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Impact of burnout on empathy

Benjamin J Smith, Arthur J Morris, Molly Reynolds,
Andrew McCombie, Mark Jeffery, Roger Mulder, Frank Frizelle

This study revealed high levels of personal burnout among senior doctors and suggested that empathy reduces as patient-related burnout increases. The nature of this relationship is a complex one, and other contributing variables should be considered.

Shared electric scooter injuries admitted to Auckland City Hospital: a comparative review one year after their introduction

Matthew J McGuinness, Yvonne Tiong, Savitha Bhagvan

This study demonstrates a concerningly high e-scooter-related hospitalisation rate and suggests e-scooters are currently not as safe as cycling. Strategies to improve safety are needed and could include zero tolerance for alcohol, mandatory protective gear, restrictions on time and changes in road laws.

Multidisciplinary Pigmented Lesion Clinic at Auckland District Health Board: impacts on melanoma diagnosis and treatment outcomes

Ken Hiu-Kan Ip, Aravind Chandran, Isaac Cranshaw, Alex Ng, Ann Giles, Karen Agnew

Auckland District Health Board has developed a unique melanoma service called the Pigmented Lesion Clinic (PLC), which combines the expertise of dermatologists and general surgeons. Dermatologists offer the gold standard in the diagnosis of melanomas and skin lesions, and their incorporation in the multidisciplinary PLC has reduced the number of patients undergoing unnecessary surgery for removal of benign (non-cancerous) moles. On the other hand, if surgery is required, the PLC offers a see-and-treat service, so that patients can receive surgery on the same day as their clinic appointment. A first of its kind in New Zealand, the PLC has improved both the diagnosis and treatment of melanoma, including almost halving the time taken for patients to complete treatment (wide local excision) of their melanomas.

Attitudes towards and use of cannabis in New Zealand patients with inflammatory bowel disease: an exploratory study

Kerry Appleton, Elizabeth Whittaker, Zarife Cohen, Heather Rhodes,
Cathy Dunn, Siobhan Murphy, Mabel Thompson-Gaastra, Anna Galletly,
Sean Dougherty, Andrew Haren, Nitin Sukumaran, Kristina Aluzaite,
John Dockerty, Robin Turner, Michael Schultz

Approximately 25,000 New Zealanders are affected by inflammatory bowel diseases such as Crohn's disease and ulcerative colitis. Despite treatment, patients often suffer from symptoms or side effects of the drugs, and many use complimentary or alternative medications. Our study of over 350 patients in New Zealand shows that over 50% use cannabis, mainly for recreation (63%), but also for relief of symptoms—diarrhoea, loss of appetite and fatigue (41%) and sleep (31%). 74% reported an improvement in the quality of life and an additional 54% would request a prescription for cannabis if it were legal. Cannabis users were younger than non-users and were of all ethnicities. But they were more likely to be unemployed or self-employed.

The 777 Planner: improving the resuscitation call experience at North Shore Hospital

Daniel Gibbons, Dushiyanthi Rasanathan, Naomi Heap, Jonathan Wallace

Resuscitation or 777 calls are emergency events that rely on the effective communication, leadership and teamwork of the responding resuscitation team. We designed the *777 Planner* meeting held at the start of shifts in the hospital for members of the resuscitation team to meet and allocate roles prior to events. Pre- and post-intervention surveys showed that the introduction of this meeting and planning roles improved the respondents' experiences of resuscitation calls.

Pasifika Prediabetes Youth Empowerment Programme: learnings from a youth-led community-based intervention study

Ridvan Firestone, Gavin Faeamani, Elizabeth Okiakama, Tevita Funaki, Akarere Henry, Danielle Prapavessis, Jennifer Masaga, Justice Firestone, Jemaima Tiatia-Seath, Anna Matheson, Blakely Brown, Max Schleser, Keaweʻaimoku Kaholokula, Claire Ing, Barry Borman, Lis Ellison-Loschmann

This paper describes the success of researchers, community members and youth who worked together in co-designing a community-based intervention programme targeting prediabetes prevention. The approach highlights the importance of community partners taking on an equal role and leading the intervention.

Exploring admissions for Māori presenting with major trauma at Christchurch Hospital

Tengo Kandelaki, Melissa Evans, Angela Beard, Christopher Wakeman

Major trauma contributes a significant burden of disease on the New Zealand population. Although previous studies have shown that Māori patients experienced higher incidence rates of major trauma and higher rates of post injury disability, little is known about the demographics and outcomes of Māori major trauma patients in the South Island. This study has found that the incidence rates and mechanisms of injury were similar for Māori patients and the total population. A difference was seen in mortality rates, where Māori major trauma patients demonstrated a lower mortality compared to the total population.

New Zealand COPD Guidelines: Quick Reference Guide

Robert J Hancox, Stuart Jones, Christina Baggott, David Chen, Nicola Corna, Cheryl Davies, James Fingleton, Jo Hardy, Syed Hussain, Betty Poot, Jim Reid, Justin Travers, Joanna Turner, Robert Young

These are the first national, evidence-based guidelines for assessing and treating COPD (chronic lung disease) in New Zealand. It is hoped that these guidelines will help standardise, and maximise, the care of people with COPD across our country regardless of post-code. A key aspect of the guidelines emphasises the high burden of disease carried by Māori and Pacific people and stress the importance of developing culturally appropriate connections with patients and their whanau (whakawhanaungatangata). The guideline also focuses on the importance of non-pharmacological interventions such as smoking cessation, pulmonary rehabilitation, and breathing control. Finally, in the section on pharmacological management, we have provided clear guidance on the appropriate inhaler selection to ensure the best management of COPD, and to avoid these patients being managed as if they had asthma.

