patient death (21.9%), logistical factors (17.6%) and injection intolerance (8.1%). Mean treatment duration was 421 days. Visual outcomes were favourable overall with 20.2% of eyes improving and 59.5% remaining stable. Better baseline visual acuity strongly predicted better final vision.

CONCLUSIONS: High early cessation due to end-stage disease suggests possible late presentation, underscoring the need for earlier detection and referral. Addressing logistical barriers and supporting adherence will be increasingly important as demand for anti-VEGF therapy grows with an ageing population.

Neovascular age-related macular degeneration (nAMD) is a leading cause of impaired vision in older adults.[1,2] Without treatment, nAMD can cause a rapid and permanent decline in central vision from macular neovascularisation, fluid exudation and, ultimately, macular fibrosis.[1,2] The management of nAMD was transformed in 2004 with the advent of intravitreal agents targeting vascular endothelial growth factor (VEGF). These agents have significantly improved visual outcomes and have become the standard of care for patients with nAMD.[1,3]

Standard clinical practice involves an induction phase of monthly intravitreal injections, followed by a maintenance phase consisting of either fixed-interval 4-weekly dosing, *pro re nata* (*PRN*) injections or a treat and extend (T&E) regimen.[4] Among these, the T&E protocol has seen widespread application due to similar efficacy with fewer clinic visits.[4,5] Despite these adaptations, the delivery of anti-VEGF therapy remains resource intensive due to the ongoing need for treatment.[1] This demand is expected to expand with the increasing prevalence of nAMD associated with an ageing population demographic.[1,6]

While the efficacy of anti-VEGF therapy on visual outcomes is well established, less is known about longer-term outcomes, particularly with respect to treatment discontinuation.[1] Compared to clinical trials with high patient retention, observational cohort studies have demonstrated treatment cessation in up to 60% of patients.[7–9] Reported reasons for treatment cessation have included patient death, end-stage disease where further treatment is futile, disease quiescence, systemic diseases that preclude treatment, logistical challenges and patient choice.[7–9] The specific reasons for treatment cessation may differ by geographic region and health system. To date, there are no published studies that have examined reasons for anti-VEGF treatment cessation within New Zealand.

Understanding why treatment is discontinued has implications for clinical decision making and in informing the health sector for service planning, resource allocation and equity. The aim

of this study is to evaluate the longer-term real-world treatment outcomes for patients with nAMD being treated with anti-VEGF agents at Palmerston North eye clinic (PNEC), a regional ophthalmology service in New Zealand. The primary outcome is to determine treatment duration and describe the reasons for treatment cessation. Secondary outcomes include an assessment of visual acuity (VA) changes, injection intervals and maintenance treatment regimens used across the study.

Methods

This is a single-centre, retrospective cohort study conducted at PNEC, a regional public ophthalmology service with a catchment of 190,000 people across Palmerston North, Manawatū and Ōtaki.[10] This study included all newly diagnosed eyes with nAMD that commenced intravitreal anti-VEGF therapy between November 2017 and August 2023. Patients were identified using a prospectively maintained outcomes database established in 2017 to monitor patients receiving intravitreal injections. Collected data included demographic characteristics of age, sex and ethnicity, visual acuity, specific anti-VEGF agent used, treatment duration and documented reason for treatment cessation. Collected information was validated against the patient's electronic health record. Baseline VA could not be identified from the available clinical records for 23 eyes. These eyes were retained in analyses relating to treatment duration and reasons for treatment cessation but were excluded from analyses requiring classification of VA change.

Reasons for treatment cessation were classified into several categories as recorded in the patient electronic health record, including: end-stage disease where further treatment would be futile; death of the patient; logistical reasons, including medical comorbidities precluding further treatment or the patient leaving the region; intolerance to injections; and a dry macula for patients treated with a *PRN* treatment regimen. Treatment was guided by optical coherence tomography (OCT) findings, with a goal of complete resolution of subretinal fluid where possible. However, a small amount of subretinal fluid less than 200µm was accepted if complete resolution could not be achieved. VA was recorded as best-corrected VA in logarithm of the minimum angle of resolution (LogMAR). Visual outcomes were also categorised for descriptive purposes as either stable (loss of fewer than three Snellen lines) or improved (gain of three or more Snellen lines), allowing comparison with previous literature. Treatment duration was defined as the number of days between the first and last recorded intravitreal injection.

Statistical analysis was performed using R statistical software.[11] Time to treatment cessation was analysed using Kaplan–Meier curves. Group comparisons of continuous variables were conducted using Student's *t*-Tests and one-way analysis of variance (ANOVA) where appropriate. A p-value <0.05 was regarded as statistically significant. This study received locality approval from Health New Zealand – Te Whatu Ora MidCentral.

Results

There was a total of 527 eyes from 446 patients with a new diagnosis of nAMD across the study period. The mean age at diagnosis in years was 80.3 (standard deviation [SD] 7.64). Other patient demographic characteristics are summarised in Table 1.

Treatment duration and cessation

A total of 210 (39.8%) eyes ceased treatment during the study period. The mean duration of treatment until cessation was 421 days. The minimum treatment duration was 1 day, and the maximum treatment duration was 1,906 days. The reasons for treatment cessation and the mean treatment duration by reason for cessation are summarised in Table 2. The duration of treatment prior to cessation stratified by reasons for treatment cessation is displayed in Figure 1. There were seven eyes on a *PRN* treatment regimen that stopped treatment due to a dry macula, but these were not included in the figure as the number was small. Nine eyes had no reason specified for treatment cessation. There was no statistically significant difference in treatment duration by reason for treatment cessation (p-value 0.39).

Visual outcomes

The mean VA in LogMAR at diagnosis (N=504) was 0.70 (SD 0.48). For eyes with a follow-up period of 24 months and still receiving treatment (N=238), the mean VA in LogMAR was 0.63 (SD 0.52). The mean final recorded VA in LogMAR (N=527) was 0.72 (SD 0.57). The mean VA in LogMAR at each follow-up time point is displayed in Figure 2 and is stratified by VA at the time of initial diagnosis. Across the study period, the final VA was classified as improved in 102 (20.2%)

Table 1: Demographics of patients with newly diagnosed neovascular age-related macular degeneration at Palmerston North eye clinic across the study period (N=446).

Patient characteristic	Number of patients, N/446 (%)
Sex	
Female	265 (59.4)
Male	179 (40.1)
Unknown	2 (0.4)
Ethnicity	
NZ Māori	8 (1.8)
NZ European	419 (93.9)
Pacific people	5 (1.1)
Other	12 (2.7)
Unknown	2 (0.4)

Table 2: Reasons for treatment cessation of patients diagnosed with neovascular age-related macular degeneration during the study period.

Reason for cessation	N ceased treatment (%)	Mean duration in days
End-stage disease	94 (44.8)	389
Patient death	46 (21.9)	528
Logistical reasons	37 (17.6)	441
Intolerance to injections	17 (8.1)	347
Dry macula (PRN)	7 (3.3)	272
No reason specified	9 (4.3)	397

PRN = pro re nata.

eyes and stable in a further 300 (59.5%) eyes. The remaining 102 (20.2%) eyes had a worsened VA across the study period.

Injection intervals and treatment regimens

Five hundred and seventeen eyes were treated with a T&E protocol, and 10 eyes were treated with a *PRN* protocol. No eyes were treated with a fixed 4-weekly dosing interval. All eyes received Avastin as the first intravitreal agent. At the end of the study period, 140 eyes had switched to Eylea. For eyes still receiving treatment at the end of the study period, the mean injection interval of those treated with Avastin (N=173) was 10.9 (SD 4.2) weeks and of those receiving Eylea (N=140) was 7.2 (SD 3.5) weeks. Three eyes received Zaltrap and one eye still receiving Avastin treatment was on a *PRN* treatment protocol.

Discussion

Treatment cessation

This study describes real-world outcomes of treatment cessation and VA in patients receiving intravitreal anti-VEGF for nAMD at a regional ophthalmology service in New Zealand. Of the 527 eyes that received treatment, 39.8% ceased therapy over the study period. The most common reason for treatment discontinuation was

Figure 1: Kaplan–Meier curves showing patients still receiving treatment over time since treatment initiation stratified by reason for eventual treatment cessation: patient death (N=46), end-stage disease (N=94), intolerance to injections (N=17) and logistics (N=37).

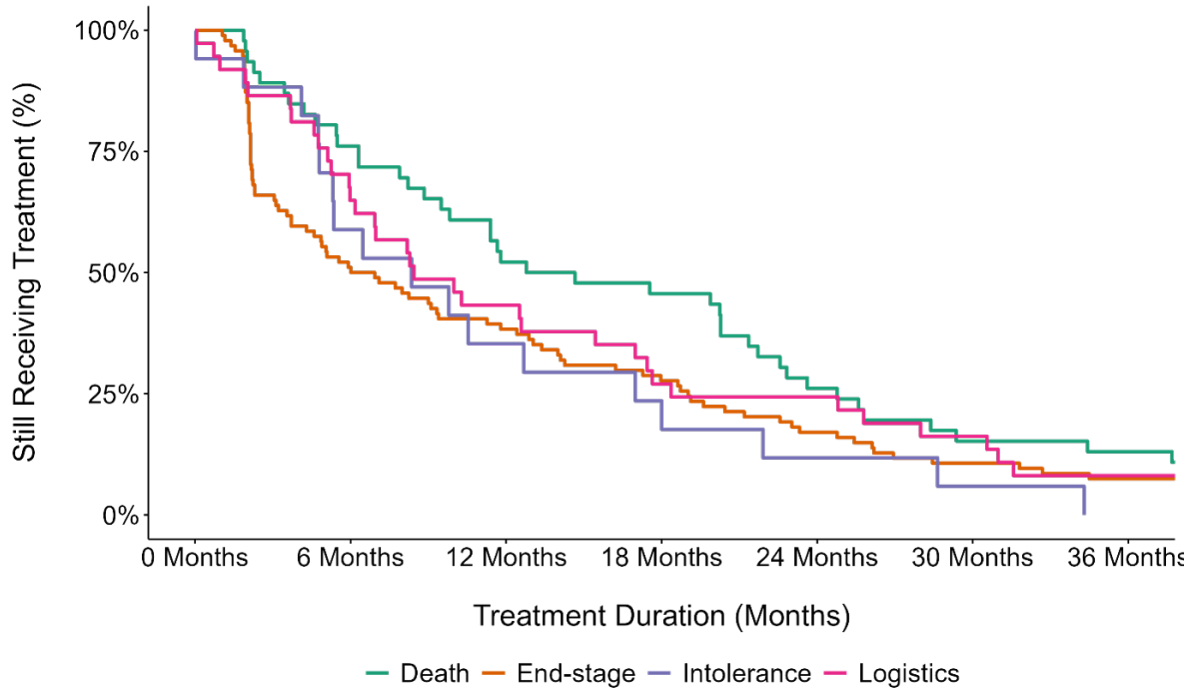
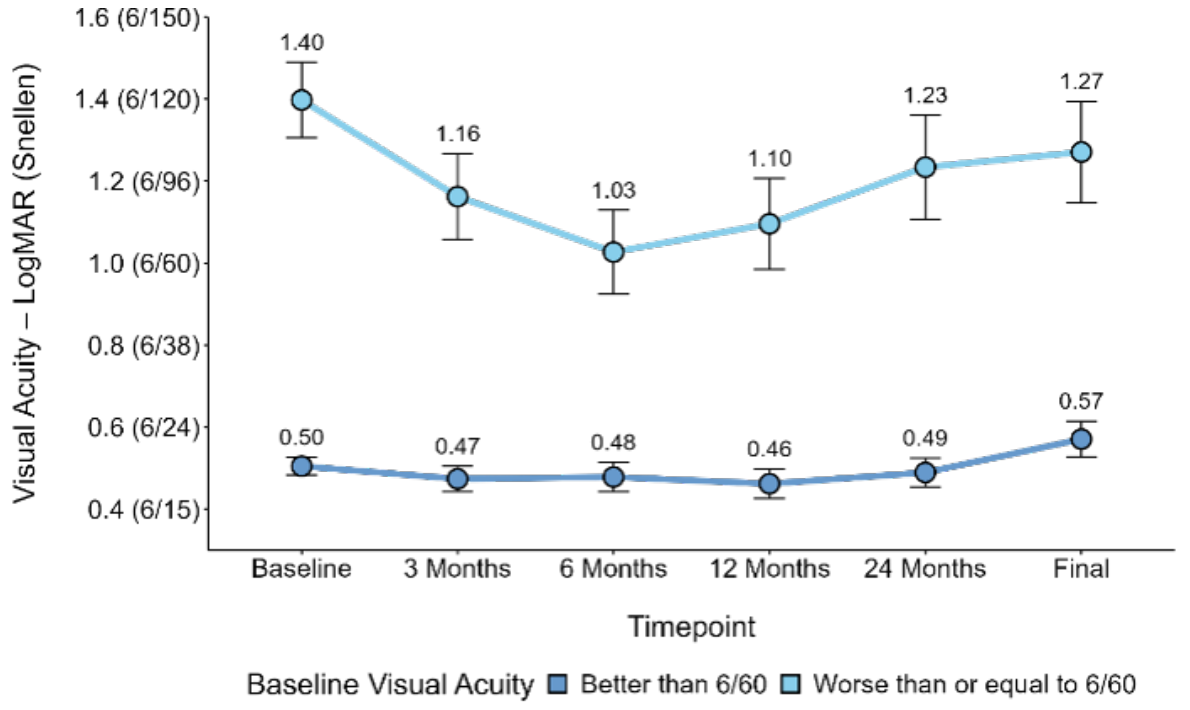


Figure 2: Mean visual acuity with 95% confidence intervals at each follow-up time point, stratified by initial visual acuity (p-value <0.001).



end-stage disease (44.8%), followed by patient death (21.9%), logistical factors (17.6%) and intolerance to injections (8.1%). A few eyes were on a *PRN* treatment protocol and ceased treatment due to disease inactivity (3.3%). The overall treatment cessation rate in this study is consistent with other real-world studies that have reported discontinuation rates ranging between 28.5 and 60%.[7–9] End-stage disease was common in these studies, being responsible for 18.1–26.4% of total treatment cessation, but significantly lower than our study's finding of 44.8%.[7,8] Notably, many patients in our study that ceased treatment due to end-stage disease did so within a short time frame after treatment initiation, suggesting that significant macular disease may have already been present at the time of first specialist appointment. This pattern is also reflected in the sub-group with baseline VA worse than 6/60. Rather than representing visual improvement, this finding likely reflects early treatment cessation in eyes with advanced disease and limited visual potential. These findings highlight the need for early detection and referral for patients with nAMD. Anti-VEGF therapy is effective in the treatment of nAMD but relies on prompt treatment as severe and irreversible vision loss occurs in the absence of treatment due to macular neovascularisation and scarring.[1,12] International studies have demonstrated significantly poorer visual outcomes with delays in initiation of intravitreal therapy, and current guidelines from the Royal Australian and New Zealand College of Ophthalmologists (RANZCO) recommend treatment initiation within 14 days of referral to get the best visual outcomes.[12,13] The PNEC has implemented several service innovations to improve timeliness of care, and a recent retrospective study has shown the service meets the RANZCO guidelines of prompt treatment initiation.[14] These innovations have included an acute macular clinic for fast-tracking new referrals, a nurse-led intravitreal injector service and, more recently, a hybrid clinic model that involves same-day intravitreal injections and imaging with OCT and fundus photography to determine the subsequent treatment interval.[14,15] While system innovations at our centre have improved timeliness from referral to treatment, delays in treatment initiation may occur at earlier points in the pathway, particularly at patient recognition of symptoms and referral aspects of the process.[12,14,15] Public education around the early symptoms of nAMD such as reduced vision and metamorphopsia is important in encouraging early presentation to primary care.[12,13] Additionally, ensuring accessible and affordable optometry services could help detect nAMD earlier and thereby allow earlier treatment initiation. Primary care by optometry is largely not publicly funded or subsidised in New Zealand, which may present a barrier to accessing care and lead to inequity by socio-economic status.

Logistical factors accounted for 17.6% of treatment cessation in our cohort, with common reasons including significant medical comorbidities and patients that left the region. Other reported logistical challenges in the literature include long travel distances to receive treatment and the cost of attending appointments, although the results of these are variable.[9] Cost and travel distances were not analysed in our study but are important metrics to consider going forwards, particularly in an analysis of equity of access to care. Intolerance to injections was responsible for 8.1% of treatment discontinuation in our study and is well described in other studies.[16] Patients report anxiety and side effects of intravitreal injections such as discomfort and irritation as key reasons for intolerance and treatment discontinuation.[16] While not all intolerance is preventable, structured support including patient education and consistent injectors may help mitigate these issues.[16] Additionally, newer treatments that allow longer treatment intervals may be helpful in supporting treatment adherence due to reduced burden of treatment.[16] Treatment cessation due to a dry macula only occurred in a minority of patients on a *PRN* treatment regimen. This group likely represents eyes with disease inactivity or regression, although the reactive nature of *PRN* dosing may contribute to undertreatment.[5] Our department has almost universally adopted the T&E protocol, offering a more proactive strategy with sustained disease control and longer interval extension.[5]

Visual outcomes and treatment modality

Across the study period, 20.2% of eyes had an improvement in VA with an additional 59.5% of eyes maintaining stable VA. Importantly, better baseline VA was strongly predictive of a better VA at all follow-up time points, a relationship that has been consistently demonstrated in other studies.[17,18] Our results reinforce the importance of early diagnosis and treatment initiation to prevent irreversible vision loss.[12] These findings may also assist clinicians in counselling patients commencing anti-VEGF therapy by providing realistic expectations regarding visual outcomes

and prognosis.

Most patients in our study were managed with a T&E regimen, consistent with current practice trends and supported by evidence demonstrating non-inferiority to fixed dosing while achieving a reduced treatment burden.[5] This has important implications for service capacity as longer intervals between injections allows the department to treat a greater number of patients. All patients were initially treated with Avastin, reflecting public funding policies in New Zealand.[19] Since June 2018, patients demonstrating a suboptimal response to Avastin after a series of three injections at 4-weekly intervals have been eligible to switch to Eylea according to Pharmac funding criteria.[20] During the study period, 140 eyes were switched to treatment with Eylea. Eyes treated with Eylea had shorter injection intervals at final follow-up, although this may reflect a greater severity of disease in patients meeting the funding criteria to switch to Eylea.[20] Some eyes were initiated on treatment before public funding of Eylea and it is possible that these eyes experienced a delay in switching, although these numbers are likely small as Eylea became publicly funded early in the study period. Faricimab is a newer intravitreal agent that has recently become publicly funded for treatment-resistant nAMD and offers potentially longer treatment intervals and reduced treatment burden.[19,21] None of the patients in this study received Faricimab but future studies will include these patients.

The small number of Māori and Pacific patients included in this cohort reflects the known epidemiology of nAMD and does not allow meaningful comparisons of treatment outcomes between ethnic groups.[22,23] However, understanding barriers to ongoing intravitreal therapy remains important, as anti-VEGF agents are also used to treat other retinal diseases such as diabetic eye disease that disproportionately affect Māori and Pacific populations.[24] Future studies examining treatment duration and discontinuation may provide valuable insights into equity of access and outcomes for these groups.

Strengths and limitations

This study offers detailed insights into real-world patterns of anti-VEGF treatment discontinuation at a publicly funded regional New Zealand centre. The study period of 6 years allows meaningful evaluation of longer-term cessation rates, treatment patterns and visual outcomes. Importantly, this work addresses the underexplored area of reasons for treatment discontinuation of anti-VEGF therapy. The findings of this work can inform local service planning and may be generalisable to similar regional centres. However, this study only reflects practice at a single centre, which may limit generalisability to centres with different populations. Another limitation is the retrospective nature of the data collection that relies on the accuracy and completeness of clinical records, though we used both the prospectively managed database of nAMD outcomes and the patient's electronic health record to validate the data. Another limitation was that baseline VA data were unavailable for 23 eyes, preventing classification of visual outcomes in these cases. However, these numbers were small, and these eyes were retained for analyses of treatment cessation. Despite these limitations, this study provides the only detailed analyses of anti-VEGF treatment cessation in the New Zealand context to date and identifies important areas for future research and service improvement.

Conclusions

This study highlights the need for early detection and treatment in the management of nAMD. The high proportion of early treatment cessation due to end-stage disease underscores the importance of timely presentation, reinforcing the value of public education and accessible optometry services. As the demand for anti-VEGF therapy increases along with an ageing population, strategies that reduce delays and support equitable access will be essential to optimising visual outcomes and service sustainability.

COMPETING INTERESTS
Nil.

AUTHOR INFORMATION
Brandon Nunns: Ophthalmology Registrar, Wellington Hospital, Wellington, New Zealand.
Aqeeda Singh: Ophthalmology Training Registrar, Dunedin Hospital, Dunedin, New Zealand.
John Ah-Chan: Consultant Ophthalmologist, Palmerston North Hospital, Palmerston North, New Zealand.

CORRESPONDING AUTHOR
Brandon Nunns: Ophthalmology Registrar, Wellington Hospital, Wellington, New Zealand.
E: brandon.nunns@gmail.com

URL
https://nzmj.org.nz/journal/vol-139-no-1643/longer-term-outcomes-of-intravitreal-therapy-for-neovascular-age-related-macular-degeneration-at-a-peripheral-centre-palmerston-

CITATION
Nunns B, Singh A, Ah-Chan J. Longer-term outcomes of intravitreal therapy for neovascular age-related macular degeneration at a peripheral centre (Palmerston North eye clinic). N Z Med J. 2026 Oct 9;139(1643):24-31. doi: 10.26635/6965.7545.

REFERENCES
1. Guymer RH, Campbell TG. Age-related macular degeneration. Lancet. 2023 Apr 29;401(10386):1459-1472. doi: 10.1016/S0140-6736(22)02609-5.
2. Wong TY, Chakravarthy U, Klein R, et al. The natural history and prognosis of neovascular age-related macular degeneration: a systematic review of the literature and meta-analysis. Ophthalmology. 2008 Jan;115(1):116-26. doi: 10.1016/j.ophtha.2007.03.008. Erratum in: Ophthalmology. 2008 Sep;115(9):1524. Wong, Tien [corrected to Wong, Tien Y].
3. Finger RP, Daien V, Eldem BM, et al. Anti-vascular endothelial growth factor in neovascular age-related macular degeneration - a systematic review of the impact of anti-VEGF on patient outcomes and healthcare systems. BMC Ophthalmol. 2020 Jul 17;20(1):294. doi: 10.1186/s12886-020-01554-2.
4. Rufai SR, Almuhtaseb H, Paul RM, et al. A systematic review to assess the 'treat-and-extend' dosing regimen for neovascular age-related macular degeneration using ranibizumab. Eye (Lond). 2017 Sep;31(9):1337-1344. doi: 10.1038/eye.2017.67.
5. Rosenberg D, Deonarain DM, Gould J, et al. Efficacy, safety, and treatment burden of treat-and-extend versus alternative anti-VEGF regimens for nAMD: a systematic review and meta-analysis. Eye (Lond). 2023 Jan;37(1):6-16. doi: 10.1038/s41433-022-02020-7.
6. Wong WL, Su X, Li X, et al. Global prevalence of age-related macular degeneration and disease burden projection for 2020 and 2040: a systematic review and meta-analysis. Lancet Glob Health. 2014 Feb;2(2):e106-116. doi: 10.1016/S2214-109X(13)70145-1.
7. Borrelli E, Foti C, Ulla L, et al. Incidence and reasons for discontinuation of anti-VEGF treatment in neovascular age-related macular degeneration. Br J Ophthalmol. 2025 Jul 22;109(8):875-881. doi: 10.1136/bjo-2024-326152.
8. Dhingra N, Upasani D, Ghanchi FD. Patterns of treatment discontinuation in patients receiving anti-vascular endothelial growth factor for neovascular age-related macular degeneration. Indian J Ophthalmol. 2022 Jun;70(6):2065-2070. doi: 10.4103/ijo.IJO_3066_21.
9. Okada M, Mitchell P, Finger RP, et al. Nonadherence or Nonpersistence to Intravitreal Injection Therapy for Neovascular Age-Related Macular Degeneration: A Mixed-Methods Systematic Review. Ophthalmology. 2021 Feb;128(2):234-247. doi: 10.1016/j.ophtha.2020.07.060.
10. Stats NZ Tatauranga Aotearoa. Aotearoa Data Explorer [Internet]. Wellington, New Zealand: 2023 [cited 2026 Jun 6]. Available from: https://www.stats.govt.nz/tools/aotearoa-data-explorer/
11. R Core Team. R: A Language and Environment for Statistical Computing. Vienna, Austria: R Foundation for Statistical Computing; 2016. Available from: https://www.R-project.org/.
12. Lim JH, Wickremasinghe SS, Xie J, et al. Delay to treatment and visual outcomes in patients treated with anti-vascular endothelial growth factor for age-related macular degeneration. Am J Ophthalmol. 2012 Apr;153(4):678-686, 686.e1-2. doi: 10.1016/j.ajo.2011.09.013.
13. Royal Australian and New Zealand College of Ophthalmologists. NZ National guidelines for management of neovascular AMD [Internet]. 2018 [cited 2025 Dec 15]. Available from: https://ranzco.edu/wp-content/uploads/2018/11/National-Guidelines-for-management-of-neovascular-AMD-RANZCO-2-1.pdf
14. Nunns B, Singh V, Ah-Chan J. Intravitreal therapy in neovascular age-related macular degeneration-adapting to increasing demand and changing times. N Z Med J. 2024 Sep 27;137(1603):129-137. doi: 10.26635/6965.6597.
15. Yap A, Kho A, Ah-Chan J. The outcomes of patients

with newly diagnosed exudative age-related macular degeneration in Palmerston North. N Z Med J. 2021 Apr 30;134(1534):46-50.
16. Giocanti-Aurégan A, García-Layana A, Peto T, et al. Drivers of and Barriers to Adherence to Neovascular Age-Related Macular Degeneration and Diabetic Macular Edema Treatment Management Plans: A Multi-National Qualitative Study. Patient Prefer Adherence. 2022 Mar 3;16:587-604. doi: 10.2147/PPA.S347713.
17. Veluswamy B, Lee A, Mirza RG, Gill MK. Correlation of Baseline Visual Acuity with Outcomes of Treatment with Anti-VEGF in Neovascular Age-Related Macular Degeneration. Clin Ophthalmol. 2020 Jun 10;14:1565-1572. doi: 10.2147/OPTH.S256009.
18. Ying GS, Maguire MG, Pan W, et al. Baseline Predictors for Five-Year Visual Acuity Outcomes in the Comparison of AMD Treatment Trials. Ophthalmol Retina. 2018 Jun;2(6):525-530. doi: 10.1016/j.oret.2017.10.003.
19. Pharmaceutical Management Agency New Zealand. Pharmaceutical Schedule Update [Internet]. Wellington, New Zealand: 2025 Dec [cited 2025 Dec 15]. Available from: https://schedule.pharmac.govt.nz/2025/11/18/SU.pdf
20. Pharmaceutical Management Agency. New Zealand Pharmaceutical Schedule [Internet]. Wellington, New Zealand: 2024 Jun [cited 2025 Dec 15]. Available from: https://schedule.pharmac.govt.nz/2024/06/01/Schedule.pdf#page=198
21. Panos GD, Lakshmanan A, Dadoukis P, et al. Faricimab: Transforming the Future of Macular Diseases Treatment - A Comprehensive Review of Clinical Studies. Drug Des Devel Ther. 2023 Sep 18;17:2861-2873. doi: 10.2147/DDDT.S427416.
22. Worsley D, Worsley A. Prevalence predictions for age-related macular degeneration in New Zealand have implications for provision of healthcare services. N Z Med J. 2015 Feb 20;128(1409):44-55.
23. Rapata M, Cunningham W, Harwood M, Niederer R. Te hauora karu o te iwi Māori: A comprehensive review of Māori eye health in Aotearoa/New Zealand. Clin Exp Ophthalmol. 2023 Sep-Oct;51(7):714-727. doi: 10.1111/ceo.14279.
24. Ramke J, Jordan V, Vincent AL, et al. Diabetic eye disease and screening attendance by ethnicity in New Zealand: A systematic review. Clin Exp Ophthalmol. 2019 Sep;47(7):937-947. doi: 10.1111/ceo.13528.

Is self-efficacy after spinal cord injury associated with hospital re-admissions or length of stay in Aotearoa New Zealand? A cross-sectional analysis

Bensy Mathew, Mitchell Wolden, Rachelle Martin

ABSTRACT

AIM: The transition from inpatient care to the community challenges coping strategies in spinal cord injury (SCI), and acute hospital re-admissions may act as profound psychological disruptors. This study compared self-efficacy scores between discharge and 18-month follow-up and examined the association of self-efficacy with hospital re-admissions and length of stay (LOS).

METHODS: This repeated cross-sectional study utilised New Zealand Spinal Cord Injury Registry data. One hundred and one participants (35.3% response rate) provided general self-efficacy (GSE) scores at discharge and 18 months. Analysis included paired *t*-tests, a one-way analysis of covariance comparing readmission groups (controlling for baseline GSE), and linear regression assessing log-transformed LOS.

RESULTS: GSE scores declined significantly from a mean of 34.1 at discharge to 32.2 at 18 months (p=0.0001; Cohen's d=0.4). After adjusting for baseline scores, participants with hospital re-admissions had significantly lower GSE at 18 months (M=31.0) than those without (M=32.9; p=0.036; adjusted Cohen's d=0.43). LOS did not show an association with GSE scores (p=0.778).

CONCLUSION: Self-efficacy significantly erodes during the transition from rehabilitation to community dwelling. Hospital re-admissions appear to have a significant association with lower self-efficacy at 18 months even when accounting for baseline self-efficacy levels.

Spinal cord injury (SCI) is a result of a neurologic insult to the spinal cord from traumatic or non-traumatic causes, with resultant temporary or permanent loss of function. While survival and life expectancy have improved after SCI,[1] it remains a devastating lifelong condition with significant physical, psychological and economic challenges.[2] Individuals with SCI try to cope with these challenges across physical, social and environmental domains.[3]

Self-efficacy has a significant role in life satisfaction and is recognised as an indicator of adjustment following SCI.[4,5] Research has shown that self-efficacy is a major factor in building resilience and the capacity to adapt to loss.[5]

While self-efficacy has been shown to have a positive correlation with leisure, recreation, social integration[6] and hope[7] and a strong negative correlation with depression,[5] anxiety and chronic pain,[8] in SCI its association with hospital re-admissions and length of stay (LOS) of these re-admissions remains under-investigated.

The transition from an inpatient rehabilitation unit to community dwelling inherently challenges a patient's coping strategies; however, an acute, unplanned hospital re-admission may act as an even more profound psychological disruptor. Unplanned hospitalisation readmissions are often due to major secondary health conditions (SHCs) (i.e., pressure injuries, urinary tract infections, pain, etc.). People with SCI are 2.4 times more likely to be hospitalised than the general population,[9] with a mean LOS of 31.5 days with large variation.[10] In a prospective study with 951 people with newly diagnosed traumatic SCI, 36.2% of participants were re-hospitalised within a year with SHCs and 12.5% re-hospitalised at least twice with an average LOS of 15.5±30.8 days across all episodes.[11] General hospital environments frequently lack specialised SCI infrastructure and staff trained in managing neurogenic bowel, bladder or pressure injury in SCI. Consequently, individuals often experience severe loss of autonomy, institutional dependency and hospital-associated functional decline. This systemic mismatch can erode the fragile baseline confidence and self-efficacy an individual compiled during their primary rehabilitation. Through studying individuals who sustained an SCI, the aims of our project were to:

1. compare the self-efficacy between discharge

and the 18-month follow-up following inpatient rehabilitation;
2. evaluate the 18-month self-efficacy scores between participants with and without an acute hospital re-admission; and
3. examine the association between hospital re-admission LOS and self-efficacy scores at 18-month follow-up.

This study explores these exploratory associations to identify clinical trends during community reintegration.

Evaluating factors that affect self-efficacy has significant clinical and practical benefits that would help address key gaps in understanding the long-term wellbeing of individuals with SCI. Quantifying these relationships provides a vital foundation to improve care and rehabilitation management decisions in two distinct ways. First, it identifies low baseline self-efficacy at initial discharge as a critical clinical marker for targeted, pre-emptive community psychological support. Second, by demonstrating the precise psychological toll of hospital readmission, these findings justify the development of proactive, cross-system transitional care protocols designed to protect patient autonomy and prevent functional and psychological decline during acute secondary health crises.

Methods

Study design/data source

This was a cross-sectional study with data obtained from the New Zealand Spinal Cord Injury Registry (NZSCIR). The NZSCIR was set up in 2016 to collect basic statistics to help SCI services track incidence, causes, severity and treatment of SCI in order to improve outcomes. We followed the STrengthening the Reporting of OBservational studies in Epidemiology reporting guidelines for cross-sectional studies (www.strobe-statement.org).

Study population

Any person with a new SCI (traumatic or non-traumatic, complete or incomplete) aged 15 years and over and admitted to one of the two supra-regional spinal services in Aotearoa New Zealand from 1 August 2016 had information entered into the registry. For the purposes of this analysis, any participant who had the International Standards for Neurological Classification of Spinal Cord Injury scores of A or B were classified as having complete injury and those with scores of C or D were classified as having incomplete injury. Only participants whose consent (parental/guardian consent in case of legal minors under the age of 16 years of age) was obtained for full dataset entry and community follow-up and who completed the 18-month structured community follow-up questionnaire (online or postal) were included in this study. Of the 286 participants contacted for community follow-up from 2016 to 2023, only 101 completed the follow-up questionnaire and met inclusion criteria.

The registry has strict guidelines and procedures in place regarding privacy and data storage, approved by the Aotearoa New Zealand Health and Disability Ethics Committee (HDEC). The current study was deemed to fall outside the scope for HDEC approval, and separate ethical approval was obtained from the University of Otago Human Ethics Committee (H25/0423) and the Institutional Review Board, University of Jamestown.

Data collection

Baseline data (demographics, location of treatment provided and basic information about the SCI) were collected on all admissions. A registry co-ordinator visited participants to gain consent for full dataset inclusion. Where participants were legal minors (under the age of 16 years of age), the registry co-ordinator obtained parent/guardian consent. The full dataset included details about the SCI, treatment, complications, rehabilitation and various outcome measures. The NZSICR uses the General Self-Efficacy (GSE) Scale as the outcome measure to assess self-efficacy. The GSE scale is a 10-item scale with scores ranging from 1 to 4 for each item and total scores ranging from 10 to 40, with higher scores indicating more self-efficacy. The GSE scale has demonstrated good structural consistency and good convergent validity with other self-efficacy measures for people living with SCI.[12] Rasch analysis has shown that the GSE scale is a psychometrically robust instrument for the assessment of self-efficacy in people living with SCI.[13]

The scale was administered on discharge from the rehabilitation unit. The community follow-up questionnaire was anchored at 18 months post-injury. Consenting participants were contacted by the registry co-ordinator for community follow-up, with a structured questionnaire including the GSE scale. Data collected from the 18-month community follow-up questionnaire

included demographics (age at injury and gender), type of SCI (complete/incomplete), self-reported acute hospital re-admissions and LOS in the 12-month period preceding the follow-up and GSE scale. Acute hospital re-admission was operationally defined as any unplanned admission overnight in an hospital occurring within the 12 months preceding the 18-month interview.

Data analysis

All analyses were completed using Stata/BE 19.5 (StataCorp, Texas, United States of America). Descriptive statistics (frequency and percentage for categorical variables and mean and standard deviation [SD] for continuous variables) were calculated for SCI-related characteristics on discharge and at 18-month follow-up. The difference in total GSE scores on discharge from inpatient rehabilitation and at 18-month follow-up was compared using paired *t*-tests. To determine the relevance of changes in GSE scores over time, Cohen's d effect sizes were calculated and interpreted as negligible (0.01–0.19), small (0.20–0.49), moderate (0.50–0.79) or large (0.80–1.00).[14] In the absence of a universally established, anchor-based minimal clinically important difference (MCID) for the acute SCI population on the GSE scale, a distribution-based approach was utilised to evaluate meaningful variance. Following established psychometric frameworks for patient-reported outcomes, a standardised effect size (Cohen's d) falling between 0.2 and 0.5—corresponding approximately to 0.5 of an SD—was pre-specified as the threshold indicating a clinically meaningful population-level shift.[14–16]

Prior to running the final inferential models, continuous variables were assessed for distributional assumptions. GSE scores demonstrated a normal distribution and are reported as means with SDs (±SD). Hospital LOS data exhibited a severe right-hand skew and are consequently presented as medians with interquartile ranges. To satisfy the linearity, homoscedasticity and residual normality assumptions required for ordinary least squares regression, the raw LOS data underwent a natural logarithmic transformation (lnLOS).

A multivariable linear regression model was then constructed with 18-month GSE scores as the dependent variable, utilising log-transformed LOS variable as the primary predictor while adjusting for baseline (discharge) GSE scores. Post-estimation diagnostics were strictly applied to validate the model: homoscedasticity was evaluated using the Breusch–Pagan test, and the normality of the model's residuals was formally verified via the Shapiro–Wilk test.

A one-way analysis of covariance (ANCOVA) was conducted to compare 18-month GSE scores between those with and those without hospital re-admissions after discharge, while controlling for baseline GSE scores on discharge from inpatient rehabilitation. Partial eta squared (ηp^2) was calculated for ANCOVA to show the magnitude of the effect of acute hospital re-admissions on GSE scores at 18m, with ηp^2=0.01 indicating a small effect, ηp^2=0.06 indicating a medium effect and ηp^2=0.14 indicating a large effect.[14] *Post hoc* analysis was conducted using predictive margins to calculate the adjusted mean GSE scores for the hospital re-admission group while holding the baseline covariate at its mean value. To ensure the precision of these estimates, standard errors (SEs) and 95% confidence intervals (CIs) were derived via the delta method.[17] Statistical significance was based on a two-tailed alpha level of 0.05.

Results

Of the 286 participants who were contacted for community follow-up, only 101 (35.3%) completed the 18-month follow-up questionnaire. Participant characteristics are presented in Table 1. On average, respondents were 54.18±17.60 years old. The majority were male (63%) and had sustained an incomplete SCI (70%). The mean total GSE score on discharge was 34.1±4.72, and on follow-up at 18 months was 32.17±5.10. Thirty-eight point six percent reported acute hospital re-admissions sometime in the 12 months preceding the 18-month follow-up, with a median LOS of 5 (2–8) days (Table 1).

At the 18-month post-injury follow-up, GSE scores were significantly lower than at discharge following inpatient rehabilitation (mean difference [MD]=1.93, SD=4.86, p=0.0001; Table 1). The magnitude of difference was moderate, as indicated by a Cohen's d of 0.4. Based on our distribution-based psychometric framework, this effect size satisfies the criteria for an MCID, confirming that the 1.93-point reduction represents a true, clinically distinct drop in patient coping capacity rather than mere statistical noise.

The ANCOVA model was statistically significant ($F[2, 98]=20.36$, $p<.001$). R^2=0.294 indicated that approximately 29.4% of the variance in GSE at 18 months was explained by the model. Baseline GSE score at discharge from inpatient rehabilitation

Table 1: Demographic profile and injury characteristics of New Zealand Spinal Cord Injury Registry responders at inpatient discharge and 18-month follow-up.

Characteristics N=101	Baseline [frequency (%) or mean (SD)]
Mean age at injury in years (SD)	54.18 (17.6)
Male (%)	63 (62.4)
Female (%)	38 (37.6)
Type of SCI Complete (AIS A/B) (%) Incomplete (AIS C/D) (%)	 31 (30.7) 70 (69.3)
Acute hospital re-admissions No (%) Yes (%)	 62 (61.4%) 39 (38.6%)
Mean LOS in acute hospital in days median [IQR]	5 [2–8]
Mean discharge total GSE score (SD)	34.1 (4.7)
Mean 18-month follow-up total GSE score (SD)	32.17 (5.1)

SD = standard deviation; SCI = spinal cord injury; AIS = American Spinal Cord Injury Association Impairment Scale; LOS = length of stay; IQR = interquartile range; GSE = general self-efficacy.
*Note: Direct demographic comparisons with the 185 non-responders were precluded due to data-extraction privacy protocols; however, aggregate sample characteristics align closely with historical New Zealand Spinal Cord Injury Registry distributions.

Figure 1: Box plot of 18-month GSE scores at discharge for those who underwent hospital readmissions and those who did not.

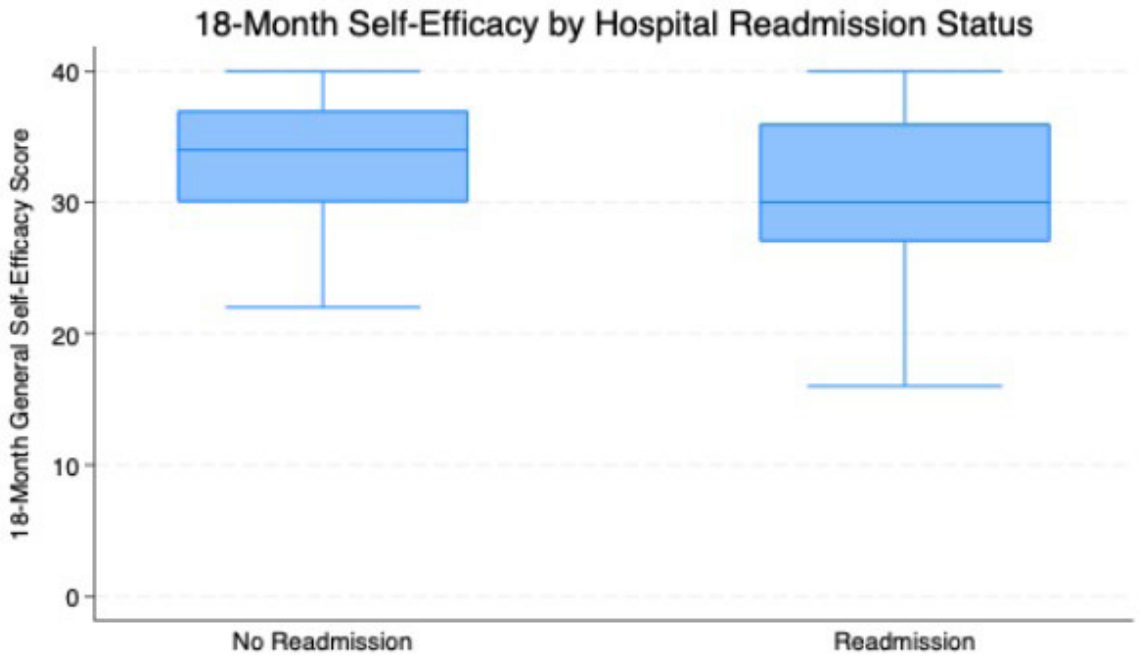


Figure 2: Scatter plot between LOS and GSE at 18 months.

was a significant predictor of the 18-month GSE score ($F[1, 98]=35.68$, $p<0.001$, $\eta p^2=0.267$). After controlling for GSE scores at initial discharge, there was a statistically significant difference in GSE scores at the 18-month follow-up based on hospital readmissions ($F[1, 98]=4.49$, $p=.0365$, $\eta p^2=0.044$). An ηp^2 of 0.044 showed a small-to-medium association of hospital re-admissions on GSE scores at the 18-month follow-up. *Post hoc* analysis of predictive margins indicated that participants who did not undergo hospital re-admissions had higher adjusted mean efficacy scores (M=32.89, SE=0.55) than those who experienced a hospital stay (M=31.02, SE=0.69) (Figure 1). This 1.87-point variance represents a small-to-medium group effect size ($\eta p^2=0.044$), which translates to a standardised Cohen's d of 0.43.

To evaluate whether the duration of hospital readmissions predicted long-term self-efficacy, a multivariable linear regression was performed among the subset of readmitted participants with complete registry data (N=38). The overall model accounted for 51.2% of the variance in 18-month GSE scores ($R^2=0.512$, $F[6, 31]=5.42$, $p=0.0006$). After adjusting for baseline discharge self-efficacy, gender, age and injury completeness, the log-transformed hospital LOS was not a statistically significant predictor of 18-month self-efficacy scores (beta=−0.14, SE=0.70, t=−0.19, p=0.847, 95% CI −1.57–1.30). The only statistically significant predictor within the multivariable framework was baseline self-efficacy at the time of inpatient discharge, which demonstrated a strong positive association with 18-month outcomes (beta=0.67, SE=0.13, t=5.17, p<0.001, 95% CI 0.40–0.93). Demographic and clinical factors, including age (p=0.445), gender (p=0.619) and injury completeness (p=0.703), did not significantly influence 18-month self-efficacy scores in this cohort (Figure 2).

Discussion

This cross-sectional analysis is the first of its kind in Aotearoa New Zealand to assess the long-term association of hospital re-admissions and LOS with self-efficacy of people living with SCI. Self-efficacy plays a key role in adjustment to SCI, linking competence beliefs to behavioural and functional outcomes. It is recognised as an important factor in the long-term adjustment and social and community participation of people with SCI.[12]

Decline in self-efficacy: comparison with literature

Our findings demonstrated a statistically significant erosion of GSE from a mean of 34.1 at discharge to 32.2 at 18 months post-discharge

(MD=1.93, p=0.0001). While an absolute drop of nearly 2 points on a 10–40 scale may appear modest, our calculated Cohen's d of 0.4 represents a stable, small-to-moderate standardised effect size. According to historical psychometric consensus,[15] population-level shifts tracking between 0.2 and 0.5 SDs carry true clinical relevance in health-related quality of life and coping measures, reflecting a discernible systemic decline across the cohort. Because GSE operates as a relatively stable dispositional trait during adulthood,[18] this systemic decline underscores the profound psychological and functional disruptions individuals face when transitioning from structured inpatient rehabilitation into the community.

This noted decline aligns with established literature.[5,19] Multiple prospective and longitudinal studies, utilising various assessment tools, such as the GSE Scale and the Moorong Self-Efficacy Scale, have consistently reported a trend of decreasing or persistently poor self-efficacy in the long-term post-discharge period. Trajectory modelling has estimated that a proportion of participants enter the community with declining or very poor levels of self-efficacy that persist for at least the first year.[5]

Association of hospital re-admissions on self-efficacy

Our ANCOVA model revealed that even when accounting for their initial baseline status, patients who faced acute hospital readmissions scored significantly lower on the GSE scale at 18 months compared with those who remained in the community (p=0.0365). Crucially, this 1.87-point deficit achieved clinical significance by meeting our distribution-based MCID threshold, yielding a standardised effect size of Cohen's d=0.43.

In a clinical rehabilitation context, a shift of this magnitude implies a tangible reduction in a patient's perceived capability to problem solve, manage SHCs and independently navigate community barriers. This highlights that hospital re-admissions act as a major psychological destabiliser over a long-term horizon, demanding targeted coping interventions when these patients return home.

Our findings contrast with the short-term longitudinal findings of Gassaway et al.,[20] where hospital readmissions—despite being highly prevalent (occurring in 13–23% of their cohort)—did not prevent patients from achieving positive, upwards self-efficacy growth within the first 180 days post-discharge.

This divergence highlights a critical temporal threshold in SCI rehabilitation. In the immediate 6 months following discharge, the acute disruptive impact of a readmission may be temporarily buffered by transitional care, closer clinical monitoring or residual post-discharge support systems, allowing self-efficacy to remain on an upward trajectory despite medical setbacks. However, by our 18-month end point, the cumulative, unbuffered reality of navigating recurrent health crises within the community appears to take a measurable toll. Over time, hospital readmissions transition from transient medical setbacks to critical markers of a clinically meaningful decline in patients' perceived coping capacity (MD=1.87, adjusted Cohen's d=0.43).

Importantly, our multivariable regression model adds crucial depth to this narrative: while the descriptive or unadjusted presence of readmissions flags a vulnerable group, the specific duration of those readmissions (lnLOS) was not an independent predictor of 18-month GSE scores (beta=−0.14, p=0.847), whereas baseline discharge self-efficacy remained highly predictive (beta=0.67, p<0.001). This indicates that long-term psychological vulnerability is not strictly a dose-dependent response to the number of days spent back in a hospital bed. Instead, the capacity to withstand the psychological shock of hospital re-admission is anchored heavily in the psychological capital a patient possesses at discharge.[20]

Readmissions have an association on long-term GSE not because hospital stays inherently destroy coping beliefs, but because they expose and exacerbate pre-existing vulnerabilities in patients who transition into the community with lower initial self-efficacy baselines. This underscores the necessity of moving beyond purely medical metrics of readmission tracking to actively target long-term, community-based psychological coping frameworks.

SHCs and LOS

Previous research on self-efficacy and SHCs has focussed primarily on somatic symptoms like pain, fatigue and total somatic SHC scores.[8,21] Findings from others generally shows a trend towards a small negative correlation.[4] Self-efficacy is consistently shown to have a strong negative correlation with psychological SHCs like depression and anxiety.[4] Notably, frequently reported somatic SHCs, such as pressure ulcers and urinary tract infections, have not been

individually investigated in relation to self-efficacy, only as part of a total SHC score.[4]

Our multivariable analysis confirmed that the duration of hospital readmissions (lnLOS) does not have a significant, cumulative negative association with 18-month self-efficacy outcomes (beta=−0.14, p=0.847). This finding shifts the clinical focus away from medical-stay metrics alone; the primary driver of long-term coping capacity is not the absence of SHCs or shorter hospital readmission LOS, but rather the strength of a patient's self-efficacy at the time of initial inpatient discharge (beta=0.67, p<0.001). This aligns with contemporary frameworks suggesting that self-efficacy is an active asset established early in recovery. Consequently, interventions should not merely target the mitigation of readmission metrics but must aggressively optimise a patient's coping beliefs prior to community transition to safeguard their long-term psychological trajectory.

Clinical implications

Self-efficacy is a valuable clinical predictor of life adjustment[22] and should be treated as a crucial prognostic rehabilitation outcome variable.[23] Its strong negative correlation with mood disorders[4] supports a central role in rehabilitation psychology.

Our finding that GSE significantly erodes during the 18-month post-discharge transition points to a critical vulnerability window in the outpatient continuum. While we do not have broader health system infrastructure, administrative cost or macro-allocation data at our disposal to evaluate systemic health reform, our targeted data regarding the psychological toll of hospital re-admission provide a clear clinical rationale for optimising existing localised care pathways.

Specifically, these findings justify the clinical refinement of discharge planning to incorporate alternative, scalable care modalities—such as digital health platforms or professional peer-mentoring partnerships[20,23]—to ensure equity of support regardless of patient location. This is particularly relevant given that Aotearoa New Zealand's unique topography presents distinct challenges for spinal outreach infrastructure: because specialised spinal rehabilitation services are centralised within major urban hubs, individuals transitioning to remote or rural regions often face significant travel distances to access specialist care. Future registry-based analyses should incorporate spatial data and proximity-to-care metrics to formally evaluate whether geographical distribution acts as a primary moderator of community coping and self-efficacy.

Furthermore, targeted clinical resource allocation towards established interventions is warranted. Self-efficacy can be enhanced through active-living programmes, physical activity and involvement in sports.[7] Other psychological interventions effective in improving adjustment outcomes include cognitive behavioural therapy, cognitive restructuring[24] and design thinking.[25] Finally, peer-mentoring programmes have demonstrated positive effects on self-efficacy and reduced hospital readmission days.[20,26] While the NZSCI action plan endorses consistent national peer support provision,[27] current services are largely volunteer-led by consumer organisations like the New Zealand Spinal Trust. The evidence from our clinical cohort indicates a clear opportunity to support and expand these programmes, perhaps through training paid professional mentors to achieve long-term improvements in self-efficacy outcomes following SCI. The negative association between hospital readmissions and self-efficacy reinforces the rationale for broad preventive care strategies—such as app-based transitional care and comprehensive education for patients, their whānau and community providers—while also justifying localised SHC prevention programmes centred on regular follow-ups.

Limitations

There are limitations to this study that should be considered. First, all standard limitations inherent to cross-sectional analyses apply. Second, the low response rate of 35.3% (n=101/286) introduces a risk of selection bias. Because a comparative analysis of the 185 non-responders fell outside the scope of our initial approved data-extraction protocol, administrative boundaries prevented us from retroactively accessing individual-level demographics for this cohort. Although a direct statistical comparison could not be executed, the baseline characteristics of our responding sample closely align with broader aggregate demographic distributions historically reported by the NZSCIR. Additionally, our sub-group analysis investigating LOS was restricted strictly to readmitted participants (N=38). Given the number of controlled covariates within this framework, this specific sub-model is limited by reduced statistical power and an increased risk of overfitting; thus, these secondary findings must be interpreted purely as exploratory clinical trends.

Furthermore, data extraction from the NZSCI registry was restricted to strictly de-identified parameters to comply with ethics-mandated privacy frameworks, precluding the use of directly linked National Health Index (NHI) institutional records. Consequently, our data relied on self-reported metrics from the 18-month community follow-up questionnaire, making the parameters prone to recall bias in a cohort with medical complexity. This framework also prevented us from differentiating between a single prolonged inpatient stay and intermittent multiple admissions, and did not capture the exact chronological dates or timing of the hospital readmissions within the follow-up window. Consequently, we could not evaluate the direct temporal proximity between an acute hospital stay and the final GSE measurement, which may mask individual longitudinal trajectories. For example, a participant readmitted at 3 months post-discharge whose self-efficacy subsequently recovered is grouped identically with an individual readmitted at 17 months who is in acute psychological distress.

Nevertheless, utilising self-reported community parameters ensured the capture of acute healthcare encounters occurring nationwide across regional health boundaries, which regional hospital databases would otherwise omit. Epidemiological validation studies confirm that the recall of major, salient healthcare events—such as overnight hospitalisations—maintains high accuracy and agreement with health records over 12–24-month windows, rendering it a reliable metric for population-level analyses.[28] Finally, our findings remain vulnerable to residual unmeasured confounding. External exposures such as geographical rurality, post-discharge social integration, financial strain, leisure, depression, anxiety, chronic pain and the specific severity of SHCs were not available in our dataset. Future research utilising the NZSCIR framework should structurally request and incorporate these registry-tracked parameters to successfully isolate hidden clinical and socio-economic trajectories.

Future research

The NZSCIR's 5-year and 10-year follow-up questionnaires provide a valuable opportunity to assess the long-term, longitudinal association between self-efficacy, re-hospitalisations and LOS. More focussed research is necessary to clarify the relationships between self-efficacy and specific somatic SHCs,[12] variables such as geographic location/district health board catchment (to calculate rurality indices) and ethnicity, especially as SHCs are expected to increase with the ageing SCI population. Future studies should differentiate between single prolonged admissions and intermittent multiple admissions to better understand the true association with the length and type of acute hospital stay. Crucially, future research must prioritise the development or validation of outcome tools that are responsive to Māori perspectives of health and wellbeing, ensuring culturally appropriate assessment and intervention strategies.

Conclusion

This study represents the first longitudinal analysis in Aotearoa New Zealand to utilise NZSCIR data in tracking the relationship between acute hospital re-admission and self-efficacy among community-dwelling individuals with SCI. Our findings reveal a statistically significant decline in self-efficacy from the point of inpatient discharge to the 18-month follow-up, identifying a critical "vulnerability window" in the transitional care continuum. Acute hospital re-admissions demonstrated a statistically significant association with lower 18-month self-efficacy scores, suggesting that the current outpatient infrastructure may face challenges in sustaining the psychological gains achieved during intensive inpatient rehabilitation. To provide a more comprehensive picture of long-term wellbeing in Aotearoa New Zealand, future longitudinal research must investigate the multifactorial drivers of psychological resilience and differentiate between types of hospital readmissions. Ultimately, these findings serve as a framework for integrating accessible transitional support systems to bridge the gap between hospital and home, ensuring that self-efficacy remains a primary prognostic target in SCI rehabilitation.

COMPETING INTERESTS
RM is a member of the Accident Compensation Corporation external advisory group redesigning the needs assessment processes.

ACKNOWLEDGEMENTS
The principal investigator gratefully acknowledges the essential support provided by the New Zealand Spinal Cord Injury Registry team. Special thanks are extended to co-ordinators Tracey Croot, Greta Minty and Christine Mangold for their diligent efforts in data collection and provision. The author also wishes to thank Dr Kayode Ahmed for his assistance in verifying the statistical analysis.

AUTHOR INFORMATION
Dr Bensy Mathew: Consultant Physician, Auckland Spinal Rehabilitation Unit, Counties Manukau Health, Auckland, Aotearoa New Zealand; PhD Candidate, PhD in Clinical Research Programme, University of Jamestown, North Dakota, United States of America.
Dr Mitchell Wolden: Clinical Research Program Director and Professor, University of Jamestown, North Dakota, United States of America.
Dr Rachelle Martin: Senior Lecturer, Rehabilitation Teaching and Research Unit, Department of Medicine, University of Otago, Wellington, Aotearoa New Zealand.

CORRESPONDING AUTHOR
Dr Bensy Mathew: Auckland Spinal Rehabilitation Unit, Counties Manukau Health, 30 Bairds Road, Papatoetoe, Auckland 2025, Aotearoa New Zealand.
E: bensy.mathew@tewhatuora.govt.nz

URL
https://nzmj.org.nz/journal/vol-139-no-1643/is-self-efficacy-after-spinal-cord-injury-associated-with-hospital-re-admissions-or-length-of-stay-in-aotearoa-new-zealand-a-cro

CITATION
Mathew B, Wolden M, Martin R. Is self-efficacy after spinal cord injury associated with hospital re-admissions or length of stay in Aotearoa New Zealand? A cross-sectional analysis. N Z Med J. 2026 Oct 9;139(1643):32-41. doi: 10.26635/6965.7412.

REFERENCES
1. Middleton JW, Dayton A, Walsh J, et al. Life expectancy after spinal cord injury: a 50-year study. Spinal Cord. 2012;50(11):803-811. doi: 10.1038/sc.2012.55.
2. Almeida LO, de Lima A, Sprizon GS, Ilha J. Measurement properties of assessment instruments of quality of life in people with spinal cord injury: a systematic review. J Spinal Cord Med. 2024;47(1):15-50. doi: 10.1080/10790268.2023.2254878.
3. Lude P, Kennedy P, Elfström ML, et al. Quality of life in and after spinal cord injury rehabilitation: a longitudinal multicenter study. Top Spinal Cord Inj Rehabil. 2014;20(3):197-207. doi: 10.1310/sci2003-197.
4. van Diemen T, Crul T, van Nes I, et al. Associations Between Self-Efficacy and Secondary Health Conditions in People Living with Spinal Cord Injury: A Systematic Review and Meta-analysis. Arch Phys Med Rehabil. 2017;98(12):2566-2577. doi: 10.1016/j.apmr.2017.03.024.
5. Craig A, Tran Y, Guest R, Middleton J. Trajectories of Self-Efficacy and Depressed Mood and Their Relationship in the First 12 Months Following Spinal Cord Injury. Arch Phys Med Rehabil. 2019;100(3):441-447. doi: 10.1016/j.apmr.2018.07.442.
6. Zhao H, Cole S. Leisure, Recreation, and Life Satisfaction: A Longitudinal Study for People With Spinal Cord Injury. Top Spinal Cord Inj Rehabil. 2023;29(4):61-72. doi: 10.46292/sci23-00020.
7. Peter C, Müller R, Cieza A, Geyh S. Psychological resources in spinal cord injury: a systematic literature review. Spinal Cord. 2012;50(3):188-201. doi: 10.1038/sc.2011.125.
8. Craig A, Tran Y, Siddall P, et al. Developing a model of associations between chronic pain, depressive mood, chronic fatigue, and self-efficacy in people with spinal cord injury. J Pain. 2013;14(9):911-920. doi: 10.1016/j.jpain.2013.03.002.
9. Savic G, Short DJ, Weitzenkamp D, et al. Hospital readmissions in people with chronic spinal cord injury. Spinal Cord. 2000;38(6):371-377. doi: 10.1038/sj.sc.3101019.
10. Jedrusik AM, Brinkhof MWG, Müller LL, et al. Unplanned hospital admissions due to secondary health conditions after spinal cord injury: a population-based description of determinants of length of stay. Spinal Cord. 2023;61(5):290-295. doi: 10.1038/s41393-023-00880-8.
11. Dejong G, Tian W, Hsieh CH, et al. Rehospitalization in the first year of traumatic spinal cord injury after discharge from medical rehabilitation. Arch Phys Med Rehabil. 2013;94(4 Suppl):S87-97. doi: 10.1016/j.apmr.2012.10.037.
12. van Diemen T. Self-management, self-efficacy, and secondary health conditions in people with spinal cord injury [doctoral thesis on the Internet]. University of Groningen; 2020 Sep 30 [cited 2026 Aug 28]. Available from: https://research.rug.nl/en/

publications/self-management-self-efficacy-and-secondary-health-conditions-in-/
13. Peter C, Cieza A, Geyh S. Rasch analysis of the General Self-Efficacy Scale in spinal cord injury. J Health Psychol. 2014;19(4):544-555. doi: 10.1177/1359105313475897.
14. Cohen J. Statistical Power Analysis for the Behavioral Sciences. 2nd ed. Lawrence Erlbaum Associates; 1988.
15. Norman GR, Sloan JA, Wyrwich KW. Interpretation of Changes in Health-related Quality of Life: The Remarkable Universality of Half a Standard Deviation. Med Care. 2003;41(5):582-592. doi: 10.1097/01.MLR.0000062554.74615.4C.
16. Luszczynska A, Scholz U, Schwarzer R. The general self-efficacy scale: multicultural validation studies. J Psychol. 2005;139(5):439-457. doi: 10.3200/JRLP.139.5.439-457.
17. Oehlert GW. A note on the delta method. Am Stat. 1992;46(1):27-29.
18. Schwarzer R, Jerusalem M. Generalized Self-Efficacy Scale. In: Weinman J, Wright S, Johnston M, eds. Measures in Health Psychology: A User's Portfolio. Causal and Control Beliefs. NFER-NELSON; 1995. p. 35-37.
19. van Leeuwen CM, Edelaar-Peeters Y, Peter C, et al. Psychological factors and mental health in persons with spinal cord injury: An exploration of change or stability. J Rehabil Med. 2015;47(6):531-537. doi: 10.2340/16501977-1953.
20. Gassaway J, Jones ML, Sweatman WM, et al. Effects of Peer Mentoring on Self-Efficacy and Hospital Readmission After Inpatient Rehabilitation of Individuals With Spinal Cord Injury: A Randomized Controlled Trial. Arch Phys Med Rehabil. 2017 Aug;98(8):1526-1534.e2. doi: 10.1016/j.apmr.2017.02.018.
21. Geyh S, Nick E, Stirnimann D, et al. Self-efficacy and self-esteem as predictors of participation in spinal cord injury--an ICF-based study. Spinal Cord. 2012;50(9):699-706. doi: 10.1038/sc.2012.18.
22. van Diemen T, Craig A, van Nes IJW, et al. Enhancing our conceptual understanding of state and trait self-efficacy by correlational analysis of four self-efficacy scales in people with spinal cord injury. BMC Psychol. 2020;8(1):108. doi: 10.1186/s40359-020-00474-6.
23. Liu T, Xie S, Wang Y, et al. Effects of App-Based Transitional Care on the Self-Efficacy and Quality of Life of Patients With Spinal Cord Injury in China: Randomized Controlled Trial. JMIR Mhealth Uhealth. 2021;9(4):e22960. doi: 10.2196/22960.
24. Cardile D, Calderone A, De Luca R, et al. The Quality of Life in Patients with Spinal Cord Injury: Assessment and Rehabilitation. J Clin Med. 2024;13(6):1820. doi: 10.3390/jcm13061820.
25. Wolstenholme D, Downes T, Leaver J, et al. Improving self-efficacy in spinal cord injury patients through "design thinking" rehabilitation workshops. BMJ Qual Improv Rep. 2014;3(1):u205728.w2340. doi: 10.1136/bmjquality.u205728.w2340.
26. Jones ML, Gassaway J, Sweatman WM. Peer mentoring reduces unplanned readmissions and improves self-efficacy following inpatient rehabilitation for individuals with spinal cord injury. J Spinal Cord Med. 2021;44(3):383-391. doi: 10.1080/10790268.2019.1645407.
27. Ministry of Health – Manatū Hauora, Accident Compensation Corporation. New Zealand Spinal Cord Impairment Action Plan 2014-2019. Ministry of Health – Manatū Hauora, Accident Compensation Corporation; 2018 Mar 15 [cited 2026 Aug 28].
28. Short ME, Goetzel RZ, Pei X, et al. How accurate are self-reports? Analysis of self-reported health care utilization and absence when compared with administrative data. J Occup Environ Med. 2009;51(7):786-796. doi: 10.1097/JOM.0b013e3181a86671.

Effectiveness of selective laser trabeculoplasty for glaucoma and ocular hypertension in a large real-world cohort in New Zealand

Patchara Jirapanyayut, William Shew, John Ah-Chan

ABSTRACT

AIM: The Laser in Glaucoma and Ocular Hypertension (LiGHT) trial supports selective laser trabeculoplasty (SLT) as first-line glaucoma treatment; however, local real-world data are limited. We evaluated the real-world outcomes of SLT on intraocular pressure (IOP) and medication burden in a regional Aotearoa New Zealand hospital.

METHODS: We conducted a retrospective clinical audit of all SLT procedures performed at Palmerston North Hospital between August 2022 and April 2025. The primary outcome was IOP at final follow-up. The secondary outcome was a change in medication burden. Sub-groups analysed included optimal treatment (360-degree laser, Goldmann applanation tonometry, ≥6 months follow-up) and treatment-naive eyes.

RESULTS: A total of 236 eyes from 166 patients were included in the study. Most eyes (93.2%) were on established topical therapy at baseline. Mean IOP reduced from 18.3±5.2mmHg to 14.5±4.2mmHg, a mean reduction of 3.8mmHg (20.8%, p<0.001), with 93.6% achieving IOP ≤21mmHg at final follow-up. The medication burden remained statistically stable. In the optimal sub-group (n=62), 43.5% achieved clinical success (≥20% IOP reduction) with a 3.2mmHg mean drop. In treatment-naive eyes (n=16), mean IOP reduced by 5.3mmHg, with 93.8% remaining drop-free. Baseline IOP was the only significant predictor of clinical success.

CONCLUSION: SLT effectively lowers IOP in a real-world regional New Zealand setting, including in heavily medicated eyes. Stable medication burden reflects adjunctive use in this cohort rather than a procedural limitation. Treatment-naive outcomes support the growing evidence for SLT as a primary intervention.

Glaucoma is a chronic, progressive optic neuropathy characterised by loss of retinal ganglion cells and corresponding visual field defects.[1] It remains the second leading cause of irreversible blindness worldwide after cataracts.[1] The mainstay of treatment is to reduce the intraocular pressure (IOP) to prevent or slow progressive deterioration, which is defined as the "target IOP" by the European Glaucoma Society.[2] Traditionally, the first-line therapy for primary open-angle glaucoma (POAG) and ocular hypertension (OHT) has been topical medication. However, the real-world efficacy of these topical drops is often limited by adherence difficulties, side effects—such as ocular surface toxicity—cost and the cumulative burden of multi-bottle regimens, especially in older patients with multiple comorbidities.[3]

Selective laser trabeculoplasty (SLT) is an office-based laser procedure that delivers laser energy to the trabecular meshwork cells, targeting the melanotic elements using the principle of selective photothermolysis. While the mechanism of action of SLT is not fully understood, theories suggest it is likely explained by stimulation of biological responses in the trabecular meshwork rather than by direct structural changes. These include increased cellular activity, the release of cytokines, the recruitment and activation of macrophages, and enhanced phagocytosis of debris within the meshwork.[4]

The landmark Laser in Glaucoma and Ocular Hypertension (LiGHT) trial aimed to compare first-line SLT with first-line topical medication in open-angle glaucoma and OHT.[5,6] At the 3-year mark, SLT achieved non-inferior IOP control with superior cost effectiveness, lower cumulative treatment costs and a high proportion of patients maintaining drop-free disease control.[6] In a 6-year extended follow-up, the LiGHT trial demonstrated the sustained benefits of SLT, showing continued effective IOP control, a reduced need for topical medications and a lower subsequent requirement for incisional glaucoma surgery when compared

to initial topical therapy management. SLT also achieved these effects without compromising health-related quality of life, supporting its role as an effective first-line treatment strategy.[5]

LiGHT trial results have prompted a shift away from the drop-first treatment paradigm in POAG and OHT.[5,6] The American Academy of Ophthalmology recently published an ophthalmic technology assessment of SLT, concluding that SLT is an effective treatment option and can be used as a primary intervention.[7] The National Institute for Health and Care Excellence guideline now also recommends offering 360-degree SLT as a first-line treatment to people with newly diagnosed OHT at risk of visual impairment and chronic open-angle glaucoma that is not advanced.[8]

Despite the expanding evidence base, there is limited published literature evaluating the real-world efficacy of SLT in Aotearoa New Zealand, particularly within regional public hospital services where population and service configurations differ from those in tertiary centres in Europe or the United Kingdom. Local data are important for clinicians and funders considering wider implementation of SLT-first treatment pathways in the New Zealand context.

The Palmerston North Hospital ophthalmology service covers Palmerston North and the surrounding Manawatū, Tararua and Horowhenua districts. The population served was estimated at 181,550 in 2025.[9] There is a single SLT-capable delivery device (Ellex Tango) with four senior medical officers, one college-accredited registrar trainee, two non-training registrars and two therapeutically qualified optometrists who provide glaucoma treatment services. The aim of this audit was to describe real-world IOP and medication outcomes following SLT in a regional New Zealand public ophthalmology service.

Methods

Study design and setting

This was a retrospective clinical audit conducted in a single public hospital ophthalmology service in Palmerston North, New Zealand. The service provides secondary-level glaucoma care for a mixed urban–rural population. All SLT procedures performed between 29 August 2022 and 24 April 2025 were identified from a combination of the manual SLT laser logbook and the electronic clinical booking system. De-identified data were then extracted from the web-based clinical records system, including dictated letters and scanned notes. The audit was registered with the local clinical audit facilitator at Health New Zealand – Te Whatu Ora MidCentral. In accordance with national guidance, a formal Health and Disability Ethics Committee review was not required for this type of audit using routinely collected, de-identified data.

Eligibility criteria

Eyes were eligible if they underwent SLT in the audit period for POAG, OHT, normal tension glaucoma, pseudoexfoliative/pigmentary glaucoma or mixed-mechanism glaucoma and there was sufficient information to define a baseline IOP and glaucoma medication status. The initial raw dataset contained 243 eyes from 173 individuals. Seven eyes had no recorded post-SLT follow-up and therefore were excluded from outcome analysis, leaving 236 eyes from 166 individuals.

IOP measurement and baseline definition

IOP was measured in routine practice using Goldmann applanation tonometry (GAT) or rebound tonometry (iCare), depending on the clinic setting and clinician preference. For this audit, the tonometry value documented in each clinical visit was used. When both GAT and iCare readings were documented on the same date, the GAT measurement was preferentially selected. For each eye, the index date was defined as the date of SLT. Baseline IOP was defined as the measurement representing the stable pre-SLT treatment state. In most cases, this was the GAT measurement recorded on the day of SLT. Where a GAT measurement was not available on the SLT date, the most recent prior clinic visit with a recorded GAT measurement was used, provided that there had been no change in glaucoma medications between that visit and the SLT appointment.

In 53 eyes, no GAT measurement was recorded on the day of SLT. However, there had been no changes in glaucoma therapy between the preceding GAT visit and the SLT procedure. In these cases, the most recent prior GAT measurement, along with the corresponding treatment regimen, was used to define the baseline IOP.

In five eyes, a temporary topical therapy (e.g., addition of a short-term agent until the day of SLT) was initiated between the prior visit and the SLT date. In these instances, the baseline IOP and medication burden were defined using the data prior to the introduction of the temporary agent, ensuring that the baseline correctly reflected the

patient's established clinical status, including classifying patients as treatment-naive (zero medication) if they were not on other long-term therapy prior to the temporary safety intervention. In 11 eyes, no suitable GAT measurement was available at or before the SLT date. In these cases, the iCare reading on the date of SLT was used as the baseline IOP.

Follow-up and outcome measures

Follow-up data were extracted, including all post-SLT visits to the ophthalmology department. Each treated eye was analysed as a separate observation. Follow-up continued until the most recent recorded visit, until the cutoff date of 30 July 2025 or until an additional intraocular intervention was performed. Eyes were censored at the time of any subsequent intervention intended to lower IOP, including incisional glaucoma surgery, combined cataract and glaucoma surgery and repeating SLT within 3 years. Follow-up was also censored at the time of cataract surgery, where this was felt to potentially influence post-operative IOP measurement.

The primary outcome was post-SLT IOP control. This was assessed by the absolute IOP measured at follow-up and the change in IOP from baseline to the last recorded follow-up visit for each eye. Additional descriptors of IOP control included mean IOP at approximately 1, 3, 6 and 12 months after SLT, the proportion of eyes achieving clinically relevant thresholds of IOP reduction (≥20% and ≥30%), and the proportion of eyes with IOP ≤21mmHg at last follow-up. To account for variation in baseline pressure across the diagnostic groups, mean percentage reduction in IOP was also evaluated. The secondary outcome was glaucoma medication burden following SLT.

Sub-group analyses

Two defined sub-group analyses were performed in this audit. First, a treatment-naive analysis was conducted on eyes receiving zero topical glaucoma medication at baseline. Second, an "optimal treatment" sub-group was analysed, consisting of eyes with strict GAT-measured IOP, full 360-degree treatment and at least 6-months of follow-up.

Statistical analysis

Data were analysed using R (R Foundation for Statistical Computing, Vienna, Austria). Continuous variables are presented as means with standard deviations, and categorical variables as counts and percentages. The Shapiro–Wilk test was used to confirm the normal distribution of continuous variables, particularly in the smaller sub-group cohorts. Absolute change in IOP was calculated as the difference between baseline IOP and the IOP at the last recorded follow-up for each eye, and the percentage reduction was calculated relative to baseline values. Pre-operative and post-operative outcomes for both IOP and medication burden were compared using paired Student's *t*-Tests. A p-value of <0.05 was considered statistically significant.

Results

Cohort characteristics

A total of 243 eyes from 173 patients underwent SLT between 29 August 2022 and 24 April 2025. The mean age at treatment was 74.2±10.0 years. Of the treated eyes, 129 (53.1%) were from female patients, and 114 (46.9%) were from male patients. New Zealand Europeans made up the majority of the cohort, accounting for 221 eyes (90.9%), followed by other Europeans (13 eyes, 5.3%), Asians (six eyes, 2.5%) and Māori (three eyes, 1.2%). The most common indication for SLT was POAG or OHT. These accounted for 183 eyes (75.3%), followed by normal tension glaucoma in 30 eyes (12.3%), pseudoexfoliative or pigmentary glaucoma in 21 eyes (8.6%), mixed-mechanism glaucoma in five eyes (2.1%) and secondary or narrow-angle disease in four eyes (1.6%).

Of the 243 treated eyes, 236 (97.1%) had at least one documented post-SLT follow-up visit and were included in outcome analyses. Seven eyes (2.9%) had no recorded follow-up and were excluded from further analysis. Among those included, the mean follow-up duration was 9.8±8.7 months (median 8 months, range 0–31 months).

Baseline medication data demonstrated a high burden of disease. Only 16 eyes (6.8%) were treatment naive (zero agents), while 68 eyes (28.8%) were on one agent, 62 eyes (26.3%) were on two agents, 75 eyes (31.8%) were on three agents and 15 eyes (6.4%) were on four agents.

Where procedural details were available, 360-degree SLT treatment of the trabecular meshwork was performed in 117 of 156 eyes (75.0%), with the remainder receiving partial treatment arcs of 180–270 degrees. The mean number of laser applications was 87.9±19.8 shots (range 30–140), and the mean pulse energy was 0.78±0.22mJ (n=155). Post-operative anti-inflammatory therapy was prescribed per the clinician's preference. No

Table 1: Demographics of the study cohort (n=243 eyes).

Characteristic	Frequency (n=243)	Percent (%)
Age (years)		
<60	19	7.8
60–69	46	18.9
70–79	98	40.3
80–89	76	31.3
≥90	4	1.6
Mean±standard deviation	74.2±10.0	
Sex (eyes)		
Female	129	53.1
Male	114	46.9
Ethnicity		
New Zealand European	221	90.9
Other European	13	5.3
Asian	6	2.5
Māori	3	1.2
Glaucoma diagnosis		
Primary open-angle glaucoma/ ocular hypertension	183	75.3
Normal tension glaucoma	30	12.3
Pseudoexfoliative/pigmentary	21	8.6
Mixed-mechanism	5	2.1
Secondary/narrow-angle	4	1.6
Baseline topical medications		
Treatment naive (0 agent)	16	6.8
1 agent	68	28.8
2 agents	62	26.3
3 agents	75	31.8
4 agents	15	6.4

routine anti-inflammatory drops were used in 105 eyes (43.2%), while 92 eyes (37.9%) received a topical non-steroidal anti-inflammatory agent and 46 eyes (18.9%) were treated with a topical corticosteroid.

IOP outcomes

Among the 236 eyes with at least one post-SLT follow-up visit, the mean baseline IOP was 18.3±5.2mmHg. At the most recent follow-up, mean IOP was 14.5±4.2mmHg, corresponding to a mean absolute reduction of 3.8±5.2mmHg ($p<0.001$, paired *t*-test). Overall, 119 eyes (50.4%) achieved an IOP reduction of at least 20%, and 77 eyes (32.6%) achieved a reduction of 30% or greater. At last follow-up, 221 eyes (93.6%) had a controlled IOP of ≤21mmHg.

When analysed by time since SLT, the first post-procedure assessment (within the first month) showed a mean IOP of 17.4±6.6mmHg, corresponding to a mean reduction of 2.2±5.6mmHg from baseline ($p<0.001$). Mean IOP at the 1-month mark was 14.93±4.15mmHg (mean reduction 3.7±5.2mmHg; $p<0.001$), at the 2-month mark was 15.9±5.3mmHg (mean reduction 3.3±5.1mmHg; $p<0.001$), at the 3-month mark was 15.4±3.6mmHg (mean reduction 4.4±4.2mmHg; $p<0.001$), at the 6-month mark was 14.8±3.2mmHg (mean reduction 3.3±5.1mmHg; $p<0.001$) and at the 12-month mark was 15.2±4.9mmHg (mean reduction 4.4±5.2mmHg; $p<0.001$). Beyond 12 months, the number of patients contributing to follow-up decreased, with greater variability in observed IOP values.

Sub-group analysis: treatment-naive cohort

A sub-group analysis was performed on the 16 treatment-naive eyes at baseline. This group demonstrated a more pronounced response to SLT. The mean baseline IOP was 19.6±4.8mmHg, which decreased to 14.3±3.6mmHg at final follow-up. This corresponds to a mean reduction of 5.3±4.2mmHg ($p<0.001$). Clinically, 13 eyes (81.2%) achieved a 20% or greater reduction, and 15 eyes (93.8%) remained medication free at their last visit.

Figure 1: Mean change in intraocular pressure (IOP) and topical medication burden following selective laser trabeculoplasty (SLT). The blue line represents the mean IOP reduction from baseline (mmHg) at each follow-up interval, with error bars indicating standard deviation. The orange line represents the mean reduction in the number of topical glaucoma medications relative to baseline, with error bars indicating standard deviation. Positive values indicate a reduction in IOP or a reduction in medication burden.

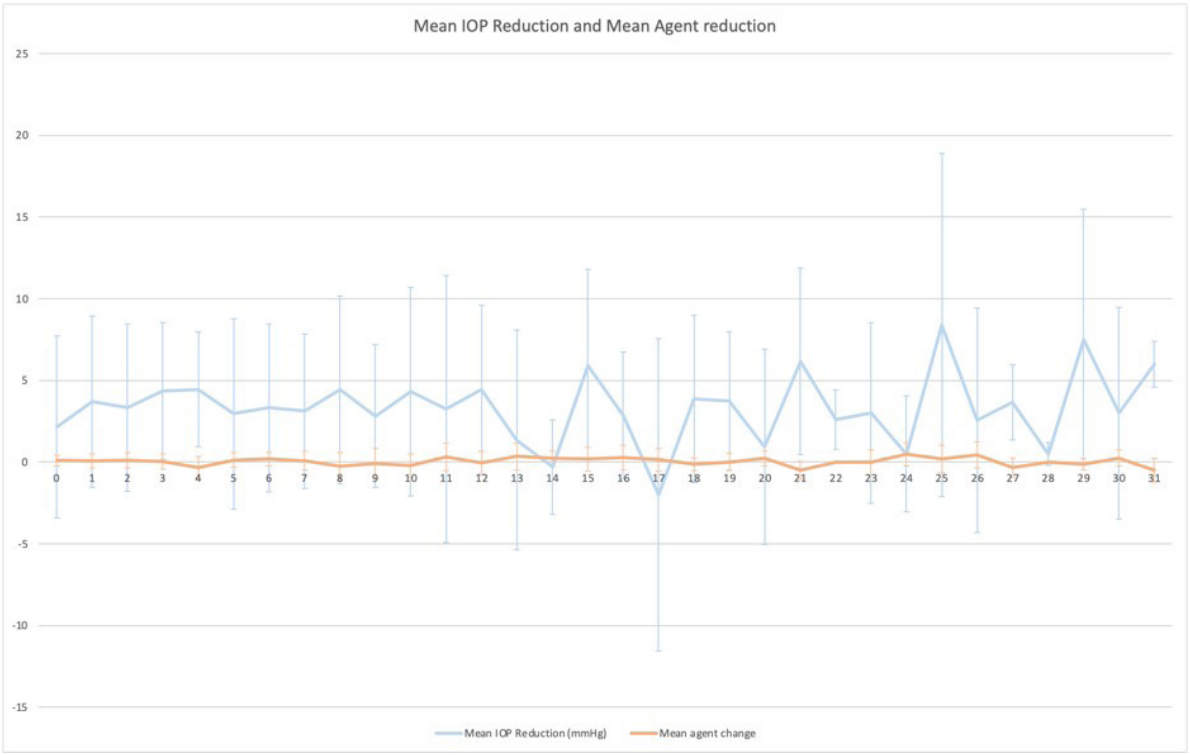
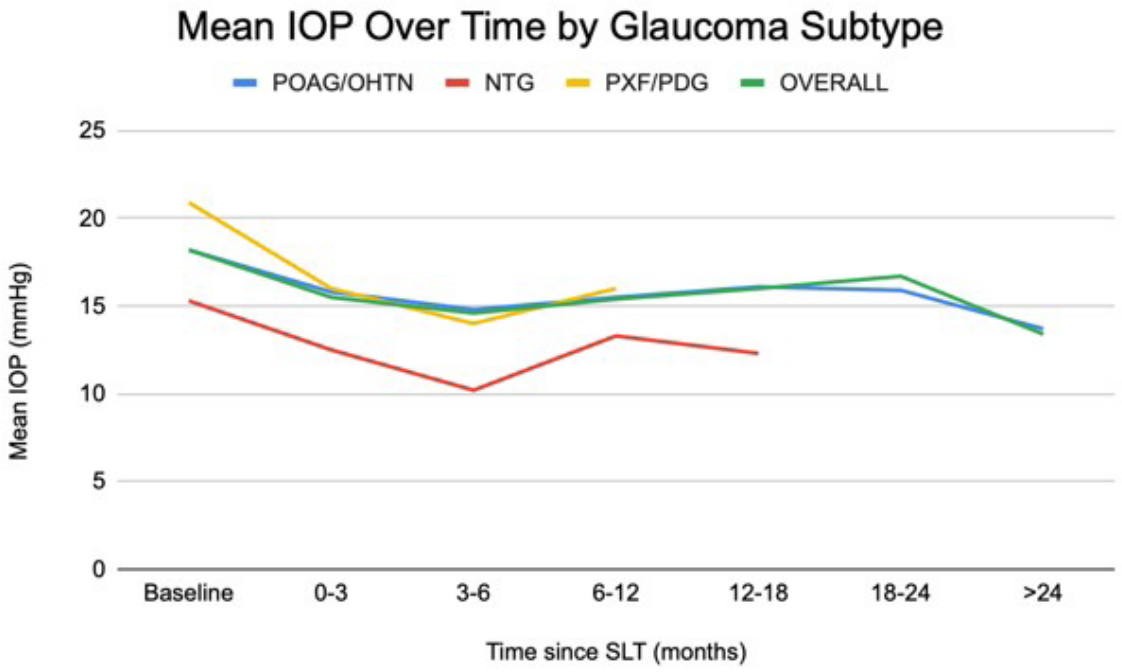


Figure 2: Mean IOP over time following SLT across clinical sub-groups.



IOP = intraocular pressure; SLT = selective laser trabeculoplasty; POAG/OHTN = primary open-angle glaucoma/ocular hypertension; NTG = normal tension glaucoma; PXF/PDG = pseudoexfoliative/pigmentary glaucoma.

Sub-group analysis: optimal treatment cohort

A total of 62 eyes met the criteria for the optimal treatment cohort. The mean baseline IOP was 17.0±5.4mmHg. At the final recorded follow-up, the mean IOP reduced to 14.4±4.1mmHg, representing a mean absolute reduction of 3.2±5.0mmHg ($p<0.001$). Clinical success (IOP reduction of ≥20% from baseline) was achieved in 27 of the eyes (43.5%). The medication burden was statistically stable, with 41 eyes (66.1%) remaining on their baseline topical regimen.

Predictors of success and failure

Predictive analyses were performed across the full cohort to determine factors influencing outcome. We defined clinical success as ≥20% IOP reduction and clinical failure as ≤5% IOP reduction. Eyes achieving clinical success had a significantly higher baseline IOP (20.5mmHg) than those failing to reach the threshold (16.2mmHg). Conversely, eyes with a 5% IOP reduction demonstrated a significantly lower baseline IOP (16.8mmHg) than the non-failure cohort (19.1mmHg). Pre-operative burden, patient age and the extent of treatment arc did not significantly predict failure in our cohort.

Medication outcomes

In 236 eyes with post-SLT follow-up, the mean number of topical glaucoma medications at the baseline level was 2.03±1.07. At the final recorded follow-up visit, the mean number of topical medications was 1.99±1.12. A reduction in medication burden was observed in 36 eyes (15.3%), while 168 eyes (71.2%) had no change in the number of medications and 32 eyes (13.6%) required an increase in topical agents. At the final review, 26 eyes (11.0%) were recorded as drop-free. However, the majority of these drop-free eyes had OHT or early POAG and a relatively modest or zero baseline bottle count.

Overall, the magnitude of medication reduction was modest, with no sustained large decrease in topical therapy burden observed across the cohort. No sight-threatening complications were recorded in the clinicians' notes for the follow-up visits.

Discussion

This audit reports the real-world outcomes of SLT within a regional New Zealand ophthalmology service. Our results confirm that SLT is an effective treatment for reducing IOP, achieving a mean reduction of 3.8mmHg (20.8%) and a success rate of 93.6% for IOP control (≤21mmHg). These findings align with international benchmarks for SLT efficacy, which typically report IOP reductions of 20–30%.[10,11] However, unlike the landmark LiGHT trial, our cohort did not demonstrate a significant reduction in medication burden. This contrast of successful pressure lowering without decreasing medication burden is best explained by the differences between our patient population and those recruited into the LiGHT trial, rather than by any limitation of SLT itself.

The primary outcome of post-SLT IOP control is particularly notable given the demographics of our cohort. Unlike the LiGHT trial, where participants who were recruited were treatment naive with early disease, our demographic reflects a real-world mix of disease type, severity and progression.[5,6] This is shown by 93.2% of included eyes already being on an established topical therapy. A significant proportion of our cohort (38.1%) was on maximal medical therapy. SLT appears effective even as an adjunct in heavily medicated eyes and may help deter the need for incisional surgery in those who would otherwise have limited options.

To validate our real-world findings against established trial standards, we isolated a high-quality data sub-group (n=62) defined by strict clinical parameters (GAT tonometry, 360-degree treatment, ≥6 months of follow-up). Under these optimised conditions, 43.5% of eyes achieved a clinical benchmark of ≥20% reduction in IOP. While this reduction is lower than the primary success rate reported in treatment-naive trials like LiGHT, it is expected given our heavily medicated patient cohort. Furthermore, analysis of the treatment-naive sub-group (n=16) demonstrated a mean IOP reduction of 5.3mmHg and a 93.8% drop-free rate at final follow-up. Although the sample size was small, these outcomes are consistent with the data shown in the LiGHT trial, reinforcing current guidelines that support SLT as first-line therapy.

With regard to our secondary outcome of medication burden following SLT, the data demonstrate stability in the medication regimen. In patients with high topical agent burden, the clinical goal is often to rescue the eye from further disease progression rather than to reduce medication. For a patient who is already on maximally tolerated medical therapy with uncontrolled pressure, success can be defined as achieving the target IOP while maintaining the same medication regimen. The lack of medication reduction in our cohort should not be interpreted as a failure of the SLT but rather reflects the SLT indications (further IOP lowering rather than drop cessation in some patients) and the case mix.

The variability in treatment approaches observed in our cohort (180–360-degree applications, differing follow-up intervals) is a hallmark of real-world retrospective data. This variance is likely explained by the "innovation adoption curve" occurring within our department during the audit period (2022–2025). Following the publication of the LiGHT trial in 2019 and subsequent international guideline shifts in 2022, clinicians transitioned their practice paradigms at different rates. Additionally, the variations in follow-up and tonometry methods reflect the inherent resource constraints of a regional public hospital.

Beyond the absolute IOP reduction observed, SLT can provide a crucial therapeutic safety net for patients with inconsistent adherence. The addition of SLT reduces the reliance on perfect medication adherence to maintain target IOP. In an ageing population such as our cohort, where cognitive decline, arthritis and cost are barriers to compliance, SLT offers a compliance-independent treatment effect.

The limitations of this study reflect its retrospective nature. The follow-up duration was variable (0–31 months), limiting the assessment of long-term SLT failure rates or the timing for potential re-treatment. Secondly, selection bias is inevitable as our cohort is likely to be a "refractory" group with more advanced disease than the general glaucoma population. Finally, the IOP measurements were obtained by several clinicians and nurses using both GAT and iCare. This introduces potential interobserver variability but this in itself is reflective of standard clinical practice in resource-limited regional centres.

Conclusion

In conclusion, this audit supports the effectiveness of SLT in lowering IOP in a regional

New Zealand setting. While we did not observe a significant reduction in the medication burden, this reflects the historical practice pattern of using SLT as an adjunct therapy for complex, medicated glaucoma rather than a primary intervention. The stability of medication regimens in combination with IOP reduction suggests that SLT is an effective intervention and may help delay the need for higher-risk incisional surgery. Our optimal treatment and treatment-naive sub-group results support the ongoing paradigm shift towards a primary SLT therapy, which we anticipate will have a significant impact on medication freedom in future practice.

COMPETING INTERESTS
JAC participates on the Palmerston North Eye Clinic Quality Improvement Committee and holds a leadership or fiduciary role in the Macular Degeneration New Zealand Medical Advisory Committee (unpaid).

AUTHOR INFORMATION
Patchara Jirapanyayut, MBChB: Palmerston North Hospital, Palmerston North, Manawatū–Whanganui, New Zealand.
William Shew, BOptom, MBChB: Auckland District Health Board, Auckland, New Zealand.
John Ah-Chan, BMedSci, MBChB, MHSM, AFRACMA, FRANZCO: Ophthalmology Department, MidCentral District Health Board, Palmerston North, Manawatū–Whanganui, New Zealand.

CORRESPONDING AUTHOR
Patchara Jirapanyayut: Palmerston North Hospital, Palmerston North, Manawatū–Whanganui, New Zealand. E: Pat34020@gmail.com

URL
https://nzmj.org.nz/journal/vol-139-no-1643/effectiveness-of-selective-laser-trabeculoplasty-for-glaucoma-and-ocular-hypertension-in-a-large-real-world-cohort-in-new-zealan

CITATION
Jirapanyayut P, Shew W, Ah-Chan J. Effectiveness of selective laser trabeculoplasty for glaucoma and ocular hypertension in a large real-world cohort in New Zealand. N Z Med J. 2026 Oct 9;139(1643):42-50. doi: 10.26635/6965.7450.

REFERENCES
1. Dietze J, Blair K, Zeppieri M, Havens SJ. Glaucoma. [Updated 2024 Mar 16]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025. Available from: https://www.ncbi.nlm.nih.gov/books/NBK538217/
2. Pazos M, Traverso CE, Viswanathan A, et al. European Glaucoma Society - Terminology and guidelines for glaucoma, 6th Edition. Br J Ophthalmol. 2025;109(Suppl 1):1-212. doi: 10.1136/bjophthalmol-2025-egsguidelines.
3. Gedde SJ, Vinod K, Wright MM, et al. Primary Open-Angle Glaucoma Preferred Practice Pattern®. Ophthalmology. 2021;128(1):P71-150. doi: 10.1016/j.ophtha.2020.10.022.
4. Jha B, Bhartiya S, Sharma R, et al. Selective Laser Trabeculoplasty: An Overview. J Curr Glaucoma Pract. 2012;6(2):79-90. doi: 10.5005/jp-journals-10008-1111.
5. Gazzard G, Konstantakopoulou E, Garway-Heath D, et al. Laser in Glaucoma and Ocular Hypertension (LiGHT) Trial: Six-Year Results of Primary Selective Laser Trabeculoplasty versus Eye Drops for the Treatment of Glaucoma and Ocular Hypertension. Ophthalmology. 2023;130(2):139-151. doi: 10.1016/j.ophtha.2022.09.009.
6. Gazzard G, Konstantakopoulou E, Garway-Heath D, et al. Selective laser trabeculoplasty versus eye drops for first-line treatment of ocular hypertension and glaucoma (LiGHT): a multicentre randomised controlled trial. Lancet. 2019;393(10180):1505-1516. doi: 10.1016/S0140-6736(18)32213-X.
7. American Academy of Ophthalmology. Selective Laser Trabeculoplasty for the Treatment of Glaucoma OTA [Internet]. 2023 [cited 2025 Dec 27]. Available from: https://www.aao.org/education/ophthalmic-technology-assessment/new-ophthalmictechnologyassessment-6
8. National Institute for Health and Care Excellence. Glaucoma: diagnosis and management: NICE guideline | NG81 [Internet]. 2022 [cited 2025 Dec 27]. Available from: https://www.nice.org.uk/guidance/ng81/chapter/Recommendations
9. Stats NZ | Tatauranga Aotearoa. Place and ethnic group summaries [Internet]. [cited 2025 Dec 28]. Available from: https://tools.summaries.stats.govt.nz
10. Wu CM, Chang TC. Selective Laser Trabeculoplasty. Int Ophthalmol Clin. 2023;63(4):23-32. doi: 10.1097/IIO.0000000000000483.
11. Oliver-Gutierrez D, Guevara-Chavarría O, Djavanmardi S, et al. Real-Life Effectiveness and Safety of Selective Laser Trabeculoplasty as Primary, Adjunctive, and Substitutive Therapy. Turk J Ophthalmol. 2025;55(3):132-140. doi: 10.4274/tjo.galenos.2025.75570.

Māori notified with tuberculosis in one public health region of Aotearoa New Zealand: a document review

Ihāpera Esson, Susan McAllister, Amy Jones, Darelle Toki, Nina Scott, Philip C Hill

ABSTRACT

AIM: Among Aotearoa New Zealand–born people with tuberculosis (TB), half are Māori. TB is preventable, and Aotearoa New Zealand has signed up to the global strategy to end the TB epidemic. TB among Māori has endured since the late 1800s and occurs in a complex political, social and wellbeing context. We aimed to review current public health practices used for contacting and following up Māori with TB and their contacts.

METHODS: We undertook a retrospective case review of Māori notified with pulmonary TB (2018– 2023) in the Waikato Region. Data included TB notification, treatment start and end dates, number and type of contacts, latent TB infection (LTBI) testing, screening and support for wellbeing issues.

RESULTS: Seventeen Māori were identified with pulmonary TB (aged 23–81 years). Sixteen started and 13 completed treatment. One died prior to formal TB notification; two died during treatment. A total of 182 contacts were identified—mostly household contacts (42%) and hospital staff (25%). Sixty-four percent (n=117) of contacts were screened for LTBI: 15 (11%) tested positive and were referred for follow-up. Health navigator support was noted for two patients only.

CONCLUSION: A new model of care is required for contacting and following up Māori with TB and their contacts to end the Māori TB epidemic.

Tuberculosis (TB) is a leading infectious disease globally.[1] In Aotearoa New Zealand, approximately 300 people are diagnosed with TB each year.[2] Most are people born outside of Aotearoa New Zealand. Among those born in Aotearoa New Zealand, half (53%) are of Māori ethnicity, with a rate for Māori of 3.5 per 100,000 per year—over five times the rate for New Zealand European or Other (0.4 per 100,000).[3] These numbers and rates have changed very little in recent decades.[4]

TB is treatable and preventable, and Aotearoa New Zealand has signed up to the global TB strategy to end the global TB epidemic by 2035.[5] A generic framework has been developed by the World Health Organization (WHO) for low-incidence countries such as Aotearoa New Zealand.[6] The priority actions in the framework informed the Ministry of Health – Manatū Hauora *Guidelines for Tuberculosis Control in New Zealand 2019*.[7] Both the framework and the Aotearoa New Zealand guidelines recognise the importance of tailored responses to reach populations highly vulnerable to infection who have limited access to healthcare. Māori in Aotearoa New Zealand fit both these categories.

TB among Māori has endured in Aotearoa New Zealand since the late 1800s. Despite the availability of treatment and preventive measures, TB remains a cause of avoidable death and morbidity for Māori and other Indigenous communities worldwide.[8–10] TB is a disease of colonisation. During the late nineteenth and early twentieth centuries, travel to Aotearoa New Zealand was promoted in Britain as "*therapeutic migration*"[11,12] for TB sufferers. This led to a large population of immigrants with TB, and to the previously unexposed Māori community experiencing an extraordinarily high TB disease and death rate.[11] At the time TB was often referred to as "*the dirty disease*",[11] and was accompanied with considerable stigma.[12] This same feeling of stigma and fear remains today.

TB occurs in the context of complex political, social and wellbeing issues, and is more likely to be transmitted within communities who experience poverty, poor housing and have limited access to the other determinants of health.[13–15] Inequities between Māori and non-Māori in health and the determinants of health are well documented.[16–18] Countering inequities in TB in Indigenous communities requires addressing historical trauma and

providing culturally appropriate care that also acknowledges the social determinants of health and importance of holistic social support.[19,20]

Continued high TB notification rates result from ongoing transmission of the pathogen, and through reactivation of disease from a burden of latent TB infection (LTBI). If a person with TB is diagnosed early and receives the recommended duration of multidrug treatment (usually a minimum of 6 months), the risk of death and transmission is reduced and health outcomes for people with TB are improved.[21] For those with LTBI, preventive treatment can reduce reactivation by up to 90%.[22,23] Both treatment of disease and preventive treatment in those with LTBI are necessary for TB elimination.[24]

Also included in the Aotearoa New Zealand guidelines is the importance of contact tracing to enable early identification and adequate treatment of contacts with TB and prevent further transmission.[7] Key steps in contact tracing are assessing risk, identifying and prioritising contacts and developing a plan. Contacts are identified according to their closeness and proximity to the TB index patient. Identifying contacts can be a time-consuming process that requires well-developed communication skills and the ability to establish high-trust relationships with affected communities. In a resource-constrained public health sector, finding services and staff with culturally appropriate skills and time to develop trust with patients is often challenging. The networks around Māori who have TB are often large and complex in relation to mobility and social issues. Therefore, the standard approach to contact tracing is often limited with respect to Māori and other Indigenous populations.[9,25–28] The aim of this document review was to examine current practices for the contacting and follow-up of Māori notified with TB (index patient) and their contacts, and identify any gaps in practice to help inform our wider study and the design of adjusted or new practices to end the Māori TB epidemic in Aotearoa New Zealand.

Guidelines for assessing and managing TB patient contacts

In Aotearoa New Zealand, TB disease is notifiable.[7] Healthcare providers are required to report patients with confirmed TB to the local medical officer of health, which are then registered in EpiSurv—a national surveillance system managed by Public Health and Forensic Science. The full guidelines for assessing and managing TB patient contacts are outlined in the Ministry of Health – Manatū Hauora *Guidelines for Tuberculosis Control in New Zealand 2019*.[7] Patient contacts are identified according to where they fall in concentric "contact" circles around their index patient and their level of risk. First-circle contacts include household contacts as well as non-household who have regular, non-specified, prolonged contact with the index patient. Second-circle contacts include, for example, frequent visitors to the home, and friends, relatives or work colleagues. Third-circle contacts (sporadic) are those living in the same community or attending the same school, social club or workplace. High-risk contacts are classified as those in the first circle plus those in the second circle with increased risk factors for TB, such as having an immunosuppressive illness.[7] Contacts aged under 5 years should have a chest X-ray or test for LTBI. For screening contacts over the age of 5 years who are considered high risk, the first step is to enquire about TB symptoms. Those with symptoms undergo further investigation for TB disease. Those without TB symptoms are offered a test for LTBI, which is optional, and further investigations are undertaken depending on the result. Treatment of a positive LTBI result is not compulsory, and patients have the right to decline treatment; nor is it notifiable by legislation.[7] Lower-risk contacts would normally not be screened unless transmission to high-risk contacts is likely to have occurred. Hence, the management of patient contacts requires well-developed communication between the local medical officer of health, the public health nurse (PHN), the index patient and their contacts.

Methods

This document review is part of a larger TB study, funded by the Health Research Council of New Zealand, aiming to develop and test methods for eliminating endemic TB for Māori. Case records of Māori notified with pulmonary TB (index patient) from 2018 to 2023 in the Waikato Region of Aotearoa New Zealand were requested from the public health service (PHS) in the region and retrospectively reviewed.

Physical paper patient notes were obtained with permission from the PHS in addition to data from electronic records on Clinical Workstation (CWS), which is used by the PHS and local hospitals. Identification of ethnicity by the PHS was through

the EpiSurv portal and was cross-checked on the CWS and by the PHN who met with the patient. Data were entered into a bespoke password-protected Excel file, in which each patient was identifiable only by a study identification number. Records were viewed in the PHS office.

Data collected

The variables collected on people with TB included date of birth, sex, TB site, TB notification date and TB treatment start and end date.

The document review and analysis undertaken included:

1. The number, type and scope of contacts identified. Included within the type of contacts are their age and ethnicity, and whether they were: a) a household contact, b) a close contact, including work colleagues and family who visited the index patient often, c) a casual contact, including friends, whānau/family or others who had brief interaction with the index patient, or d) hospital staff—any staff who attended the index patient if they had a stay in hospital.
2. The process for contacting TB patient contacts and the outcome. The total number of communications for each index patient was recorded, including visits, calls, text messages or emails and non-specified communication. Visits were those when the index patient was visited by the PHN at their home, clinic or hospital, and the index patient was present. Phone calls were those from a PHN to the index patient or their whānau/family or caregiver, which were answered. Text or emails included those between a PHN and the index patient or their whānau/family or caregiver, including texts/emails that were and were not answered.
3. Any information on whether close contacts were offered and tested for LTBI, any repeat testing and the result of LTBI tests.
4. Any other process for contacting an index patient and their contacts, including community-level relationship building and engagement with Māori staff.
5. Documentation of holistic wellbeing assessment and support for health gain. This included any processes for individual or whānau hauora (family health) gain, such as screening and addressing unmet health and wellbeing needs. The scope was wide, with parameters for the notes review described as "*needs assessed for any determinants of health*".

Analysis

Analyses were exploratory and descriptive, and as such no statistical hypothesis testing was undertaken.

Ethical considerations

Informed consent from patients with TB was not required as there was no contact with them. The proposal received ethical approval from the University of Otago Human Ethics Committee (Health) (HD23/101).

Results

A total of 17 Māori were notified with pulmonary TB between 2018 and 2023 and included in this review (12% of all Māori notified with TB disease throughout Aotearoa New Zealand in the same timeframe [n=139]).[2] For 15 index patients, TB was identified through the patient self-reporting with symptoms to a health practitioner. One person was diagnosed on hospital admission, and one was diagnosed as a result of contact investigation. Other patient characteristics are shown in Table 1. One person (aged 64) died prior to formal TB notification from an unknown cause of death. All of the remaining 16 people were offered and started treatment, of whom 13 (81%) were recorded as having completed their treatment (Figure 1). Of the three patients with incomplete treatment, two died, and their deaths were recorded as being unrelated to TB. Both were aged >60 years.

Review of documentation for holistic wellbeing assessment and support for health gain showed a range of issues were documented. Smoking status was recorded for 10 people, four of whom were current smokers, with two offered smoking cessation advice. The housing situation was noted for eight people, employment status noted for nine, alcohol consumption noted for two, other disabilities noted for three and mental health issues noted for four, while six had another health condition documented. Investigation into family support for the patient was noted for six people and who they were living with was noted for 12. The presence of a cultural or health navigator support person was noted for two people. Various actions by a PHN to meet health and wellbeing needs were implemented. These included

Table 1: Characteristics of Māori notified with tuberculosis (TB) in the Waikato Region between 2018 and 2023.

Characteristic	TB patients (n=17) n (%)
Gender	
Male	9 (52.9)
Female	8 (47.1)
Age (years) at time of TB notification	
<30	4 (23.5)
30–39	0 (0.0)
40–49	2 (11.8)
50–59	2 (11.8)
60+	9 (52.9)
Age (mean; range)	55.9; 23–81
Registered with a general practitioner	
Yes	15 (88.2)
No	2 (11.8)
Type of TB	
Pulmonary/lung	11 (64.7)
Both pulmonary and extrapulmonary	6 (35.3)

Figure 1: Treatment flowchart for Māori notified with tuberculosis (TB) in the Waikato Region from 2018 to 2023.

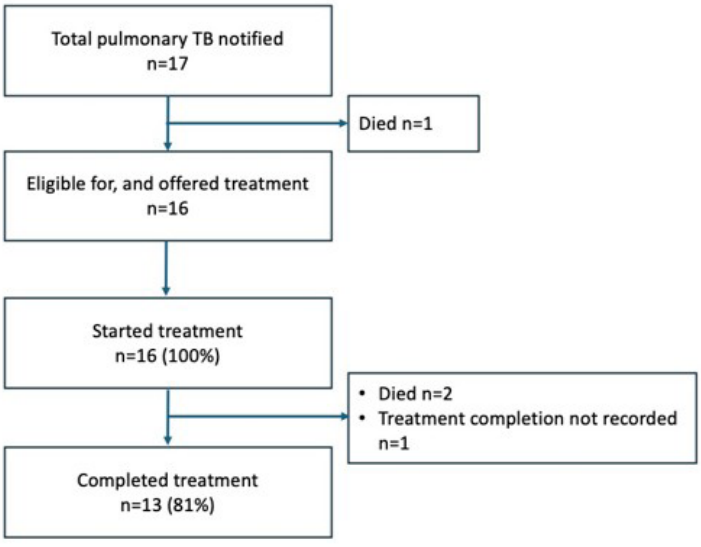


Table 2: Characteristics and type of tuberculosis (TB) index patient contacts.

	N (%)
Total number of patient contacts (mean per index patient; range)	182 (10.7; 1–41)
Ethnicity of contacts (prioritised)	
Māori	86 (47.3)
European	21 (11.5)
Other ethnicity	5 (2.7)
Not recorded	70 (38.5)
Age of contacts (year)	
<5	9 (4.9)
5–9	7 (3.8)
10–19	21 (11.5)
20–29	27 (14.8)
30–39	36 (19.8)
40–49	30 (16.5)
50–59	31 (17.0)
60+	20 (11.0)
Not recorded	1 (0.5)
Type of contact	
Household	77 (42.3)
Close	33 (18.1)
Casual	16 (8.8)
Hospital staff	46 (25.3)
Unspecified	10 (5.5)
Total number of communications (n=503)	
Visits	321 (63.8)
Phone calls	104 (20.7)
Text/email	78 (15.5)
Mean number of communications per index patient	29.6
Latent TB infection (LTBI) testing for contacts	
Yes	117 (64.3)

Table 2 (continued): Characteristics and type of tuberculosis (TB) index patient contacts.

	N (%)
No	65 (35.7)
LTBI test result for those who were tested (n=117)	
Positive	15 (12.8)
Negative	102 (87.2)

transport support to get to appointments, referral to another health professional, such as a physiotherapist, dietician or mental health services, and referral for work and income or social worker support.

From 17 index patients there was a total of 182 contacts identified, giving an average of 11 contacts per index patient and ranging between one and 41 contacts per index patient (Table 2). Household contacts were the predominant contact type recorded (42%). This was followed by hospital staff who were identified as contacts for five index patients, with one index patient having as many as 26 hospital staff contacts. Only 33 (18%) of the contacts were considered close contacts and 16 (9%) were classified as casual contacts. A total of 503 communications were made with contacts, giving an average of 30 communications per index patient. Of the 182 contacts, 117 (64%) were tested for LTBI. The remainder were either not eligible or no reason was stated. Repeat tests were done on 57% of those who first tested LTBI-negative (59/103). Fifteen people (13%; 15/117), three of whom were children aged under 5 years, tested positive for LTBI—one on a repeat test. All contacts who tested positive for LTBI were referred for follow-up; however, the outcomes of follow-up were not recorded in the notes accessed for this study.

Discussion

Our document review reveals the intensive effort required from staff in the PHS for assessing and managing TB patient contacts as well as attempts to address other health and wellbeing needs. In a low TB incidence country such as Aotearoa New Zealand, meeting globally agreed targets for achieving TB elimination will, however, require renewed and specific strategies to close the gap in TB rates between Aotearoa New Zealand–born Māori and Europeans.

Primary care is an important entry point to the TB care pathway, with 15 of the 17 patients diagnosed after self-reporting to a health practitioner with symptoms. Evidence shows that Māori have limited access to primary care and that this access has decreased over time.[18,29] Even though most of those diagnosed with TB in this study were registered with a general practitioner (84%), that does not mean that they had good access to effective primary care,[17,30] or that clinicians were aware of the possibility of TB in Aotearoa New Zealand and able to recognise the symptoms in a timely manner. A systematic review has reported that Indigenous peoples show longer delay and time to diagnosis and treatment, thereby exacerbating severity of symptoms and risk of death.[10] Of concern was that three of the 17 patients we reviewed had died—one before starting treatment and two during their treatment, with missed or late diagnosis of TB possibly a factor contributing to this. Over the years 2018–2023, there was an annual average of 1.16% of deaths of the people notified annually with TB in Aotearoa New Zealand,[31–36] which is considerably lower than the 18% found in our review. In Canada, where there is a high TB incidence in the Indigenous population, there is evidence that a major contributor to death from TB is a lack of cultural understanding rather than a lack of technical expertise.[19] It is clear that improved access to primary care for Māori with symptoms of TB will be essential for achieving TB elimination, and that missed and late diagnosis of TB along with causes of death for Māori with TB requires thorough investigation.

It is not clear why one TB patient did not complete treatment, which is a limitation of our document review. Directly observed therapy is normally undertaken with TB patients in Aotearoa New Zealand to ensure treatment is completed, and while TB treatment is free there are likely to be other costs related to travel and lost income. Ensuring financial costs to patients are

met, utilising digital interventions for reminders, and education and counselling are some of the strategies recognised for improving treatment success in other countries.[1,37] Treatment completion for Māori with TB is another area that needs further investigation when developing a model of care for Māori TB elimination.

It was encouraging to see there was some documentation on wellbeing assessment and support for health gain given the long-standing and strong association of TB with poverty and reduced access to the determinants of health, including healthcare. The presence of a cultural or health navigator support person was noted for two people. It is not recorded what model of care support staff operated within—for example, whether Māori cases were matched with Māori staff or whether it included quality mechanisms and infrastructure for navigators. Research on the impact of culturally matched navigator roles is expanding.[38] The model of care for Māori TB elimination being explored in our parent study involves navigators working in a high-trust, culturally appropriate and safe practice, and infrastructure includes training, tools and quality mechanisms such as a health needs assessment along with follow-up protocols and clinical escalation pathways.

Most of the contacts identified in our document review were household members or hospital staff who were caring for a TB patient (68%; 123/182), who theoretically sit in the concentric circle approach to contact tracing. These are often the easiest people to identify and contact, but this process will likely miss people with TB and those with LTBI in the community. A limitation of our study is that we do not know what proportion of actual contacts were contacted and whether all those at risk were followed up and tested for LTBI. Moreover, the actual definition of "household" was not entirely clear and there is the possibility that whānau living at a different address were still labelled as "household". Nevertheless, given the often large and complex networks of Māori whānau, it is likely that people who may have been in contact with the index patient and possibly infected with TB were not identified and offered testing and early treatment. These people may have active TB and spread TB further in the community, with ongoing community transmission evidenced by the fact that four of the TB patients in this study were under the age of 30. It is clear that to eliminate TB for Māori communities, a much wider circle of contacts will need to be identified, communicated with and offered testing and treatment—and that this will need to occur in a timely manner within a culturally safe practice to prevent ongoing spread of TB, severe illness and death. Moreover, the determination of who is a close contact and who is considered "high priority" for contact tracing will need to be reconsidered in the development of a model of care for Māori TB elimination.

The Aotearoa New Zealand TB guidelines provide very little detail on what Māori-specific TB elimination approaches are needed and state that "*Providers of TB services need to address this inequity through the delivery of a whānau centred and culturally responsive model of care for Māori.*"[7] Specifics on how to provide this type of care are not given, leading to varied approaches to designing, testing and delivering a responsive model of TB care for Māori. Indeed, we are not aware of any model of care for TB in Māori that has been developed at the PHS level anywhere in Aotearoa New Zealand. One healthcare leader in the PHS where this study was based reflected "*Māori have generations of good reasons not to trust our plans. The question isn't why they don't engage, but why we haven't built systems worthy of their trust.*" Eliminating TB for Māori may require a fundamental transformation in approach that is truly whānau centred and culturally responsive.

Study limitations

This study investigated Māori notified with TB within one regional PHS only and is therefore not representative of practices occurring throughout the country. We were also dependent on data that were recorded, and on the quality of these data, and recognise that considerable effort, time and communication is undertaken between clinicians and their patients, and on an informal basis between patients, contacts, medical officers of health and the PHN. From such de-identified data it is not always possible to determine where gaps lie and where improvements need to be made. Moreover, misclassification of ethnicity is a possibility that can lead to undercounting of Māori patients. From the records it was not possible to determine the number of contacts needing to be followed up, nor was it possible to determine the eligibility of contacts for LTBI testing, which would have been the ideal for assessing against performance standards. The LBTI-positive proportion that we noted in the paper will therefore be lower than when using the denominator of those eligible rather than all

contacts actually identified. Treatment should be offered to contacts who have a positive LTBI test;[7] however, as this is not notifiable, we were not able to identify from the records what happened after their referral for the 15 contacts who tested positive. It is unclear whether this gap is in documentation of follow-up or the actual referral process, or where responsibility lies once a referral is made. Lastly, the utilisation of molecular testing to identify clusters, corroboration of data from PHS throughout the country and further in-depth research would add value but were out of scope for this research.

Conclusion

To end the global TB epidemic, the WHO and the Aotearoa New Zealand TB guidelines recognise that tailored responses will be needed for priority populations highly vulnerable to infection who have limited access to healthcare. It is clear that in Aotearoa New Zealand Māori are a priority population for TB control and elimination. Therefore, Māori-specific TB elimination approaches—such as a model of TB care that addresses individual and whānau wellbeing needs, expands contact tracing and ensures there is a high-trust, culturally appropriate relationship between staff and patient at the outset—are needed to meet the goal of TB elimination. By describing current practices in one PHS, along with areas for improvement, this study has made a start towards identifying a viable Māori TB elimination approach.

COMPETING INTERESTS
Nil.

ACKNOWLEDGEMENTS
The authors would like to acknowledge Dr Richard Vipond for his support for this project and providing comments on a draft manuscript. We also thank Ms Kelly Reddington for her support in accessing the data and overall project support.
The study in which this project is embedded is funded by the Health Research Council of New Zealand. The document review project was funded by Te Niwha Infectious Disease Research Platform as a summer studentship. NS was funded as a named investigator.

AUTHOR INFORMATION
Ihāpera Esson: Health New Zealand – Te Whatu Ora, Waikato.
Susan McAllister: Centre for International Health, Division of Health Sciences, University of Otago, Dunedin.
Amy Jones: Health New Zealand – Te Whatu Ora, Waikato.
Darelle Toki: Health New Zealand – Te Whatu Ora, Waikato; Centre for International Health, Division of Health Sciences, University of Otago, Dunedin.
Nina Scott: Health New Zealand – Te Whatu Ora, Waikato.
Philip C Hill: Centre for International Health, Division of Health Sciences, University of Otago, Dunedin.

CORRESPONDING AUTHOR
Sue McAllister: Centre for International Health, Division of Health Sciences, University of Otago, Dunedin.
E: Sue.mcallister@otago.ac.nz

URL
https://nzmj.org.nz/journal/vol-139-no-1643/maori-notified-with-tuberculosis-in-one-public-health-region-of-aotearoa-new-zealand-a-document-review

CITATION
Esson I, McAllister S, Jones A, et al. Māori notified with tuberculosis in one public health region of Aotearoa New Zealand: a document review. N Z Med J. 2026 Oct 9;139(1643):51-61. doi: 10.26635/6965.7457.

REFERENCES
1. World Health Organization. Global tuberculosis report 2025 [Internet]. World Health Organization: Geneva; 2025 [cited 2026 Aug 27]. Available from: https://www.who.int/teams/global-programme-on-tuberculosis-and-lung-health/tb-reports/global-tuberculosis-report-2025
2. The Institute of Environmental Science and Research. Public Health Surveillance, Annual Notifiable Disease Tables [Internet]. The Institute of Environmental Science and Research. [cited 2025 Jun 25]. Available from: https://www.esr.cri.nz/digital-library/notifiable-disease-dashboard/
3. New Zealand Institute for Public Health and Forensic Science. Tuberculosis in New Zealand annual report 2019 [Internet]. New Zealand Institute for Public Health and Forensic Science: Porirua, New Zealand. [cited 2026 Aug 27]. Available from: https://www.phfscience.nz/digital-library/tuberculosis-in-new-zealand-annual-report-2019/
4. The Institute of Environmental Science and Research. Tuberculosis in New Zealand Annual Report 2020 [Internet]. The Institute of Environmental Science and Research; 2023 [cited 2025 Jun 27]. Available from: https://www.esr.cri.nz/media/amrb5bzf/esr-tuberculosis-annual-report-2020-1.pdf
5. World Health Organization. The End TB Strategy [Internet]. World Health Organization; 2014 [cited 2018 May 16]. Available from: https://www.who.int/teams/global-tuberculosis-programme/the-end-tb-strategy
6. Lönnroth K, Migliori GB, Abubakar I, et al. Towards tuberculosis elimination: an action framework for low-incidence countries. Eur Respir J. 2015;45(4):928-952. doi: 10.1183/09031936.00214014.
7. Ministry of Health – Manatū Hauora. Guidelines for tuberculosis control in New Zealand 2019 [Internet]. Wellington, New Zealand: Ministry of Health – Manatū Hauora; 2019 [cited 2026 Apr 13]. Available from: https://static.info.content.health.nz/docs/health-pros/topics/diseases-conditions/guidelines-tuberculosis-control-new-zealand-2019.pdf
8. Tollefson D, Bloss E, Fanning A, et al. Burden of tuberculosis in indigenous peoples globally: a systematic review. Int J Tuberc Lung Dis. 2013;17(9):1139-1150. doi: 10.5588/ijtld.12.0385.
9. Devlin S and Passmore E. Ongoing transmission of tuberculosis in Aboriginal communities in NSW. N S W Public Health Bull. 2013;24(1):38-42. doi: 10.1071/NB12113.
10. Varughese M, Heffernan C, Li MY, Long R. Time to diagnosis and treatment of pulmonary tuberculosis in indigenous peoples: a systematic review. BMC Infect Dis. 2023;23(1):131. doi: 10.1186/s12879-023-08098-y.
11. Bryder L. "A health resort for consumptives": tuberculosis and immigration to New Zealand, 1880-1914. Med Hist. 1996;40(4):453-471. doi: 10.1017/s002572730006169x.
12. Littleton J, Park J, Bryder L. The End of a Plague?

Tuberculosis in New Zealand. In: Herring D, Swedlung A, eds. Plagues and Epidemics: Infected Spaces Past and Present. New Zealand: Routledge; 2010. p. 119-136.
13. Cormier M, Schwartzman K, N'Diaye DS, et al. Proximate determinants of tuberculosis in Indigenous peoples worldwide: a systematic review. Lancet Glob Health. 2019;7(1):e68-e80. doi: 10.1016/S2214-109X(18)30435-2.
14. Hargreaves JR, Boccia D, Evans CA, et al. The social determinants of tuberculosis: from evidence to action. Am J Public Health. 2011;101(4):654-662. doi: 10.2105/AJPH.2010.199505.
15. Dehghani K, Lan Z, Li P, et al. Determinants of tuberculosis trends in six Indigenous populations of the USA, Canada, and Greenland from 1960 to 2014: a population-based study. Lancet Public Health. 2018;3(3):e133-e142. doi: 10.1016/S2468-2667(18)30002-1.
16. Uerata L, Scott N, Tamatea J, et al. Understanding the determinants of health for Māori living with chronic disease in Aotearoa New Zealand. J Prim Health Care. 2025;17(4):347-354. doi: 10.1071/HC25064.
17. Sheridan N, Jansen RM, Harwood M, et al. Hauora Māori - Māori health: a right to equal outcomes in primary care. Int J Equity Health. 2024;23(1):42. doi: 10.1186/s12939-023-02071-6.
18. Graham R, Masters-Awatere B. Experiences of Māori of Aotearoa New Zealand's public health system: a systematic review of two decades of published qualitative research. Aust N Z J Public Health. 2020;44(3):193-200. doi: 10.111/1753-6405.12971.
19. Hick S. The Enduring Plague: How Tuberculosis in Canadian Indigenous Communities is Emblematic of a Greater Failure in Healthcare Equality. J Epidemiol Glob Health. 2019;9(2):89-92. doi: 10.2991/jegh.k.190314.002.
20. Verrall AJ, Hill PC, Thorburn D, et al. Towards elimination of tuberculosis in New Zealand. N Z Med J. 2020;133(1513):89-96.
21. Golub JE, Bur S, Cronin WA, et al. Delayed tuberculosis diagnosis and tuberculosis transmission. Int J Tuberc Lung Dis. 2006;10(1):24-30.
22. Rangaka MX, Cavalcante SC, Marais BJ, et al. Controlling the seedbeds of tuberculosis: diagnosis and treatment of tuberculosis infection. Lancet. 2015;386(10010):2344-2353. doi: 10.1016/S0140-6736(15)00323-2.
23. Stennis NL, Burzynski JN, Herbert C, et al. Treatment for Tuberculosis Infection with 3 months of Isoniazid and Rifapentine in New York City Health Department Clinics. Clin Infect Dis. 2016;62(1):53-59. doi: 10.1093/cid/civ766.
24. Getahun H, Matteelli A, Chaisson RE, Raviglione M. Latent Mycobacterium tuberculosis infection. N Engl J Med. 2015;372(22):2127-2135. doi: 10.1056/NEJMra1405427.
25. Cook VJ, Shah L, Gardy J, Bourgeois A. Recommendations on modern contact investigation methods for enhancing tuberculosis control. Int J Tuberc Lung Dis. 2012;16(3):297-305. doi: 10.5588/ijtld.11.0350.
26. Nagarajan K, Das B. Tuberculosis and social networks: a narrative review on how social network data and metrics help explain tuberculosis transmission. Curr Sci. 2019;116(7):1068-1080.
27. Kawatsu L, Izumi K, Uchimura K, et al. Can social network analysis assist in the prioritisation of contacts in a tuberculosis contact investigation? Int J Tuberc Lung Dis. 2015;19(11):1293-1299. doi: 10.5588/ijtld.15.0378.
28. Etkind S, Veen J. Contact follow-up in high-and low-prevalence countries. In: Raviglione M, Reichman L, Hershfield E, editors. Tuberculosis: A Comprehensive, International Approach. New York, United States of America; Informa Healthcare; 2006. p. 555-582.
29. Jeffreys M, Ellison-Loschmann L, Irurzun-Lopez M, et al. Financial barriers to primary health care in Aotearoa New Zealand. Fam Pract. 2024;41(6):995-1001. doi: 10.1093/fampra/cmad096.
30. Ministry of Health – Manatū Hauora. Health and Independence Report 2024 - Te Pūrongo mō te Hauora me te Tū Motuhake 2024 [Internet]. Wellington, New Zealand; Ministry of Health – Manatū Hauora; 2025 [cited 2026 Apr 13]. Available from: https://www.health.govt.nz/system/files/2025-09/health-and-independence-report-2024.pdf
31. New Zealand Institute for Public Health and Forensic Science. Tuberculosis in New Zealand annual report 2018 [Internet]. New Zealand Institute for Public Health and Forensic Science. [cited 2026 Apr 13]. Available from: https://www.phfscience.nz/digital-library/tuberculosis-in-new-zealand-annual-report-2018/
32. New Zealand Institute for Public Health and Forensic Science. Tuberculosis in New Zealand annual report 2019 [Internet]. New Zealand Institute for Public Health and Forensic Science. [cited 2026 Apr 13]. Available from: https://www.phfscience.nz/digital-library/tuberculosis-in-new-zealand-annual-report-2019/
33. New Zealand Institute for Public Health and Forensic Science. Tuberculosis in New Zealand annual report 2020 [Internet]. New Zealand

Institute for Public Health and Forensic Science. [cited 2026 Apr 13]. Available from: https://www.phfscience.nz/digital-library/tuberculosis-in-new-zealand-annual-report-2020/
34. New Zealand Institute for Public Health and Forensic Science. Notifiable diseases annual surveillance summary 2021 [Internet]. New Zealand Institute for Public Health and Forensic Science. [cited 2026 Aug 27]. Available from: https://www.phfscience.nz/digital-library/notifiable-diseases-annual-surveillance-summary-2021/
35. New Zealand Institute for Public Health and Forensic Science. Notifiable diseases annual surveillance summary 2022 [Internet]. New Zealand Institute for Public Health and Forensic Science. [cited 2026 Aug 27]. Available from: https://www.phfscience.nz/digital-library/notifiable-diseases-annual-surveillance-summary-2022/
36. New Zealand Institute for Public Health and Forensic Science. Notifiable diseases annual surveillance summary 2023 [Internet]. New Zealand Institute for Public Health and Forensic Science. [cited 2026 Aug 27]. Available from: https://www.phfscience.nz/digital-library/notifiable-diseases-annual-surveillance-summary-2023/
37. Marley G, Zou X, Nie J, et al. Improving cascade outcomes for active TB: A global systematic review and meta-analysis of TB interventions. PLoS Med. 2023;20(1):e1004091. doi: 10.1371/journal.pmed.1004091.
38. Rankin A, Baumann A, Downey B, et al. The Role of the Indigenous Patient Navigator: A Scoping Review. Can J Nurs Res. 2022;54(2):199-210. doi: 10.1177/08445621211066765.

A retrospective observational study of on-call hospital pharmacist activities in a rural setting in Aotearoa New Zealand

Lisa Kremer, Brianna Fisk, Simone Hutchinson, Susannah Rice, Caitlin Wade, Carolyn Coulter

ABSTRACT

AIM: There is a paucity of published information on pharmacist on-call activities. Rural healthcare settings have been largely overlooked in previous research, which to date focusses on international urban tertiary hospitals. This study's aim is to investigate the types of enquiries, frequency of callbacks, and activities of on-call pharmacists at Timaru Hospital, a rural secondary hospital in Aotearoa New Zealand.

METHODS: We conducted a retrospective analysis of data entered by on-call pharmacists at Timaru Hospital between January 2021 and December 2023. Data were classified according to enquiry classification, reason for callback, call topic, caller identity, pharmacist level of experience, high-risk APINCH and patient safety.

RESULTS: There were 669 enquiries over the 3-year period, at a rate of one phone enquiry every 1.6 days, and 388 (58%) required a callback. Of the 669 enquiries, 140 (21%) related to high-risk medicines coded to APINCH and 46 (7%) related to patient safety. The on-call service cost approximately NZ$215,150 to NZ$265,850 for the 3 years.

CONCLUSION: Rural hospital on-call pharmacists require general specialist knowledge and broad expertise to be able to respond to the diversity of enquiries relating to medicines information and medication dosing. The results demonstrate the importance and impact of rural hospital pharmacist on-call activities, and the need for improved training and optimised after-hours medicine management.

On-call hospital pharmacists provide an essential service for patient care within hospital settings to ensure both access to medicines and optimal use of medicines at all times throughout the patient's hospital admission.[1,2] Pharmacists' specialist medication knowledge means they have the right knowledge to contribute to both safety and efficacy surrounding medication use. Pharmacists embedded in a hospital multidisciplinary team contribute to reducing avoidable medication-related harm (e.g., adverse drug events, drug interactions). Pharmacists contribute to improving medication-related health outcomes by ensuring the right medicine/medicines are prescribed at the right time, for the right patient.[3] Hospital pharmacists also play an important role in enhancing patient safety and satisfaction,[4] and reducing prescribing errors and preventable adverse drug reactions.[5] Collaborative practice between hospital pharmacists and general practitioners (GPs; family doctors) can result in reduced drug-related problems at discharge.[6] Aotearoa New Zealand hospital pharmacists work onsite during business hours (e.g., Monday to Friday, 8 am to 5 pm). Outside of business hours, on-call pharmacists are available to answer enquiries relating to, for example, medicine optimisation or medication supply. There have been multiple cases made for an extended-hours 7-day service model to ensure optimal inpatient health outcomes; however, in Aotearoa New Zealand this is not common practice.[1,7] Results of a 2017 meta-analysis indicated that hospital inpatients have higher overall mortality rates on the weekends compared with weekdays, possibly associated with staffing shortfalls and decreases or delays for medical procedures, further supporting the need for 24/7 pharmacist services.[8] Despite this, there are few published studies on pharmacist on-call activities, yet this information could enable pharmacists' activities to be better recognised and could also inform training of early career colleagues.

Activities that rural or urban on-call pharmacists carry out within Aotearoa New Zealand have not been described in the literature. All publicly

funded hospital pharmacy departments in Aotearoa New Zealand offer an on-call pharmacist service. Timaru Hospital is a rural secondary hospital in the South Canterbury area, providing healthcare to more than 63,000 people residing in 13,658 square kilometers.[9] The pharmacy business hours are 8:30 am to 5 pm Monday to Friday, and the on-call pharmacist service runs outside of these hours, including 24/7 on public holidays. The on-call pharmacist service is used by health professionals working in Timaru Hospital, including doctors, nurses and various specialised technicians, and is available to local community pharmacists and GPs (family healthcare providers, community-based doctors) residing in the Timaru Region.

The aim of this research is to describe rural on-call pharmacists' activities at Timaru Hospital during a 3-year period, including during the COVID-19 pandemic. While similar studies have been conducted overseas in urban areas or on a national scale, our investigation is tailored specifically to the unique healthcare challenges encountered in smaller, remote communities within Aotearoa New Zealand.

Methods

This is a retrospective data analysis of on-call pharmacist activities at Timaru Hospital from January 2021 to December 2023. All the data were de-identified, and no ethical approval was required. On-call pharmacists entered on-call activities in a Microsoft Excel spreadsheet, and all activities were coded by enquiry classification, reason for callback, call topic, caller identity and pharmacist level of experience (Appendix 1). The research team coded these data into subcategories: medicines information, high-risk APINCH classification and patient safety (Appendix 1). All subcategory data were assigned to their final code after group consensus (BF, SH, SR, CW). Content analysis occurred for systematically categorising and quantifying the qualitative data and to identify patterns and trends. Each category was assigned a numerical code, grouped and analysed. The coding process was reviewed (BF, SH, SR, CW) to ensure consistency and accuracy, with any discrepancies resolved through research group discussion. Research team members (BF, SH, SR, CW) were assigned specific codes and this was kept the same throughout the dataset to ensure consistency. Data were systematically analysed for each code in chronological order to ensure any contextual information for more recent enquiries was not missed. If two enquiries recorded on the data sheet were related they were categorised under one data point; this was done to prevent inaccuracies. Coded data were collated using Stata statistical software (version 18.0).

It is the responsibility of the on-call pharmacist to respond to all phone enquiries and be within a 20- to 30-minute drive from the hospital during their shift. On-call pharmacists are required to have their on-call phone and necessary resources with them to address enquiries. When supplying medicine for a callback, hospital pharmacists may also complete a clinical review, including a bedside consultation and medicines review.

In September 2023, due to staffing pressures post-pandemic, stock supplies across the hospital, including in the after-hours cupboard, were increased and weeknight phone enquiries (Monday to Thursday) were answered by a tertiary hospital. The pharmacy manager was still available informally for enquiries such as cold-chain alerts, but these data were not collected. Additionally, community providers had stopped calling regarding pandemic-related questions as there was now greater familiarity with treatments.

Costs

On-call hospital pharmacists receive a base rate of NZ$8 per hour, increased to NZ$10 per hour for public holidays. This costs approximately NZ$1,000 per week to always have a hospital pharmacist available. When a phone enquiry takes longer than 15 minutes, the on-call pharmacist is paid for the time worked. It costs between approximately NZ$60 per hour to NZ$110 per hour, depending on both the penal rate and the pharmacist's base salary (according to level of experience). Callbacks attract a minimum payment for 3 hours, costing approximately NZ$175 to NZ$325 per callback, depending on both the penal rate and the pharmacist's base salary. A callback would very rarely take longer than 3 hours.

Results

There were six pharmacists during the study period, with one pharmacist being rostered on call at a time. During the 3-year data collection period there were 669 phone enquiries to an on-call pharmacist, at a rate of one phone enquiry every 1.6 days (Table 1). The highest number of enquiries in 1 year was 263 in 2022. Of the 669 enquiries, 388 (58%) required a callback. In 2023, there were

significantly fewer callbacks compared to the previous 2 years. The main reason for a callback was to supply medicine (n=235; 70%).

There was a higher proportion of callbacks concerning medicines information in 2022 (n=48; 33%), which was during the COVID-19 pandemic. At that time, GPs were frequently enquiring if Paxlovid was appropriate for their patient or if they should refer them to the emergency department of the hospital, or house officers (early career medical doctors) were enquiring about the correct dosing of Paxlovid based on impaired renal function.

The main users of the on-call service were duty nurse managers (n=378; 57%) and house officers (n=185; 28%). In 2022 there was an increase in the number of medications available in the after-hours cupboard. There was a noticeable drop in the number of phone enquiries from duty nurse managers (a reduction of 56 enquiries), and subsequently there were 41 fewer callbacks relating to the supply of medicines in 2023.

Call topic

Supply of medicines (n=332; 50%) and medicines information (selection and dosing) (n=241; 36%) accounted for the highest call topic. Call topics that were classified as medicines information (selection and dosing) included, for example, Paxlovid dosing, antibiotic dosing, analgesic alternatives and crushability of medicines (Table 2). There was an increase in medicines information (selection and dosing) from years 2021 (n=57; 24%) to 2022 (n=97; 40%), and this was sustained in 2032 (n=87; 36%).

APINCH classification

The most common APINCH enquiry asked across the 3 years was anti-infectives (n=81; 58%) followed by narcotics and other sedatives (n=27; 19%) (Table 3). It is routine hospital procedure for medical staff to contact a pharmacist prior to initiating vancomycin; therefore, it was excluded from the anti-infective medicines category if the enquiry related to routine dosing and monitoring. No enquiries fell under the chemotherapy category, as there is only a day-stay chemotherapy unit at Timaru Hospital.

Patient safety

A total of 25 enquiries related to patient safety topics such as enquiries concerning a wrong dose or overdose (n=11; 44%): for example, paracetamol overdose, clozapine re-titration, fentanyl overdose

Table 1: Summary of caller identity, reason for callback and enquiry classification.

Category	2021 (%)	2022 (%)	2023 (%)	Total (%)
Caller identity (total)	219 (100)	263 (100)	187 (100)	669 (100)
Duty nurse manager (clinical nurse leader)	133 (61)	148 (57)	92 (49)	378 (57)
Medical house officer (early career medical doctor/resident physician/intern)	63 (29)	61 (23)	59 (32)	185 (28)
Other	16 (7)	43 (16)	26 (14)	76 (11)
Medical consultant (experienced medical doctor/physician/specialist)	7 (3)	11 (4)	10 (5)	30 (4)
Reason for callback (total)	116 (100)	147 (100)	74 (100)	337 (100)
Supply of medicines	88 (76)	96 (65)	51 (69)	235 (70)
Medicines information	22 (19)	48 (33)	22 (30)	92 (27)
Cold chain	6 (5)	3 (2)	1 (1)	10 (3)
Call outcome (total)	219 (100)	263 (100)	187 (100)	669 (100)
Callbacks	118 (54)	146 (56)	74 (40)	338 (51)
Enquiry only	101 (46)	117 (44)	113 (60)	331 (49)

Table 2: Summary of enquiries classified according to call topic.

Call topic	2021 (%)	2022 (%)	2023 (%)	Total (%)
Supply of medicines (not always resulting in a callback, as could be referred to the duty nurse co-ordinator)	124 (37)	136 (41)	72 (22)	332 (50)
Medicines information (selection and dosing)	57 (24)	97 (40)	87 (36)	241 (36)
Monitoring and follow-up	6 (27)	6 (27)	10 (45)	22 (3)
Paediatrics	3 (19)	7 (44)	6 (37)	16 (2)
Anticoagulation	5 (42)	3 (25)	4 (33)	12 (2)
Cold chain	6 (50)	4 (33)	2 (17)	12 (2)
Out of scope enquiries	3 (30)	7 (70)	0 (0)	10 (1)
Antimicrobial selection	5 (56)	1 (11)	3 (33)	9 (1)
Allergy review	1 (14)	6 (86)	0 (0)	7 (1)
Anticoagulation reversal	2 (50)	2 (50)	0 (0)	4 (1)
Pregnancy and lactation	3 (75)	1 (25)	0 (0)	4 (1)
Total	215	270	184	669

Table 3: Summary of enquiries classified according to APINCH criteria.

High-risk APINCH classification	Total enquiries (%) over 3 years
Anti-infective medicines	81 (58)
Potassium and other electrolytes	7 (5)
Insulin	4 (3)
Narcotics and other sedatives	27 (19)
Chemotherapy	0 (0)
Heparin and anticoagulants	21 (15)
Total	140 (100)

and vancomycin overdose (and not routine monitoring and dosing advice) (Table 4).

The second highest enquiries for patient safety topics were the administration of the wrong medicine (n=7; 28%). The largest percentage of medicines involved in safety-related enquiries were other antimicrobials (n=7; 32%), followed by opioids (n=3; 14%) and vancomycin (n=3; 14%).

Cost analysis

For the rural on-call hospital pharmacist service in the 3-year period, it cost approximately NZ$59,150 to NZ$109,850 for 338 callbacks (depending on the penal rate and the hospital pharmacist's base salary) and approximately NZ$156,000 for the base rate (e.g., the hourly rate for being on-call). The total cost to provide on-call services for the 3-year period is approximately NZ$215,150 to NZ$265,850, or NZ$71,716 to NZ$88,616 per year. There were 72 fewer call backs in 2023 (n=74) compared to the previous year (n=146), which resulted in a saving of approximately NZ$12,600 to NZ$23,400.

Table 4: Summary of enquiries classified according to patient safety.

Patient safety topic	Total enquiries (%) over 3 years
Wrong dose/overdose	11 (44)
Wrong medicine administered	7 (28)
Charting error	5 (20)
Equipment failure	2 (8)
Allergy	0 (0)
Total	25 (100)
Medicine	
Other antimicrobials (including COVID antivirals)	7 (32)
Opioids	3 (14)
Vancomycin	3 (14)
Anticoagulants	1 (5)
Paracetamol	1 (5)
Clozapine	1 (5)
Nifedipine	1 (5)
Cytotoxic medicines	1 (5)
Parkinson's medicines	1 (5)
Diabetes medicines	1 (5)
Osteoporosis medicines	1 (5)
Total	21 (100)

Discussion

The key findings from this retrospective analysis of on-call hospital pharmacist activities in a rural setting in Aotearoa New Zealand showcase the diversity of enquiries and value of pharmacist expert medicine knowledge. According to our APINCH analysis, on-call hospital pharmacists often receive enquiries for advice on high-risk medicines such as anti-infective medications and narcotics and other sedatives. Applying pharmacist expert medicine knowledge for anti-infectives is time critical, supporting the essential healthcare worker status of hospital pharmacists.[3,10] A recently published observational study of on-call hospital pharmacist services in South Australia by Lim et al. (2025) substantiates our findings.[10] The authors report that antimicrobials (44%) and narcotics (24%) were the top two APINCH medicines on-call hospital pharmacists provided expert medicine advice on.[10] St Vincent's Hospital, Australia, reported that the top two APINCH medicines were also anti-infective medicines (40%), followed by narcotics (11%).[11] Our results also show on-call pharmacists provide advice on what to do following administration of incorrect doses or overdoses (n=11; 44%) or administration of the wrong medicine (n=7; 28%). Although our absolute numbers may be small, these numbers represent significant clinical impact, further supporting the benefit to the hospital from on-call pharmacist skills and knowledge and the need for 24/7 access to a pharmacist. Additionally, this may support the requirement for rural hospital pharmacists to embody a wide range of clinical knowledge. This caters for diverse illnesses and complex medical conditions within rural hospital settings that do not have specialty services (e.g., neonatal intensive care, haematology), but the on-call pharmacists will need to respond to all

aspects of patient care.

In addition to providing expert medicine knowledge, on-call pharmacists are also required to attend callbacks to supply medicines. Timaru Hospital has a procedure where the supply of medication predominantly occurs in discussion with the duty nurse manager, who has good knowledge of where to source medication across the hospital and therefore helps minimise pharmacist callbacks relating to medication supply. Our results show that over a 3-year period in this small rural hospital, on-call pharmacists were required to return to the hospital to supply medicines 338 times. This represents 51% of all on-call enquiries and an approximate cost of NZ$59,150 to NZ$109,850. St Vincent's Hospital in Australia had similar on-call results to our findings, where approximately 59% of on-call enquiries related to medication supply.[11] In another Australian publication, authors report on on-call data from seven South Australian hospital sites (including metropolitan and regional sites).[10] Overall, the on-call pharmacist service had 12% of enquiries resulting in a call-back with an associated costing of approximately AU$620,000 (approximately NZ$750,000).[10] This hospital had significantly fewer callbacks (as a percentage) compared to our findings of 58%; this also requires further investigation to understand the difference between South Australia and Timaru.

In 2022, Timaru Hospital made a successful change to reduce the number of callbacks. Following the increased range of medication availability in the after-hours medication cupboard in 2022, there were 41 fewer callbacks in 2023 and 56 fewer calls from the duty nurse manager in 2022. An approximate cost savings of NZ$7,175 to NZ$13,325 resulted from this initiative. Increasing after-hours access by the duty nurse manager to the pharmacy department may lead to an additional reduction in callbacks and enquiries from the duty nurse manager, with a potential associated cost saving. However, implementing this option would breach current legislation in Aotearoa New Zealand. With a pharmacist workforce that is under strain, under-resourced and understaffed, allowing duty nurse manager access to the pharmacy dispensary could be beneficial to the pharmacist profession.[12,13] Should a legal framework be implemented to allow after-hours access to the hospital pharmacy, the duty nurse manager would need to be under the direction of the on-call pharmacist with clinical support maintained over the phone.

Over our 3-year study period, the proportion of phone enquiries handled at Timaru Hospital rose steadily from 40% in 2021 and 44% in 2022 to 60% in 2023. Several factors may explain this upwards trend, including stronger professional relationships between pharmacy and non-pharmacy staff, higher patient acuity, increased patient turnover and a generally heavier health workforce workload. For context, Kilcullen et al. (2016) and Heath et al. (2014) reported that 88% and 76% of enquiries, respectively, were managed by an on-call pharmacist over the phone, which is slightly higher than our findings.[11,14] However, these comparisons should be treated with caution, as there is a 10-year gap between those data collection periods and our study.

A high number of enquiries from nursing staff based in England and Ireland hospitals have been previously published, with authors suggesting the need to develop a specific resource on how to best utilise the on-call hospital pharmacist service.[14,15] Creating a resource for new on-call pharmacists and hospital colleagues (e.g., house officers) at Timaru Hospital is worth further investigation.

Strengths and limitations

A key limitation of this study is the absence of ethnicity data, which could allow for targeted interventions, potentially enhancing the on-call service's effectiveness and directly benefitting under-represented groups within the population, such as Māori (Indigenous people of Aotearoa New Zealand). It was a requirement for all on-call pharmacists to complete the on-call spreadsheet; however, there could be missing data. Presenting rural data that have not previously been reported is a strength of this research. The results from this study could be used to inform changes needed, such as changes to after-hours cupboard medicine availability, to create orientation training packages to prepare new pharmacists starting on-call roles and to improve patient safety. Additionally, this could lead to further education resource development for hospital colleagues to ensure the on-call pharmacist service is utilised efficiently and effectively.

Conclusion

By describing the volume and range of medicine-related enquiries managed by rural on-call pharmacists at Timaru Hospital, our results indicate the important role pharmacists provide to clinical teams in a rural setting. The

breadth of enquiries managed over the study period, including during COVID-19, suggests that on-call pharmacist services offer an important and impactful contribution to medicines-related decision making in smaller, remote communities in Aotearoa New Zealand.

COMPETING INTERESTS
The authors have no relevant financial or non-financial interests to disclose.

ACKNOWLEDGEMENTS
The authors wish to acknowledge Thelma Fisher, Subject Librarian at the University of Otago, for their support in upskilling some members of this research group in literature searching.

AUTHOR INFORMATION
Lisa Kremer, PhD, BPharm: School of Pharmacy and Pharmacology (He Rau Kawakawa), University of Otago – Ōtākou Whakaihu Waka, Ōtepōti Dunedin, Aotearoa New Zealand.
Brianna Fisk: School of Pharmacy and Pharmacology (He Rau Kawakawa), University of Otago – Ōtākou Whakaihu Waka, Ōtepōti Dunedin, Aotearoa New Zealand.
Simone Hutchinson: School of Pharmacy and Pharmacology (He Rau Kawakawa), University of Otago – Ōtākou Whakaihu Waka, Ōtepōti Dunedin, Aotearoa New Zealand.
Susannah Rice: School of Pharmacy and Pharmacology (He Rau Kawakawa), University of Otago – Ōtākou Whakaihu Waka, Ōtepōti Dunedin, Aotearoa New Zealand.
Caitlin Wade: School of Pharmacy and Pharmacology (He Rau Kawakawa), University of Otago – Ōtākou Whakaihu Waka, Ōtepōti Dunedin, Aotearoa New Zealand.
Carolyn Coulter, PhD, BPharm: Timaru Hospital Pharmacy Department, Health New Zealand – Te Whatu Ora South Canterbury, Timaru, Aotearoa New Zealand.

CORRESPONDING AUTHOR
Lisa Kremer: School of Pharmacy and Pharmacology (He Rau Kawakawa), University of Otago – Ōtākou Whakaihu Waka, 18 Frederick St, Ōtepōti Dunedin, Aotearoa New Zealand. E: Lisa.kremer@otago.ac.nz

URL
https://nzmj.org.nz/journal/vol-139-no-1643/a-retrospective-observational-study-of-on-call-hospital-pharmacist-activities-in-a-rural-setting-in-aotearoa-new-zealand

CITATION
Kremer L, Fisk B, Hutchinson S, et al. A retrospective observational study of on-call hospital pharmacist activities in a rural setting in Aotearoa New Zealand. N Z Med J. 2026 Oct 9;139(1643):62-74. doi: 10.26635/6965.7198.

REFERENCES

1. Falconer N, Snoswell C, et al. The right time and place: the need for seven-day pharmacist service models. J Pharm Pract Res. 2021;51(6):444-455. doi: 10.1002/jppr.1761.
2. Bullock B, Donovan P, Mitchell C, et al. The impact of a pharmacist on post-take ward round prescribing and medication appropriateness. Int J Clin Pharm. 2019 Feb;41(1):65-73. doi: 10.1007/s11096-018-0775-9.
3. Lee KMK, Koeper I, Johnson ME, et al. Multidisciplinary perspectives on roles of hospital pharmacists in tertiary settings: a qualitative study. Int J Qual Health Care. 2024 Jan 12;36(1):mzad110. doi: 10.1093/intqhc/mzad110.
4. Dawoud DM, Smyth M, Ashe J, et al. Effectiveness and cost effectiveness of pharmacist input at the ward level: a systematic review and meta-analysis. Res Social Adm Pharm. 2019 Oct;15(10):1212-1222. doi: 10.1016/j.sapharm.2018.10.006.
5. Klopotowska JE, Kuiper R, van Kan HJ, et al. On-ward participation of a hospital pharmacist in a Dutch intensive care unit reduces prescribing errors and related patient harm: an intervention study. Crit Care. 2010;14(5):R174. doi: 10.1186/cc9278.
6. Sørensen CA, Jeffery L, Falhof J, et al. Developing and piloting a cross-sectoral hospital pharmacist intervention for patients in transition between hospital and general practice. Ther Adv Drug Saf. 2023 Mar 18;14:20420986231159221. doi: 10.1177/20420986231159221.
7. Sin B, Yee L, Claudio-Saez M, et al. Implementation of a 24-hour pharmacy service with prospective medication review in the emergency department. Hosp Pharm. 2015 Feb;50(2):134-8. doi: 10.1310/hpj5002-134.
8. Pauls LA, Johnson-Paben R, McGready J, et al. The Weekend Effect in Hospitalized Patients: A Meta-Analysis. J Hosp Med. 2017 Sep;12(9):760-766. doi: 10.12788/jhm.2815.
9. Stats NZ Tatauranga Aotearoa. Census of Population and Dwellings [Internet]. 2024 May 8 [cited 2026 Jul 7]. Available from: https://www.stats.govt.nz/census/
10. Lim AYL, Perkins CJ, Bakoos D, et al. Provision of on-call pharmacist services across public hospitals: a retrospective observational study. Int J Pharm Pract. 2026 Feb 18;34(1):47-54. doi: 10.1093/ijpp/riaf066.
11. Heath EK, Welch SA, Costello N. On-call pharmacist enquiries and outcomes: an on-call database review, 2003–2012. J Pharm Pract Res. 2014;44(4):201-204. doi: 10.1002/jppr.1033.
12. Health New Zealand – Te Whatu Ora. Health

Worforce Plan 2023 - 2024 [Internet]. Wellington, New Zealand: 2023 Jul 4 [cited 2026 Jul 12]. Available from: https://www.healthnz.govt.nz/publications/health-workforce-plan-2023-24

13. Pharmaceutical Society of New Zealand Incorporated. Pharmacy Workforce Survey 2024: Executive Report [Internet]. Wellington, New Zealand: 2024 Aug [cited 2026 Feb 12]. Available from: https://www.psnz.org.nz/Folder?Action=View%20File&Folder_id=254&File=Pharmacy%20Workforce%20Survey-%20Executive%20Report.pdf
14. Kilcullen N, O'Brady C. GM-003 Do you need the on-call pharmacist? Eur J Hosp Pharm. 2016 Feb 14;23:a159-A160. doi: 10.1136/ejhpharm-2016-000875.359
15. Cheeseman MP, Rutter P. On-call hospital pharmacy services in NHS England: service provision and documentation of medicines advice calls. Eur J Hosp Pharm. 2016 Jan;23(1):11-15. doi: 10.1136/ejhpharm-2015-000679.

Appendix

Code definitions

The categories were selected based on their relevance to hospitals using an on-call pharmacist service and their usefulness for new on-call pharmacists in the development of training packages.

Appendix Table 1: Code definitions.

Code	Definition
Enquiry classification	**Categorised into callback and phone enquiry only**
Callback	The pharmacist needed to be onsite at the hospital to resolve the enquiry.
Phone enquiry only	The pharmacist resolved the enquiry over the phone without needing to come into the hospital.
Reason for callback	**Categorised into the supply of medicines, medicines information, and cold chain, with medicine information further divided into COVID-related and non–COVID-related from 2022.**
Supply of medicines	Enquiry related to the physical availability and location of medicines.
Medicines information	Enquiries from other healthcare professionals regarding medicines that required pharmacist expertise. From 2022, this is divided into COVID-related and non–COVID-related enquiries.
Cold chain	The process ensures that refrigerated medicines are continuously stored at the appropriate temperatures.
Call topic	**Categorised into medicines information, dosing, anticoagulation, antimicrobial selection, allergy review, pregnancy and lactation, paediatrics, cold chain, out of scope enquiries and supply of medicines.**
Medicines information	Calls about medicines requiring pharmacist expertise.
Dosing	Enquiries about proper dosage or adjustments based on patient needs.
Anticoagulation	Enquiries regarding the use or management of anticoagulant medicines.
Antimicrobial selection	Enquiries regarding appropriate antimicrobial therapy.
Allergy review	Requests to assess or confirm a patient's allergy status in relation to prescribed medication.
Pregnancy and lactation	Enquiries regarding the safety of medicine use during pregnancy or breastfeeding.
Paediatrics	Enquiries specific to medications or dosing in paediatric patients.

Appendix Table 1 (continued): Code definitions.

Code	Definition
Cold chain	Enquiries about maintaining cold chain for medicines requiring refrigeration.
Out of scope enquiries	Enquiries that fall outside of the pharmacist's responsibility or expertise.
Supply of medicines	Enquiries for medicine supply, availability or delivery.
High-risk APINCH classification	**Categorised into anti-infective agents, potassium and other electrolytes, insulin, narcotics, chemotherapy, heparin and anticoagulants.**
Anti-infective medicines	Enquiries about medications used to treat infections.
Potassium and other electrolytes	Enquiries about high-risk electrolyte medications like potassium.
Insulin	Enquiries about the use or administration of insulin.
Narcotics	Enquiries about controlled substances or narcotic medications.
Chemotherapy	Enquiries about cancer treatment medicines.
Heparin and anticoagulants	Enquiries about blood thinners, including heparin and other anticoagulants.
Patient safety issues	**Categorised into wrong dose/overdose, wrong medicine administered, allergy, charting error or equipment failure.**
Wrong dose/overdose	Enquiries about patients receiving incorrect dose/doses or accidental overdose.
Wrong medicine administered	Enquiries involving the administration of the wrong medicine.
Allergy	Enquiries about a potential or confirmed allergic reaction.
Charting error	Enquiries related to errors in medication charts.
Equipment failure	Enquiries regarding medical or dispensing equipment malfunction affecting medication safety.
Patient safety (medicines involved)	**Categorised into opioids, anticoagulants, paracetamol, vancomycin, other antimicrobials including COVID antivirals, clozapine, nifedipine, cytotoxic, Parkinson's medicines, diabetes medicines or osteoporosis medicines.**
Opioids	Enquiries about opioid medications.
Anticoagulants	Enquiries about blood-thinning medications.
Paracetamol	Enquiries about the use or dosing of paracetamol.
Vancomycin	Enquiries about vancomycin.

Appendix Table 1 (continued): Code definitions.

Code	Definition
Other antimicrobials (including COVID antivirals)	Enquiries about other antibiotics or COVID-19 antiviral medications, excluding vancomycin.
Clozapine	Enquiries about clozapine.
Nifedipine	Enquiries about nifedipine.
Cytotoxic medicines	Enquiries about medications that are toxic to cells, commonly used in chemotherapy.
Parkinson's medicines	Enquiries about medications used to treat Parkinson's disease.
Diabetes medicines	Enquiries about diabetes treatments or insulin management.
Osteoporosis medicines	Enquiries about medications used to treat osteoporosis.
Caller identity	**Categorised into duty nurse manager, house surgeon, nurse, consultant, front desk, community health, laboratory, anaesthetist, patient/caregiver, general practitioner, wards, registrar, pharmacist at other hospitals, missing code or MATOS text.**
Duty nurse manager (clinical nurse leader)	The nursing manager responsible for overall ward operations.
House officer (early career medical doctor/resident physician/intern)	Junior doctor with fewer than 5 years of experience.
Nurse	Nursing staff (all roles and years of experience).
Medical consultant (experienced medical doctor/ physician/specialist)	Senior doctor with more than 12 years of experience.
Front desk	Administrative staff.
Community health	A community health worker or facility.
Laboratory	Laboratory staff, both hospital and non-hospital staff.
Anaesthetist	A medical doctor specialising in anaesthesia.
Patient/caregiver	Patients or their caregivers (either inpatient or recently discharged).
General practitioner	General practitioners (family doctor) and related to outpatient care.
Wards	Hospital wards staff regarding inpatient medication needs.
Registrar	Senior medical trainee (approximately 5 to 12 years of experience).
Pharmacist at other hospitals	Pharmacists from other healthcare facilities (e.g., Christchurch Hospital).
Missing code	Enquiries lacking specific categorisation or missing documentation.

Appendix Table 1 (continued): Code definitions.

Code	Definition
External fridge monitoring programme/weekly fridge monitoring programme	Enquiries based on the Medicines and Therapeutic Optimisation System for specialised medication inquiries.
Pharmacist experience level	**Categorised into early career or senior pharmacist based on number of years of experience.**
Early career pharmacist	Pharmacists with fewer than 5 years of experience.
Senior pharmacist	Pharmacists with more than 5 years of experience or in specialised roles.

Highlighting the push and the pull: a comparison of New Zealand and United Kingdom resident doctor contracts

Alexander Bell, Alicia Schwarzenbach

ABSTRACT

The United Kingdom (UK) resident doctor workforce faces escalating pressures, including pay erosion, intense competition for training posts, rota instability and high burnout risk. While remuneration has dominated industrial disputes, comparatively less attention has been paid to the impact of contractual worker protections and day-to-day working conditions on morale and retention. Drawing on lived experience of working as resident doctors in both the UK and New Zealand, this article compares key elements of national employment contracts and collective agreements. We examine differences in annual leave autonomy, rota publication and enforcement mechanisms, staffing resilience through "relief" roles, cross-cover remuneration, access to personal medical appointments, reimbursement of mandatory professional expenses, meal provision and structured support for examination preparation and career progression. Although UK pay structures recognise antisocial hours, New Zealand contracts embed wider protections that promote flexibility, professional development and workforce wellbeing. We suggest that these comparatively low-cost, system-level interventions contribute meaningfully to higher reported satisfaction and improved retention among New Zealand resident doctors. Adopting similar contractual safeguards within the UK may represent an achievable and cost-effective strategy to enhance morale, reduce attrition and strengthen long-term workforce sustainability within the National Health Service.

The strain on the United Kingdom (UK) resident doctor workforce is mounting, with long-standing disputes over pay, highly competitive specialty training posts with an average competition ratio of approximately 7:1 (up to 167:1 depending on the speciality) and dissatisfaction with working conditions being at high levels.[1,2] These pressures are reflected in high levels of burnout, with around 61% of doctors in training assessed as being at moderate or high risk of burnout.[2] While degradation in pay undoubtedly contributes to disillusionment within the resident doctor workforce, the authors argue that the impact of worker rights and working conditions are significant factors that are often overlooked.

Indicators of workforce strain and dissatisfaction are also reflected in reported career intentions and retention of domestically trained doctors. In the UK's General Medical Council workforce experience data, approximately 34% of doctors reported that they were likely to leave the profession after 2 years, highlighting perceived intentions and workforce dissatisfaction.[3,4] In contrast, Medical Council of New Zealand | Te Kaunihera Rata o Aotearoa (MCNZ) data indicate comparatively strong retention of domestically trained doctors, with approximately 99% retained after 1 year and around 90% after 3 years in practice.[5]

International medical migration has been a long-standing phenomenon, with large numbers of British doctors moving to work in New Zealand. Doctors moving from the UK to New Zealand frequently report improved working conditions, greater lifestyle satisfaction and better career opportunities compared with their experience in the National Health Service (NHS).[6–8] Therefore, one could argue that medical migration may indirectly reflect workplace dissatisfaction. The authors acknowledge the opportunity for selection bias to have been introduced in the latterly mentioned studies. It would also be prudent to highlight that approximately 65% of UK doctors relocating to New Zealand subsequently return to the UK after 2 years. This trend then plateaus, with around 72% and 77% returning to the UK after 3 and 10 years, respectively.[9] Importantly, factors often cited as being key determinants of the decision to return to the UK include proximity to family and friends, change in personal

circumstance or family needs or never intending to stay in New Zealand, and these appear separate from workplace-associated push and pull factors.[6–8]

Through personal experience working as resident doctors in the UK and New Zealand, and by a comparison of employment contracts, this viewpoint article will examine how working conditions for New Zealand resident doctors promote autonomy, self-development and flexibility. From this, we suggest actionable and cost-effective interventions that would significantly improve resident doctor morale and retention in the UK. This viewpoint article focusses on resident doctor contracts and working conditions. An assessment of senior medical officer and consultant pay and conditions is beyond the scope of this article and requires dedicated analysis.

The collective agreement

Doctors in New Zealand are paid based on contracts that are typically renegotiated every 2–3 years, whereby unions negotiate with the government to come to an accord termed a "collective agreement".[10,11] This enables updated agreements reflecting evolving pressures, training and workloads in a constantly changing healthcare system and economic environment. In contrast, the UK resident doctor contract undergoes infrequent negotiations, whereby contractual discussions and changes frequently occur following intense disputes and industrial action. Since 2002, the UK resident doctor contract has been amended in 2016 and in 2024, each time following successive rounds of industrial action by resident doctors.[12] This viewpoint article will explore comparisons between key points of the UK and New Zealand resident doctor contracts, including annual leave, rota co-ordinators and rota publications, staffing and examinations.

Annual leave, rota co-ordinators and "resilience"

A key determinant of workplace happiness is autonomy, particularly in relation to control over annual leave. The nature of healthcare work and rotations through medical training mean autonomy around leave is challenging in both the UK and New Zealand. Doctors in both systems experience difficulties obtaining leave due to service pressures and staffing constraints. However, there remain key differences in the logistics of leave requests that promote greater autonomy for New Zealand resident doctors with particular acknowledgment to the clear wording of the collective agreements.

In New Zealand, it is the employer's responsibility to find cover for requested leave. This prevents the need for doctors to orchestrate convoluted shift swaps within a complex rota at the expense of their own time. New Zealand allows leave to be requested on any shift, including out-of-hours, weekends and nights, enabling doctors to take leave when desired rather than from a limited pool of standard shifts. The same is not true in the UK, where annual leave may only be requested on standard rostered working days (approximating 50–70% of shifts depending on department). New Zealand doctors generally have the weekend before and after a leave period protected. Requests for time off in lieu—e.g., having worked a bank holiday—are difficult to decline if given enough notice (2 weeks).[10,11] No such protections are worded into the UK contract, which only encourages that leave requests, where possible, should be responded to positively.[12,13]

It is important to recognise that despite these clear guidelines, leave availability remains a significant issue consistently raised by resident doctors in New Zealand, particularly in certain specialties such as general surgery. Indeed, 54% of Australasian general surgical registrars reported considering leaving surgical training, with 38% of those listing poor lifestyle and quality of life during training as the number one reason for this dissatisfaction.[14]

Relief doctors

To facilitate staffing flexibility, New Zealand has developed the role of "relief" doctors. Relief doctors cover staffing gaps when clinicians are on rostered leave, night shifts, attending training or taking annual leave. The volatile role, with late-notice placements and the challenges of working in varying clinical environments, is compensated by a substantially increased salary equating to an approximate 30–50% increase in pay.[10,11]

The development of this role ensures safe staffing levels and builds resilience into the system, unburdening the individual at the same time as aiming to reduce the need for expensive locum doctors—which attract an enhanced hourly rate standardised across New Zealand based on years of experience ranging from 1.3 to 5.4 times the standard hourly rate.[10,11] The development of this role also facilitates resident doctor training, development and wellbeing. Without a similar role in

the UK, there is less resilience in the system to fill rota gaps, increasing the reliance on costly locums that have no standard rate and are determined by the employing NHS staff bank.[13] It could be argued that the relief role may be of benefit if developed in the UK given that over 26% of resident trainees found that training was adversely affected due to rota gaps not being dealt with appropriately.[2]

Rota delays

Although there is a requirement for rota publication in the UK to be at least 6 weeks before the commencement of a post, this can be delayed with no real consequence. The two New Zealand resident doctor medical associations take differing approaches to delayed rota publication.

Specialty Trainees of New Zealand (STONZ) requires publication of a rota more than 28 days prior to start date, with a punitive cost of NZ$75 per day of delayed publication within 28 days to be paid to all members.[10] Alternatively, New Zealand Resident Doctors' Association (NZRDA) policy is that resident doctors are not obliged to work out-of-hour shifts they were not given 28 days' notice of, or can opt to work them at additional locum duty pay.[11] This incentivises compliance from rota teams and empowers and compensates resident doctors should a delay in publication or the publication of a non-compliant rota occur. Similar steps might be sought in the UK.

Delayed rota publication is not insignificant. Timely rota publication has considerable implications for resident doctors' workplace and personal lives. It can dictate arrangements for accommodation and potential need for relocation. Furthermore, timely rota publication promotes successful annual leave requests through early application as well as accommodating life plans and events. Delay in publishing a rota may hinder these, therefore reducing workplace autonomy and satisfaction.

Medical appointments

The wellbeing of the medical workforce is an important consideration in both New Zealand and the UK. In New Zealand, the collective agreements allow flexibility for doctors to attend personal medical appointments, often through sick leave or discretionary leave arrangements.[10,11] In the UK, NHS employment policies also provide mechanisms for time off to attend healthcare appointments, although the ease of access and the consistency of this can vary significantly between employers and between departments within the same employing trust.[13] Despite the existence of such provisions in both systems, challenges related to rota pressures and staffing constraints can make it difficult for doctors to prioritise their own healthcare. This raises broader concerns about workforce wellbeing and the expectations placed on healthcare professionals.

Remuneration and development

Remuneration

Resident doctors in New Zealand work comparatively more hours than their UK counterparts. House officers and registrars worked an average of 66.9 and 53.5 hours per week, respectively.[9] This is compared with a contractual maximum number of hours per week of 48 for NHS resident doctors for those that have not opted out of the European Working Time Directive, although true hours worked are likely to be higher.[12]

In the UK, remuneration works on a penal system where doctors are paid a base salary, with enhancements or supplemented payments for unsocial hours and rota intensity.[12] On the other hand, New Zealand offers a banded system and remunerates doctors based on a "run category".[10,11] An increased number of hours worked, and therefore a higher run category, results in increased salary, regardless of the type of shift or the frequency of weekends completed, with no specific enhancements for out-of-hours work. It is possible that resident doctors may work beyond their contractual hours as determined by their run category. However, a mechanism exists called a "run review", whereby doctors may have their run category reassessed if they feel the run category does not reflect the actual hours worked.

The UK mandates that shifts cannot be longer than 13 hours, while this is 16 hours in New Zealand. Additionally, the UK does not allow doctors to work more than seven consecutive shifts. This number is extended to 12 in New Zealand. The remuneration structure in the UK recognises the antisocial nature and physical burden of working out-of-hours shifts, nights and weekends, as well as recognising the patient safety risks associated with fatigued doctors. An NZRDA workforce survey reported that 92% of respondents had experienced fatigue severe enough to raise concerns about clinical error, and 74% reported nearly falling asleep while driving home after shifts.[15] Undoubtedly, preventing fatigue in doctors is paramount to patient safety; currently, the UK is putting more protections in place to

protect their doctors and patients from the harms of inadequate rest.

Cross cover

While the provision of relief doctors generally ensures adequate staffing, sickness means late-notice gaps that may arise might be unable to be filled. New Zealand acknowledges this increase in workload, stress and responsibility by remunerating resident doctors with "cross cover" when they are asked to cover another doctor's workload—a flat rate of an additional NZ$300 per day.[10,11] No such scheme exists in the UK, where short staffing is commonly reported to adversely impact training, and doctors are simply expected to "pick up the slack". A healthcare system based on good will is not sustainable.

Reimburse non-optional expenses

One factor seemingly overlooked in the debate around resident doctor pay and working conditions is the mandatory expenses required for doctors to practice. These include medical licensing fees, medical indemnity, exam fees, college membership, conference fees and courses, which are all mandatory for progression, amassing thousands of dollars. By reimbursing the costs that are mandatory for doctors to practice medicine and progress towards being consultants, Health New Zealand – Te Whatu Ora demonstrates that it values the role its resident doctors play and recognises these significant costs and the importance of ongoing professional development.[10,11] The UK does not have a comparable scheme, with much more limited study budgets, although tax relief may be sought for mandatory professional body membership.

Meal allowance

The UK has no requirement for meal services to be provided to on-shift staff, offering only the guidance that meals, hot and cold, should be accessible to all staff with costs incurred to the employee.[12] In a 2008 cross-sectional survey of NHS doctors, only 12% of respondents reported their employer was supportive of healthy eating, with perceived barriers to healthy eating listed as lack of breaks, lack of selection and canteen opening times.[16] In New Zealand, it is required that if a doctor is on duty over a recognised meal period, the doctor is entitled to a meal provided by the employer at the employer's expense.[10,11] The adverse impacts of unhealthy and inadequate nutrition on the wellbeing and performance of doctors have been well outlined, with limited organisational access and availability frequently identified as key barriers.[17,18] Therefore, it could be suggested that providing healthy meals and snack choices in the workplace could have the added benefit of promoting employee health and wellbeing, workforce longevity and productivity.

Promoting self-development

Exams are a requirement for progression in a medical career. Doctors in the UK are required to fund their own expensive exam fees, which typically exceed thousands of pounds. While the provision of study leave exists for UK doctors, requests for these are subject to the scrutiny outlined above, similar to annual leave. In New Zealand, exam and course fees are reimbursed if relevant to specialty, and clinicians are provided with 6 weeks to revise, of which 3 weeks may be taken as a standalone block.[10] This allows clinicians to approach examinations prepared and with greater chance of success, thus preventing delays to career progression along with reducing repeat attempts requiring further time away from work. It also reduces the need for revision after long shifts and on weekends, and the high risk of burnout in an already demanding and challenging career. Despite these strategies, balancing examinations and work commitments remains a key contributing factor to burnout as outlined by New Zealand resident doctors.[19] This may highlight that more could be done. Upon successful completion of exams, doctors in New Zealand receive a "salary step", acknowledging the increased clinical knowledge that comes with passing examinations.[10,11] No comparable scheme exists in the UK.

Conclusion

The comparisons made between the UK and New Zealand align with broader literature identifying key determinants of workforce satisfaction and retention, which include working conditions, opportunities for learning and development, and autonomy and flexibility.[20] Both the UK and New Zealand healthcare systems face challenges related to workforce retention and morale, with remuneration consistently identified as an important factor influencing job satisfaction that must be addressed.[2,3,6,9] However, working conditions and workload pressures are also strongly associated with retention outcomes across both settings. It would be remiss of the authors not to acknowledge the challenges New Zealand is currently experi-

encing with an increasingly stretched healthcare system, though in-depth exploration is beyond the scope of this viewpoint article and has already been addressed by others.[9,19,21]

The collective agreements in New Zealand address and protect the working conditions and professional development of resident doctors in ways not done in the UK. Particularly, inspiration might be sought in the wording the New Zealand collective agreements take, with more clarity being given compared to the vagueness of many points in the UK doctor contract.

While overall remuneration may vary between the two systems depending on workload and hours worked, this viewpoint article argues that the greater levels of satisfaction reported by doctors working in New Zealand may be related to workplace and professional development protections. The authors suggest that the reimbursement of professional fees, meal allowance and provision, the introduction of measures to promote leave autonomy and the promotion of professional development are key factors in the happiness and retention of the New Zealand medical workforce. It must be stressed that the combination of adequate remuneration along with workplace protections are essential for promoting satisfaction and workforce retention in a highly skilled workforce, and one does not simply replace the other. It is therefore unsurprising that, alongside "push" factors within the UK, many doctors are drawn to live and work in the New Zealand medical workforce, along with non-worked related "pull" factors including quality of life, personal and family factors and availability of career opportunities.[7,8] The fact that New Zealand doctor associations have embedded and clearly documented these safeguards within their collective agreements highlights what could be seen as achievable reforms. For the UK, overlooking such steps and clarification may represent a missed opportunity to improve doctor satisfaction and strengthen retention.

COMPETING INTERESTS
Nil.

AUTHOR INFORMATION
Dr Alexander Bell: PGY3+ House Officer, Timaru Hospital, New Zealand.
Dr Alicia Schwarzenbach: PGY3+ House Officer, Timaru Hospital, New Zealand.

CORRESPONDING AUTHOR
Dr Alicia Schwarzenbach: PGY3+ House Officer, Timaru Hospital, New Zealand. E: alicia.schwar@gmail.com

URL
https://nzmj.org.nz/journal/vol-139-no-1643/highlighting-the-push-and-the-pull-a-comparison-of-new-zealand-and-united-kingdom-resident-doctor-contracts

CITATION
Bell A, Schwarzenbach A. Highlighting the push and the pull: a comparison of New Zealand and United Kingdom resident doctor contracts. N Z Med J. 2026 Oct 9;139(1643):75-81. doi: 10.26635/6965.7464.

REFERENCES

1. National Health Service England. Medical Specialty Recruitment [Internet]. National Health Service England; 2025 [cited 2026 Feb 16]. Available from: https://medical.hee.nhs.uk
2. General Medical Council. National Training Survey 2025 results [Internet]. London, United Kingdom: General Medical Council; 2025 [cited 2026 Feb 20]. Available from: https://www.gmc-uk.org/cdn/documents/national-training-survey-2025-results-report_pdf-111657596.pdf
3. General Medical Council. The state of medical education and practice in the UK: Workplace experiences 2025 [Internet]. London, United Kingdom: General Medical Council; 2025 [cited 2026 Apr 24]. Available from: gmc-uk.org/cdn/documents/somep-workplace-experiences-report-2025-full-report_pdf-111877911.pdf
4. Mahase E. Third of doctors plan to leave UK and just a quarter are happy with career progress, GMC report finds. BMJ. 2025 Aug 7;390:r1671. doi: 10.1136/bmj.r1671.
5. Medical Council of New Zealand | Te Kaunihera Rata o Aotearoa. The New Zealand Medical Workforce 2025 [Internet]. Wellington, New Zealand: Medical Council of New Zealand | Te Kaunihera Rata o Aotearoa; 2025 [cited 2026 Apr 5]. Available from: https://www.mcnz.org.nz/assets/Publications/Workforce-Survey/Workforce-Survey-Report-2025.pdf
6. Grant P. Physician job satisfaction in New Zealand versus the United Kingdom. N Z Med J. 2004 Oct 22;117(1204):U1123.
7. Gauld R, Horsburgh S. What motivates doctors to leave the UK NHS for a “life in the sun” in New Zealand; and, once there, why don’t they stay? Hum Resour Health. 2015;13(1):75. doi: 10.1186/s12960-015-0069-4.
8. Makris K, Chan Y, Lewis C. A Pilot Study of British and Irish Junior Doctors in Auckland, New Zealand, Using a Questionnaire to Explore Motivations and Intentions. Cureus. 2025 Nov 9;17(11):e96413. doi: 10.7759/cureus.96413.
9. Medical Council of New Zealand | Te Kaunihera Rata o Aotearoa. Our data: Retention [Internet]. Wellington, New Zealand: Medical Council of New Zealand | Te Kaunihera Rata o Aotearoa; 2025 [cited 2026 Jun 9]. Available from: https://www.mcnz.org.nz/about-us/our-data/retention/
10. Specialty Trainees of New Zealand, Health New Zealand – Te Whatu Ora. RMO Collective Agreement 14 February 2024 - 28 February 2026 [Internet]. Wellington, New Zealand: Specialty Trainees of New Zealand, Health New Zealand – Te Whatu Ora. [cited 2026 Feb 20]. Available from: https://stonz.co.nz/site_files/25088/upload_files/SECA%202024-2026.pdf
11. New Zealand Resident Doctors’ Association, Health New Zealand – Te Whatu Ora. Collective Agreement 18 June 2024 – 31 July 2026 [Internet]. Wellington, New Zealand: New Zealand Resident Doctors’ Association, Health New Zealand – Te Whatu Ora; 2024 [cited 2026 Feb 20]. Available from: https://nzrda.org.nz/wp-content/uploads/2025/01/HNZ-NZRDA-RMO-CA-2024-2026-Anchor-Links.pdf
12. British Medical Association. Resident doctor contract in England [Internet]. British Medical Association; 2020 Jan 17 [cited 2026 Feb 20]. Available from: https://www.bma.org.uk/pay-and-contracts/contracts/resident-doctor-contract/resident-doctor-contract-in-england
13. NHS Employers. Terms and Conditions of Service for NHS Doctors and Dentists in Training (England) 2016. Version 14 [Internet]. London, United Kingdom: NHS Employers; 2026 Jun 1 [cited 2026 Sep 7]. Available from: https://www.nhsemployers.org/system/files/2026-06/Doctors-dentists-in-training-2016-TCS-version-14-June-2026.pdf
14. Keegan RJ, Saw R, De-Loyde KJ, Young CJ. Attitudes and risk of withdrawal in general surgical registrars. N Z Med J. 2015 Nov 20;128(1425):61-68.
15. New Zealand Resident Doctors’ Association. The fight for safer rosters [Internet]. Wellington,

New Zealand: New Zealand Resident Doctors' Association; 2024 [cited 2026 Apr 27]. Available from: https://nzrda.org.nz/campaign/the-fight-for-safer-rosters/
16. Winston J, Johnson C, Wilson S. Barriers to healthy eating by National Health Service (NHS) hospital doctors in the hospital setting: results of a cross-sectional survey. BMC Res Notes. 2008 Aug 28;1:69. doi: 10.1186/1756-0500-1-69.
17. Sackeim MG, Lengyel E. Healthy food for trainees: a call to action. Postgrad Med J. 2021;97(1153):740-741. doi: 10.1136/postgradmedj-2020-138506.
18. Hamidi MS, Boggild MK, Cheung AM. Running on empty: a review of nutrition and physicians' well-being. Postgrad Med J. 2016 Aug;92(1090):478-481. doi: 10.1136/postgradmedj-2016-134131.
19. Boyle AB, Shay D, Martyn T, et al. Burnout in New Zealand resident doctors: a cross-sectional study of prevalence and risk factors. BMJ Open. 2025;15(1):e089034. doi: 10.1136/bmjopen-2024-089034.
20. Lock FK, Carrieri D. Factors affecting the UK junior doctor workforce retention crisis: an integrative review. BMJ Open. 2022;12(3):e059397. doi: 10.1136/bmjopen2021059397.
21. The Royal New Zealand College of General Practitioners. Te Rangahau Ohu Mahi - The Workforce Survey: Overview Report 2022 [Internet]. Wellington, New Zealand: The Royal New Zealand College of General Practitioners; 2023 [cited 2026 Apr 21]. Available from: https://www.rnzcgp.org.nz/documents/197/RNZCGP_Workforce_Survey_Overview_Report.pdf

Porta hepatis schwannoma: case report of a rare benign neoplasm in a patient with chronic hepatitis B

Jonathan J Sheu, Judy C Huang, Adam SR Bartlett

Chronic hepatitis B remains an important public health concern in New Zealand, disproportionately affecting New Zealanders from hepatitis B–endemic regions.[1] With increased utilisation of liver imaging for hepatocellular carcinoma surveillance, clinicians are increasingly confronted with incidental findings. We describe a case of porta hepatis schwannoma identified on routine liver imaging. Primary hepatobiliary schwannomas are exceedingly rare, with only a small number of cases reported in the literature. Their radiological appearance is often non-specific, frequently mimicking malignant lesions, highlighting the diagnostic and management challenges posed by rare benign lesions detected through surveillance imaging.

Case report

A 42-year-old Chinese woman with chronic hepatitis B and a family history of hepatocellular carcinoma was referred to hepatology clinic. She was on antiviral therapy with normal liver enzymes and an undetectable viral load. Alpha-fetoprotein was not elevated and there was no biochemical evidence of advanced liver disease. Transient elastography demonstrated a median liver stiffness of 4.1kPa, consistent with absent-to-minimal fibrosis. She was asymptomatic, with no other comorbidities. Liver ultrasound demonstrated a 4.4cm well-defined heterogeneous mass at the porta hepatis, separate from the liver (Figure 1). The liver had a smooth contour and a few simple cysts. The gallbladder and biliary tree appeared normal. On multiphase computed tomography (CT) the mass showed predominantly central arterial enhancement with a thick enhancing rind in the portal venous phase, without vascular invasion or biliary obstruction (Figure 2).

Figure 1: Transcutaneous ultrasound of the liver demonstrating a 4.4cm well-defined, heterogeneous mass at the porta hepatis, separate from the liver.

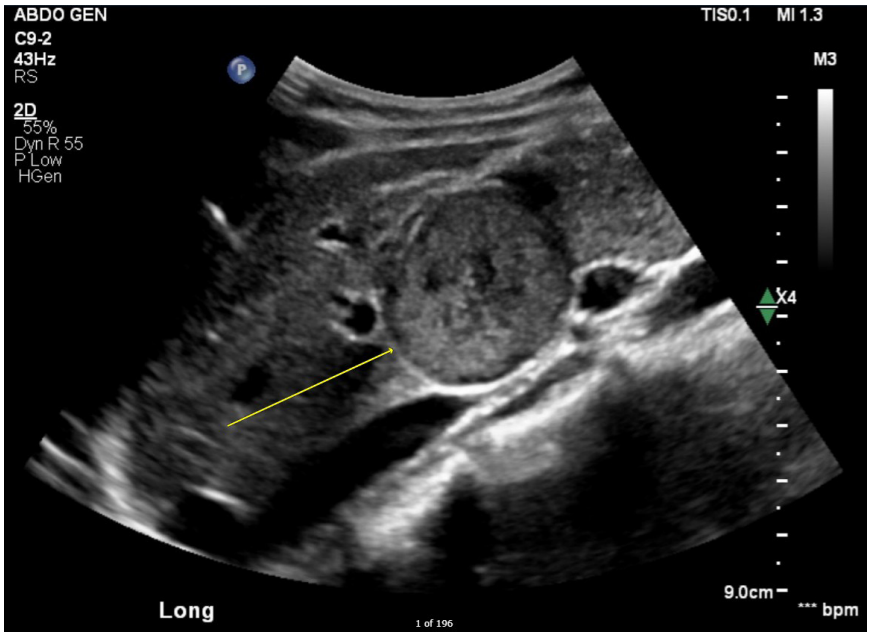


Figure 2: Portal venous phase computed tomography coronal view of the liver demonstrating a well-defined mass at the porta hepatis with no evidence of vascular invasion or biliary obstruction.

Endoscopic ultrasound-guided fine-needle aspiration demonstrated S100-positive spindle cells characteristic of schwannoma. Gastrointestinal stromal tumour (GIST), fibroblastic and smooth muscle tumours were argued against with negative staining for cluster of differentiation 117 (CD117), discovered on GIST-1 (DOG1), CD34, smooth muscle actin (SMA) and desmin.[2] Following surgical review, the patient underwent open excision of a porta hepatis mass adjacent to the hepatic artery and portal vein. The lesion was dissected free with macroscopically clear margins. Recovery was uncomplicated and the patient was discharged on post-operative day 3. Histology confirmed a schwannoma focally abutting the resection margin without malignancy. CT at 5 months showed expected post-operative stranding at the porta hepatis. Repeat surveillance imaging was planned at 12 months.

Discussion

In alignment with international goals, the Hepatitis Foundation of New Zealand aims to increase engagement in care among the estimated 94,000 people living with chronic hepatitis B nationally.[3] As imaging-based surveillance expands, clinicians may increasingly encounter incidental or indeterminate hepatobiliary lesions. This report describes one such case requiring further imaging, multidisciplinary review, histopathological diagnosis and surgical management.

Schwannomas most commonly arise from the vestibulocochlear nerve as vestibular schwannomas,[4] but rarely occur in the extremities, trunk and gastrointestinal[5] or respiratory tracts.[6] Only several dozen cases of hepatobiliary schwannoma have been reported.[5,7] Imaging appearances are variable, often mimicking malignant lesions including hepatocellular carcinoma, cholangiocarcinoma, GIST and metastases, with definitive diagnosis requiring histopathology with immunohistochemistry. In selected cases, adjunctive investigations such as serum tumour markers may suggest an alternative malignant diagnosis.

Surgical resection of benign hepatobiliary schwannoma is associated with favourable outcomes. In the largest identified review of hepatic schwannoma with 30 cases, all patients with benign lesions who underwent resection

survived to follow-up completion.[5] A review of 15 porta hepatis schwannoma cases reported no recurrence after resection among patients with available follow-up (3–41 months) (Table 1).[7]

The significance of focal tumour involvement at the resection margin remains uncertain. Evidence from benign spinal and peripheral nerve schwannomas suggests an indolent course despite residual disease.[8,9] Malignant hepatobiliary schwannoma[5] and malignant transformation of benign schwannoma have been reported,[10] though both appear exceptionally rare, leaving no clear consensus on management of positive margins.

This case illustrates how surveillance-detected lesions—even when histologically benign—can present management dilemmas, underscoring the importance of multidisciplinary review and shared decision making in balancing oncological risk, procedural risk and patient tolerance for uncertainty.

Table 1: Summary of 15 reported porta hepatis schwannoma cases from a review by Yin et al.[7]

Characteristic	Findings
Age	29–74 years (mean 48.3 years)
Sex	Female 9/15 (60%), male 6/15 (40%)
Presentation	Symptomatic 9/15 (60%): abdominal discomfort/distension (5), abdominal pain (4), jaundice (2) and weight loss (1) Asymptomatic 6/15 (40%)
Anatomical location	Porta hepatis 9/15 (60%); hepatoduodenal ligament 5/15 (33.3%); proper hepatic artery 1/15 (6.7%)
Size	2.2–7.5cm (mean 4.7cm)
Initial diagnostic impression	Hilar mass, hepatic mass, cholangiocarcinoma, focal nodular hyperplasia, spindle cell neoplasia, stromal tumour, giant lymph node hyperplasia
Treatment	Surgical resection 15/15 (100%)
Outcome	Six patients had follow-up with no evidence of relapse between 3 and 41 months

COMPETING INTERESTS
Nil.

ACKNOWLEDGEMENTS
Ethics: Confirmation was obtained from the Health and Disability Ethics Committees (HDEC) that this project was out of the scope for HDEC review. Written patient consent was obtained.

AUTHOR INFORMATION
Jonathan J Sheu: Gastroenterology Registrar, Department of Gastroenterology and Hepatology, Auckland City Hospital, Auckland.
Judy C Huang: Gastroenterologist, Department of Gastroenterology and Hepatology, Middlemore Hospital, Auckland.
Adam SR Bartlett: Associate Professor of Surgery, Hepatobiliary and Pancreatic (HBP) and General Surgeon, Department of General Surgery, Auckland City Hospital, Auckland.

CORRESPONDING AUTHOR
Jonathan J Sheu: Department of Gastroenterology and Hepatology, Auckland City Hospital, 2 Park Road, Grafton, Auckland 1023, New Zealand.
E: Jonathan.Sheu@TeWhatuOra.govt.nz

URL
https://nzmj.org.nz/journal/vol-139-no-1643/porta-hepatis-schwannoma-case-report-of-a-rare-benign-neoplasm-in-a-patient-with-chronic-hepatitis-b

CITATION
Sheu JJ, Huang JC, Bartlett ASR. Porta hepatis schwannoma: case report of a rare benign neoplasm in a patient with chronic hepatitis B. N Z Med J. 2026 Oct 9;139(1643):82-85. doi: 10.26635/6965.7565.

REFERENCES
1. Horsfall E, Gane E, Anwar A, et al. Chronic hepatitis B infection-an unmet medical need in New Zealand 35 years after universal neonatal vaccination. N Z Med J. 2020;133(1519):70-80.
2. Miettinen M. Immunohistochemistry of soft tissue tumours - review with emphasis on 10 markers. Histopathology. 2014;64(1):101-118. doi: 10.1111/his.12298.
3. The Hepatitis Foundation of New Zealand. Annual Report July 2023 - June 2024 [Internet]. New Zealand: The Hepatitis Foundation of New Zealand; 2024 [cited 2026 May 28]. Available from: https://www.hepatitisfoundation.org.nz/site_files/36909/upload_files/The%20Hepatitis%20Foundation%20Annual%20Report%2023-24.pdf?dl=1
4. Propp JM, McCarthy BJ, Davis FG, Preston-Martin S. Descriptive epidemiology of vestibular schwannomas. Neuro Oncol. 2006;8:(1)1-11. doi: 10.1215/S1522851704001097.
5. Wan DL, Zhai ZL, Ren KW, et al. Hepatic schwannoma: A case report and an updated 40-year review of the literature yielding 30 cases. Mol Clin Oncol. 2016;4(6):959-964. doi: 10.3892/mco.2016.850.
6. Kadriyan H, Savita Gera NMM, Ajmala IE, et al. Respiratory tract obstruction due to intraluminal tracheal schwannoma. The first report in Indonesia. Crit Care Shock. 2025;28(6):287-294.
7. Yin SY, Zhai ZL, Ren KW, et al. Porta hepatic schwannoma: case report and a 30-year review of the literature yielding 15 cases. World J Surg Oncol. 2016;14:103. doi: 10.1186/s12957-016-0858-9.
8. Fehlings MG, Nater A, Zamorano JJ, et al. Risk Factors for Recurrence of Surgically Treated Conventional Spinal Schwannomas: Analysis of 169 Patients From a Multicenter International Database. Spine (Phila Pa 1976). 2016;41(5):390-398. doi: 10.1097/BRS.0000000000001232.
9. Ten Hove FL, Ciggaar IA, Coerkamp EG, et al. Long-term Follow-up with MRI Scans After Enucleation of Peripheral Nerve Schwannomas: Results From a Single-center Case Series. World Neurosurg. 2024;189:e427-e434. doi: 10.1016/j.wneu.2024.06.081.
10. Ramineni M, Ulici V, Hicks DG, et al. Rapid Malignant Transformation of a Biopsy Proven Sporadic Soft Tissue Schwannoma to Spindle Cell MPNST With *TP53* mutation as an Early Event. Int J Surg Pathol. 2025;33(8):1807-1815. doi: 10.1177/10668969251340430.

Sporadic late-onset nemaline myopathy associated with monoclonal gammopathy: a case report with review of literature

Desmond Lim, Fouzia Ziad, James Cleland, Peter Wright

Sporadic late-onset nemaline myopathy (SLONM) is a rare progressive disease characterised by axial and proximal muscle weakness and pathologically characterised by nemaline rods in muscle fibres. SLONM can cause respiratory weakness and cardiomyopathy resulting in mortality. SLONM is treatable and thus accurate diagnosis is crucial.

Case report

A 65-year-old man presented with 1 year of progressive neurological symptoms including shoulder weakness, head drop, reliance on a walking stick, dysphagia and dyspnoea. There was no pain and no sensory or autonomic symptoms. On examination, there was weakness and wasting of facial, neck, shoulder, hip and thigh muscles. Sensation, reflexes and distal strength were normal and there were no fasciculations. The remainder of the cranial nerves' examination was unremarkable except for a weak cough. No skin changes were observed.

Creatinine kinase (CK) and C-reactive protein (CRP) were normal. Serum electrophoresis revealed a low-level IgG lambda paraprotein consistent with monoclonal gammopathy of undetermined significance (MGUS). An autoimmune myopathy panel was negative. A panel for hereditary neuropathies was not performed.

Spirometry showed a restrictive defect with a predicted forced vital capacity of 70%. An echocardiogram was unremarkable. Electromyography (EMG) showed severe axial myopathy, but no irritability or myotonia.

A left deltoid muscle biopsy was performed, which showed patchy atrophy of muscle fibres with basophilia (Figure 1). Gomori trichrome staining identified rod-like structures within myofibres (Figures 2 and 3), revealed to be nemaline rods by electron microscopy (Figure 4). The patient was diagnosed with SLONM.

Initial treatment was with prednisone 60mg once daily and intravenous immunoglobulin (IVIG) without response. Cyclophosphamide/bortezomib/dexamethasone chemotherapy stabilised his

Figure 1: Gomori trichome stain (20x magnification) showing muscle fibres with variation in size and shape and sarcoplasmic basophilia.

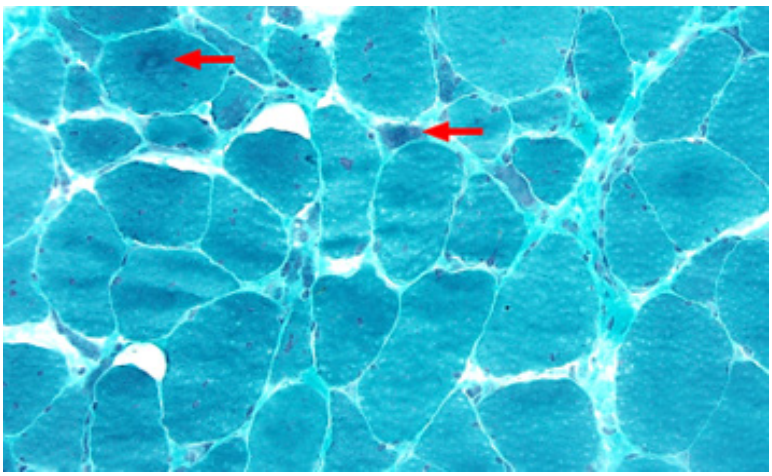


Figure 2: Gomori trichrome stain (20x magnification) longitudinal section showing atrophic fibre with rod-like structures.

Figure 3: Gomori trichrome stain (40x magnification) cross section of muscle with rod-like structures.

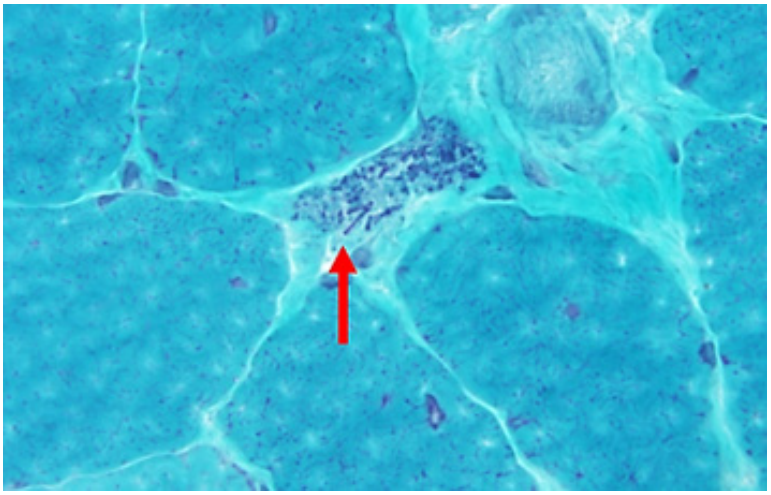
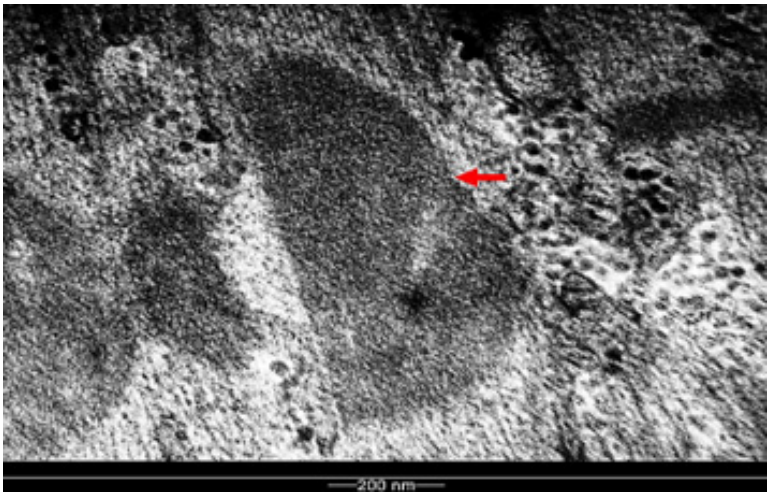


Figure 4: Electron microscopy showing nemaline rods with lattice-like structure.



symptoms. Treatment progressed to melphalan and autologous stem cell transplantation (ASCT) leading to marked symptomatic improvement. Limb strength improved and the patient was able to ambulate without a walking stick. His dysphagia and dyspnoea resolved.

Discussion

SLONM is a rare condition with fewer than 200 cases reported.[1] Mean age of onset is 52 years (range of 34–80 years).[1,2] There is a 68% 10-year survival rate.[3]

Symptoms include proximal limb and axial muscle weakness and atrophy, dyspnoea and dysphagia.[4] A secondary cardiomyopathy resulting in congestive heart failure may occur, which resolves with treatment of SLONM.[2]

Eighty-five percent of cases have a normal to mildly elevated CK.[1] Fifty-three percent of cases have associated MGUS, which may be coincidental.[4] SLONM is also associated with human immunodeficiency virus (HIV). Studies show no difference in prognosis with either MGUS or HIV.[1,4,5]

The hallmark histological finding is nemaline rods, which originate from the muscle Z-disc [6] and can be visualised with Gomori trichrome as intermyofibrillar or subsarcolemmal red clusters but are best seen with electron microscopy.[5,7] One study suggests that 32% of cases require repeat biopsy to identify nemaline rods.[3]

SLONM is likely autoimmune in aetiology. Zhao et al. propose that antibodies against Z-disc proteins damage myofibres leading to atrophy and rod formation, and that IVIG removes these circulating antibodies whereas corticosteroids and ASCT inhibit the offending plasma cells.[6]

Given that SLONM is a rare disease, there is no consensus on first-line treatment. IVIG and corticosteroids are commonly suggested as first-line agents,[3,5] but recommendations for melphalan and ASCT as first-line therapy are strengthening due to potential superior efficacy.[6]

Conclusion

SLONM should be considered in the differential diagnosis of an adult-onset progressive proximal and axial myopathy where the CK is normal or mildly elevated and non-invasive testing such as EMG are consistent with a myopathic process. A timely muscle biopsy can lead to diagnosis and commencement of chemotherapy and ASCT resulting in a favourable clinical response.

COMPETING INTERESTS
Nil.

ACKNOWLEDGEMENTS
Acknowledgement to the electron microscopy team at LabPlus, Auckland City Hospital.

AUTHOR INFORMATION
Dr Desmond Lim: Anatomical Pathology Registrar, Department of Pathology, Middlemore Hospital, Auckland, New Zealand.
Dr Fouzia Ziad: Anatomical Pathologist, Department of Pathology, Waikato Hospital, Hamilton, New Zealand.
Dr James Cleland: Neurologist, Department of Neurology, Tauranga Hospital, Bay of Plenty, New Zealand.
Dr Peter Wright: Neurologist, Department of Neurology, Waikato Hospital, Hamilton, New Zealand.

CORRESPONDING AUTHOR
Dr Desmond Lim: Anatomical Pathology Registrar, Department of Pathology, Middlemore Hospital, Auckland, New Zealand.
E: desmond-lim@hotmail.com

URL
https://nzmj.org.nz/journal/vol-139-no-1643/sporadic-late-onset-nemaline-myopathy-associated-with-monoclonal-gammopathy-a-case-report-with-review-of-literature

CITATION
Lim D, Ziad F, Cleland J, Wright P. Sporadic late-onset nemaline myopathy associated with monoclonal gammopathy: a case report with review of literature. N Z Med J. 2026 Oct 9;139(1643):86-89. doi: 10.26635/6965.7479.

REFERENCES

1. Tanboon J, Uruha A, Arahata Y, et al. Inflammatory features in sporadic late-onset nemaline myopathy are independent from monoclonal gammopathy. Brain Pathol. 2021 May;31(3):e12962. doi: 10.1111/bpa.12962.
2. Turnquist C, Grogono JC, Hofer M, Pitcher A. Sporadic late-onset nemaline myopathy: a case report of a treatable cause of cardiac failure. Eur Heart J Case Rep. 2020 Dec 22;5(1):ytaa480. doi: 10.1093/ehjcr/ytaa480.
3. Naddaf E, Milone M, Kansagra A, et al. Sporadic late-onset nemaline myopathy: Clinical spectrum, survival, and treatment outcomes. Neurology. 2019 Jul 16;93(3):e298-e305. doi: 10.1212/WNL.0000000000007777.
4. Schnitzler LJ, Schreckenbach T, Nadaj-Pakleza A, et al. Sporadic late-onset nemaline myopathy: clinico-pathological characteristics and review of 76 cases. Orphanet J Rare Dis. 2017 May 11;12(1):86. doi: 10.1186/s13023-017-0640-2.
5. Okhovat AA, Nilipour Y, Boostani R, et al. Sporadic late-onset nemaline myopathy with monoclonal gammopathy of undetermined significance: Report of four patients. Neuromuscul Disord. 2021 Jan;31(1):29-34. doi: 10.1016/j.nmd.2020.11.004.
6. Zhao B, Dai T, Zhao D, et al. Clinicopathologic Profiles of Sporadic Late-Onset Nemaline Myopathy: Practical Importance of Anti-α-Actinin Immunostaining. Neurol Neuroimmunol Neuroinflamm. 2022 May 17;9(4):e1184. doi: 10.1212/NXI.0000000000001184.
7. Keller CE, Hays AP, Rowland LP, et al. Adult-onset nemaline myopathy and monoclonal gammopathy. Arch Neurol. 2006 Jan;63(1):132-134. doi: 10.1001/archneur.63.1.132.

A call to all parties: protect our children—regulate sugary drinks in schools

Gerhard Sundborn, Simon Thornley, Bodo Lang, Loma Veatupu

The harm that sugary drinks can cause is established beyond doubt.[1] Intake of these products cause unhealthy weight, type 2 diabetes, kidney disease, gout, fatty liver and heart disease,[2] along with the ubiquitous dental caries.[3] The damage also goes beyond the physical realm. Sugary drinks compromise concentration and can fuel (literally) behavioural disorders in children—negatively impacting learning, social interactions and relationships.[4,5] The consequences include curtailed achievement, productivity and longevity.

Historically, efforts to improve the healthfulness of drinks available in schools have been short-lived and inconsistent, with previous initiatives failing to deliver lasting change.[6,7] These policies have failed to gain cross-party support, meaning that inevitably, when governments change, these policies tend to be dismissed swiftly. As a result, New Zealand has stalled in terms of reducing consumption of sugary drinks.[8] We must reverse this trend.

The New Zealand Beverage Guidance Panel (NZBGP) recently published a policy brief titled *Sugary Drink Free Schools*. The brief identifies sugar as the key driver that makes drinks harmful. The recommendations in the brief are easy to adopt and would prevent much physical and mental harm in New Zealand children. The policy brief is designed to appeal to all political parties, since it is easy to implement and strong benefits of the policy are foreseen.

In the policy, a sugary drink is defined as any beverage that exceeds 5g of sugar per 100mls, and it calls for these not to be available to children in schools. Choice will be preserved, because zero sugar, diet drinks and reduced-sugar juices will still be offered.

The purpose of this document is to call on all political parties in New Zealand to implement policy that requires all schools and early child education centres (ECEs) to be sugary drink free. All political parties, and especially the New Zealand government, have a responsibility to provide leadership to protect the health of the population through action in areas that are detrimental to health, including from sugary drinks.

As an example, to reduce harm from tobacco, the New Zealand government took a similar approach in leading change by writing and implementing the *Smoke-free Environments Act* in 1990.[9] The New Zealand government was the first in the world to implement such a policy, which has now been adopted by a further 155 countries, benefitting 6.1 billion people globally with cleaner air and reduced smoking prevalence.[9]

A comprehensive rationale for this call that describes the harms that sugary drinks pose is provided in the *Sugary Drink Free Schools* policy brief authored by the NZBGP. The Sugary Drink Free Schools policy below is repeated from this group.

This call has been supported by several prominent organisations listed below that have relevant expertise in related areas and value the health of all New Zealanders.

1. Public Health Association of New Zealand
2. Health Promotion Forum of New Zealand
3. Open Forum for Health Information New Zealand
4. New Zealand Dental Association
5. Te Ao Mārama – Aotearoa Māori Dental Association
6. New Zealand Oral Health Association
7. New Zealand Beverage Guidance Panel
8. Pasifika Medical Association
9. Pasifika Dental Association
10. Diabetes Foundation Aotearoa
11. Diabetes New Zealand
12. Hāpai Te Hauora
13. Toi Tangata
14. Te Whānau O Waipareira Trust
15. Procare
16. The Fono
17. Moana Connect
18. South Seas Healthcare
19. FIZZ New Zealand

We, with the health organisations listed above, urge politicians across the political spectrum to include this policy leading up to this year's election. Should it be implemented, a healthier next generation of New Zealanders will surely thank them for it.

Box 1: *Sugary Drink Free Schools* policy.

Sugary Drink Free Schools policy

- **This policy applies to all schools and early childhood education centres in New Zealand.**
- **Sugary drinks* will be unavailable on school premises.**
- **If a sugary drink is brought onto school grounds, the student will be asked to put it away in their bag (or throw it away if preferred) and reminded that they cannot bring such drinks to school as they are unhealthy.**
- **Sugary drink consumption is prohibited during school hours and on school premises.**
- **Water (tap/drinking fountain/packaged) and unflavoured milk are preferred, and drinks that have <5g of sugar per 100ml are drinks that are acceptable.**

All events including gala days, fundraisers, celebrations, trips, events and catering will adhere to this policy.

- For example, sports events: sports teams should only have water or zero sugar drinks for hydration.

Exemptions:

- Zero sugar alternatives
- 50% less-sugar juice acceptable (as is < 5g sugar per 100ml)

*A sugary drink here is defined as any drink that has 5g or more of sugar per 100ml, as described on the nutrition label (including soft-drinks, fizzy drinks, energy drinks, sports drinks, flavoured milk, fruit drinks, juices).
**This policy does not apply to students with diabetes, when sugary drinks are required to treat low blood glucose.
***This policy does not include hot drinks such as staffroom tea and coffee, or alcohol.

COMPETING INTERESTS
All authors declare that they have no conflicts of interest.

AUTHOR INFORMATION
Dr Gerhard Sundborn: Senior Lecturer, Department of Pacific Health, School of Population Health Faculty of Medical and Health Sciences, The University of Auckland, New Zealand.
Dr Simon Thornley: Senior Lecturer, Section of Epidemiology and Biostatistics, School of Population Health Faculty of Medical and Health Sciences, The University of Auckland, New Zealand.
Professor Bodo Lang: Senior Lecturer, School of Management and Marketing, Massey University, New Zealand.
Loma Veatupu: Senior Research Fellow, Department of Pacific Health, School of Population Health, Faculty of Medical and Health Sciences, The University of Auckland, New Zealand.

CORRESPONDING AUTHOR
Dr Gerhard Sundborn: Senior Lecturer, Department of Pacific Health, School of Population Health, Faculty of Medical and Health Sciences, The University of Auckland, Private Bag 92019, Auckland Mail Centre 1142, New Zealand. E: g.sundborn@auckland.ac.nz

URL
https://nzmj.org.nz/journal/vol-139-no-1643/a-call-to-all-parties-protect-our-children-regulate-sugary-drinks-in-schools

CITATION
Sundborn G, Thornley S, Lang B, Veatupu L. A call to all parties: protect our children—regulate sugary drinks in schools. N Z Med J. 2026 Oct 9;139(1643):90-92. doi: 10.26635/6965.7679.

REFERENCES

1. Hu FB. Resolved: there is sufficient scientific evidence that decreasing sugar-sweetened beverage consumption will reduce the prevalence of obesity and obesity-related diseases. Obes Rev. 2013 Aug;14(8):606-619. doi: 10.1111/obr.12040.
2. Thornley S, Tayler R, Sikaris K. Sugar restriction: the evidence for a drug-free intervention to reduce cardiovascular disease risk. Intern Med J. 2012 Oct;42 Suppl 5:46-58. doi: 10.1111/j.1445-5994.2012.02902.x.
3. Sheiham A, James WP. A reappraisal of the quantitative relationship between sugar intake and dental caries: the need for new criteria for developing goals for sugar intake. BMC Public Health. 2014 Sep 16;14:863. doi: 10.1186/1471-2458-14-863.
4. Thornley S, Sundborn G. The case to ban sugary food and drink from schools: these products are addictive, and kids will learn best without them. Pac Health Dialog. 2014 Mar;20(1):17-21.
5. Farsad-Naeimi A, Asjodi F, Omidian M, et al. Sugar consumption, sugar sweetened beverages and Attention Deficit Hyperactivity Disorder: A systematic review and meta-analysis. Complement Ther Med. 2020 Sep;53:102512. doi: 10.1016/j.ctim.2020.102512.
6. Pillay D, Ali A, Wham C. The effect of healthy food guidance for schools on food availability, purchasing and consumption among school children in New Zealand and Australia: an integrative review. Nutr Res Rev. 2025 Dec;38(2):571-585. doi: 10.1017/S0954422424000362.
7. Sundborn G, Thornley S, Veatupu L, Lang B. If soft drink companies can do it, why can't government? Sugary drink sales policies in schools must be tightened. Aust N Z J Public Health. 2022 Jun;46(3):415-416. doi: 10.1111/1753-6405.13218.
8. Eyles H, Dodd S, Garton KK, et al. New Zealand household purchases of sugar-sweetened, artificially sweetened, and unsweetened beverages: 2015-2019. Public Health Nutr. 2023 Dec 20;27(1):e22. doi: 10.1017/S1368980023002793.
9. Edwards R, Thomson G, Wilson N, et al. After the smoke has cleared: evaluation of the impact of a new national smoke-free law in New Zealand. Tob Control. 2008 Feb;17(1):e2. doi: 10.1136/tc.2007.020347.

Improving uptake of routine antenatal anti-D prophylaxis: completion of the audit cycle in Capital & Coast

Maria Wojcik, Judy Ormandy

Pregnant people with a Rhesus-negative blood group are at risk of developing antibodies against Rhesus-positive foetal red blood cells (sensitisation) if foetal cells cross into the maternal circulation. Sensitisation can affect current or subsequent pregnancies by causing haemolytic disease of the foetus and newborn, which may lead to complications including foetal anaemia and neonatal jaundice, as well as foetal morbidity and mortality.[1,2]

Routine antenatal anti-D prophylaxis (RAADP) reduces sensitisation from 0.95% to 0.35% when two doses of anti-D immunoglobulin are administered at 28 and 34 weeks' gestation.[3] Guidance from the Royal Australian and New Zealand College of Obstetricians and Gynaecologists and the New Zealand Blood Service (NZBS) recommends RAADP at 28 and 34 weeks' gestation at a dose of 625IU, or a single dose of 1,250IU at 30 weeks.[4,5]

A 2021 audit conducted within Capital & Coast District Health Board (CCDHB) found that only 41% of eligible patients received RAADP in accordance with national guidelines.[6] The audit identified inequities in access, with patients living closer to hospital, receiving private obstetric care or delivering at Wellington Hospital being more likely to receive RAADP.

Following the 2021 audit, multiple interventions were implemented to improve uptake. Awareness was increased through staff education delivered via presentations at local maternity meetings and through sharing of audit findings in the departmental newsletter. The anti-D referral pathway was also simplified by introducing a single-dose option. Further analysis of compliance by locality identified Porirua as a particularly underserved area, prompting the establishment of an additional community anti-D clinic in Porirua alongside existing clinics in Wellington and Kāpiti.

A re-audit is an essential component of the audit cycle to determine whether implemented changes improve practice and to identify remaining gaps.[7]

The aim of this re-audit was to ascertain whether RAADP uptake at Health New Zealand – Te Whatu Ora Capital & Coast improved since 2021. As the 2021 audit identified disparities in access by locality, care type and proximity to services, a secondary aim was to evaluate whether equity of access across these groups had improved.

Methods

All people who gave birth at Capital & Coast birthing units between September 2024 and March 2025 were identified using the BadgerNet maternity database. Single Clinical Portal (SCP) was used to identify Rhesus-negative patients within this cohort. People were excluded from analysis if they were already known to be isoimmunised (i.e., had already developed anti-D antibodies) or if they birthed prior to 28 weeks' gestation.

The NZBS provided data linked by National Health Index for anti-D doses administered to our cohort anywhere in Aotearoa New Zealand, including dosages and timings. These data were cross-referenced with BadgerNet records documenting administration of anti-D and gestation to ensure anti-D was given for RAADP purposes and not from a sensitising event. The primary outcome was uptake of RAADP, which was compared with the 2021 CCDHB compliance rates reported using a *z*-test.

Additional demographic and clinical variables were collected from BadgerNet and SCP, including maternal age at delivery, parity, place of delivery, registered home address, ethnicity and use of private obstetric care. Registered home address was used to calculate distance lived from Wellington Hospital using Google Maps. Associations between these variables and RAADP uptake were assessed using *z*-tests, *t*-tests and Mann–Whitney U tests as appropriate. A p-value of <0.05 was considered statistically significant.

This audit was approved by the Health New Zealand – Te Whatu Ora Capital, Coast and Hutt

Valley women's health service research and audit committee.

Results

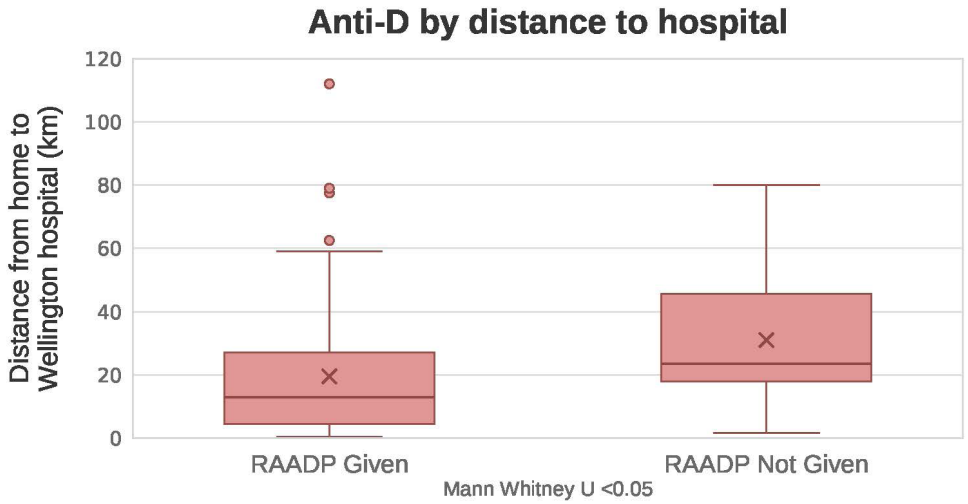
Of 1,641 people who gave birth during the study period, 164 (10%) were Rhesus negative. Ten were excluded due to delivering prior to 28 weeks' gestation or pre-existing isoimmunisation, leaving a cohort of 154. Of these, 117 (76%) received RAADP in accordance with national guidelines. This represents a significant increase from the 2021 audit, in which 83 out of 204 patients (41%) received RAADP (*z*-test p<0.01), with an absolute increase of

Table 1: Patient factors and adherence to routine antenatal anti-D prophylaxis guidelines.

Variable	RAADP administered as per guidelines	RAADP not administered as per guidelines	Total	p-value
Total number	117 (76%)	37 (24%)	154 (100%)	
Age (years) (mean±SD)	33.6±4.7	30.8±4.7		p=0.002*
Distance lived from hospital (km) median (interquartile range)	12.9 (22.0)	23.2 (28.4)		p=0.02***
Parity				
Nulliparous	61 (74%)	21 (26%)	82 (53.2%)	p=0.59**
Parous	56 (78%)	16 (22%)	72 (46.4%)	
Ethnicity				
NZ European/Other European	96 (78%)	27 (22%)	123 (79.9%)	
Māori	7 (58%)	5 (42%)	12 (7.8%)	
Asian	8 (67%)	4 (33%)	12 (7.8%)	
Other (Pacific people, Latin American, Middle Eastern, African)	6 (86%)	1 (14%)	7 (4.5%)	p=0.14**
Lead maternity carer				
Private obstetrician	14 (82%)	3 (18%)	17 (11.0%)	
Midwife (independent and hospital midwives)	103 (75%)	34 (25%)	137 (89.0%)	p=0.51**
Place of birth				
Wellington Hospital	107 (78%)	31 (22%)	138 (89.6%)	
Primary birthing unit	10 (63%)	6 (37%)	16 (10.4%)	p=0.18**

*_t_-test
**Chi-squared test
***Mann–Whitney U test

Figure 1: Distance from hospital among Rhesus-negative patients who did and did not receive routine antenatal anti-D prophylaxis.



35.3% (95% confidence interval 25.8–44.8%).

In contrast to findings from 2021, neither receipt of private obstetric care nor delivery at Wellington Hospital (compared with a primary birthing unit) was associated with an increased likelihood of receiving RAADP (Table 1). Older maternal age was associated with RAADP uptake in this cohort, although this association was not observed in the 2021 audit. Parity and ethnicity were not associated with RAADP uptake (Table 1). Pregnant people who did not receive RAADP lived, on average, further from hospital than those who did receive RAADP ($p<0.05$) (Table 1, Figure 1).

Conclusions

RAADP uptake improved substantially in Health New Zealand – Te Whatu Ora Capital & Coast following targeted interventions implemented after the 2021 audit, including staff education and establishment of an additional anti-D clinic in Porirua. While targeted service interventions improved overall RAADP uptake and reduced disparities related to model of care and place of birth, geographic inequities associated with distance from hospital persisted. While no statistically significant difference was detected by ethnicity, the audit was underpowered to detect differences within sub-groups and the absence of statistical significance should not be interpreted as evidence of equity.

Rates of RAADP administration are now higher than those reported in another tertiary obstetric unit in Aotearoa New Zealand.[8] These findings highlight the value of audit as a quality improvement tool and the importance of completing the audit cycle.

Limitations of the audit findings included people who gave birth at home, who were not included as their data were not available. The small sample size limited the ability to detect statistically significant differences within sub-groups such as ethnicity. Documentation regarding non-administration of RAADP was limited, preventing differentiation between when RAADP was not offered, declined, unable to be accessed or deemed unnecessary (e.g., if confirmed Rhesus-negative paternity).

Further work could examine persistent barriers to anti-D prophylaxis through qualitative analysis to establish reasons for non-administration. Additionally, detailed investigation should be undertaken for quantifying uptake across ethnicity, residential region and the New Zealand Index of Deprivation to identify any disparities in uptake across these groups. System-level interventions, such as automatic referral to an anti-D clinic once Rhesus-negative status is identified in BadgerNet, may reduce reliance on individual processes and minimise avoidable omissions. The option of anti-D administration outside of the hospital setting (e.g., midwifery clinics or the home) may improve access.

COMPETING INTERESTS
Nil.

AUTHOR INFORMATION
Maria Wojcik: Senior House Officer, Department of Obstetrics & Gynaecology, Health New Zealand – Te Whatu Ora, Capital, Coast & Hutt Valley, Wellington.
Judy Ormandy: Senior Lecturer, Obstetrics & Gynaecology, University of Otago, Wellington.

CORRESPONDING AUTHOR
Judy Ormandy: Senior Lecturer, Obstetrics & Gynaecology, University of Otago, Wellington.
E: judy.ormandy@otago.ac.nz

URL
https://nzmj.org.nz/journal/vol-139-no-1643/improving-uptake-of-routine-antenatal-anti-d-prophylaxis-completion-of-the-audit-cycle-in-capital-coast

CITATION
Wojcik M, Ormandy J. Improving uptake of routine antenatal anti-D prophylaxis: completion of the audit cycle in Capital & Coast. N Z Med J. 2026 Oct 9;139(1643):93-96. doi: 10.26635/6965.7468.

REFERENCES

1. Verweij E, Lopriore E, Fitzgibbon M, et al. Reporting of management and outcomes in the haemolytic disease of the fetus and newborn: a systematic literature review. J Perinatol. 2025;45:1513-1519. doi: 10.1038/s41372-025-02366-2.
2. Kwok KHM, Gissler M, Thunbo MØ, et al. Clinical characteristics and outcomes of pregnancies at risk of haemolytic disease of the fetus and newborn in Sweden, Finland, and Denmark: a population-based register study. AJOG Glob Rep. 2025;5(3):100544. doi: 10.1016/j.xagr.2025.100544.
3. Pilgrim H, Lloyd-Jones M, Rees A. Routine antenatal anti-D prophylaxis for RhD-negative women: a systematic review and economic evaluation. Health Technol Assess. 2009;13(10):iii, ix-xi, 1-103. doi: 10.3310/hta13100.
4. Royal Australian and New Zealand College of Obstetricians and Gynaecologists. Guidelines for the use of Rh(D) Immunoglobulin (Anti-D) in obstetrics (C-Obs 6) [Internet]. Melbourne, Australia: RANZCOG; 2023 [cited 2026 Apr 1]. Available from: https://ranzcog.edu.au/wp-content/uploads/Anti-D-Guidelines.pdf
5. Gounder D. Use of Rh D immunoglobulin (Anti-D Immunoglobulin) during pregnancy and the post partum period [Internet]. Wellington, New Zealand: New Zealand Blood Service; 2023 [cited 2026 Apr 1]. Available from: https://www.nzblood.co.nz/assets/Transfusion-Medicine/PDFs/111G130.pdf
6. Lahood Z, Ormandy J. Administration of Routine Antenatal Anti-D Prophylaxis (RAADP) in Wellington, Aotearoa: is our practice equitable? N Z Med J. 2023;136(1581):51-55. doi: 10.26635/6965.6013.
7. Skull S. Embedding clinical audit into everyday practice: Essential methodology for all clinicians. J Paediatr Child Health. 2020;56(10):1533-1536. doi: 10.1111/jpc.15068.
8. Gauld DN, Hinks A, Gao R, et al. Implementation and mixed method evaluation of a unique midwife-prescribed, pharmacist-administered routine antenatal Anti-D prophylaxis model in pregnant people. Res Social Adm Pharm. 2025;21(9):704-713. doi: 10.1016/j.sapharm.2025.04.004.

A Case of Abdominal Torsion of the Omentum

NZMJ, 1926

By E. R. Lange, M.B., Ch. B., *late Superintendent of the Coromandel Hospital*.

A writer in the *British Medical Journal* of 30th January, 1926, reports a case of torsion of the omentum occurring independently of hernia, and points out that since 1882 he can find records of only eighteen cases. While it is difficult to believe that this class of case is as rare as these figures suggest, the occurrence of such a condition is uncommon enough to warrant the publishing of details.

A woman aged 46, and weighing 17 stone, was admitted to the Coromandel Hospital on 31st August, 1925, complaining of having had severe pains in the right side of the abdomen for three days. The onset was insidious. There was no vomiting or irregularity of the bowels. Temperature, 99; pulse, 108; respirations, 20.

EXAMINATION.—Abdomen: Very tender, resistant, and dull on percussion on the right side over a diffuse area at the level of the umbilicus. Heart: Negative. Chest: Negative. A provisional diagnosis of appendicitis was made, and a laparotomy performed on the following morning with the assistance of Dr. A. S. Gray, of Thames.

OPERATION.—On opening the abdomen by a right paramedial incision the appendix was located and found to be perfectly normal. A mass about the size of a fist was then discovered firmly bound to the anterior parietal peritoneum high up. It was freed with difficulty, and was found to be a mass of gangrenous omentum, covered with plastic lymph and joined to the main body of omentum by a tightly-twisted rope of omental tissue. Ligatures were applied to the pedicle, and the gangrenous portion removed. A tube was inserted and the wound closed.

Convalescence was uneventful, but the patient was not discharged till 6th October, 1925, consequent on the slow healing of the deep tube sinus.

2026 Oct 9; 139(1643). ISSN 1175-8716
https://www.nzmj.org.nz/ ©PMA