Telehealth as a tool for equity: pros, cons and recommendations

Catherine Habel, Jerome Ng, Jason Gurney, Lily Fraser,
Amio Ikihele, John Manderson, Nina Scott, Bridget Robson

In this paper, we consider whether telehealth is an equity-positive tool that might help to overcome some important barriers to healthcare access for Māori and Pacific people. We consider the equity ramifications of a shift toward models of healthcare that maximise the use of telehealth solutions, and we make some recommendations regarding how we might best achieve the equity-positive potential of telehealth for Māori and Pacific people.

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The Climate Change Act will now shape the nation's health: an assessment of the first policy recommendations to reach our zero carbon target

Alex Macmillan

This year, the Government will finally be forced to act on its responsibility to protect global and national health from runaway climate change. The independent Climate Change Commission has this month released a draft of its landmark first carbon budget advice. It sets the pathways for the country to get to net zero by 2050 (as required by law) and recommends specific accompanying policies. These policies cover all sectors of society, and many of the building blocks of population health and wellbeing. The choices the Government makes in response could be a real opportunity for health and equity gains, or alternatively exacerbate existing diseases and health inequities. In assessing the Commission's recommendations, health professionals should be looking for policies that uphold the Articles of te Tiriti o Waitangi; are effective at getting us on a pathway to zero emissions before 2050; and are based on the growing body of evidence about the effects of climate policy on health equity.

The independent Climate Change Commission is mandated under the Climate Change Response (Zero Carbon) Amendment Act 2019 (the 'Climate Change Act') to develop a series of emissions budgets so that we reach zero carbon emissions before 2050 and significantly reduce other greenhouse gas emissions like agricultural methane. In addition to providing the budgets, the Commission is tasked with developing source-specific policy guidance for meeting the budgets. These sources include agriculture, transport, industrial and household heat, electricity generation and land use. The expertise of the commissioners covers climate science, economics, public policy, mātauranga Māori, agriculture and forestry. Despite the critical importance of climate change to human health, public health expertise is absent from the Commission.

Climate change is a public health issue that warrants the same kind of urgent leadership and attention as COVID-19—the effects of which it is already exacerbating and will dwarf in the future because of its long-term, accelerating effects on the basic requirements for health and survival: liveable temperatures, freshwater, food and safe housing.[1] The Paris Agreement and the Climate Change Act are therefore crucial health-protecting global and national policies. The Commission's report explicitly invokes health protection as an impetus for action.

There are good health reasons for making a zero carbon transition. Although our emissions are small in gross terms, we have very high emissions per capita. Although historically these emissions have supported our current quality of life, burning fossil fuels has come with collateral harms (eg, air pollution) and represents a global injustice, since other, lower-income countries are now paying for our ongoing climate damage. Although reducing only our own emissions won't achieve the protection we need from the health effects of climate change, we cannot reasonably insist that the major emitting nations act to protect us unless we can convince them we are doing our fair share.

Unfortunately, Aotearoa New Zealand cannot currently claim this in international forums. The most recent global formal reporting of country emissions to the United Nations ranks us 42nd in performance out of 43 high-income countries in addressing our emissions.[2] Not only does this mean we will struggle to gain protection from the actions of others, but each further delay means we leave ourselves less time for a well-planned transition. Instead, we risk being forced to make expensive, sharp, poorly planned step-changes, which come with unintended consequences. Our necessary responses to COVID-19 demonstrate the widespread consequences of having to act under urgency. The longer we wait, the more we will also struggle to simultaneously finance the increasing costs of climate damage and adaptation, such as responding to sea-level rise, severe weather events, bushfires and further outbreaks of existing and new infectious disease.

We already have all the technologies and evidence to hand to make a healthy and just transition, and this is recognised in the Commission's report. Reassuringly, the Commission demonstrates that New Zealand is in a very good position to meet our global obligations in a timely fashion. A quarter century of public health research and growing global experience with implementation also provides a solid basis for designing policies across sectors to effectively reduce emissions while ameliorating some of our major health and health equity burdens—including obesity and physical inactivity, air pollution, traffic injuries, childhood infectious diseases, cardiovascular disease and some of our commonest cancers. Local cost–benefit analyses have been conducted and compare very favourably to many existing healthcare interventions. For example, the benefits of achieving basic standards of energy efficiency and healthy insulation and heating for the remainder of our poor housing stock have been estimated to bring at least $4 of health and social benefit for every dollar spent;[3] investing in high-quality urban cycling networks would likely bring tens of dollars of health and social savings for every dollar spent;[4] and shifts at a population level towards a more plant-based diet is estimated to bring $14–20billion in health savings over the lifetime of the current population.[5]

The Commission places the heaviest emphasis on actions to reduce emissions from the transport system—the sector with the fastest growing emissions and currently responsible for about half of our carbon dioxide emissions.[6] This is also the system that determines fair access to health-promoting goods and services, jobs, social connections and healthcare. Today's investments in transport infrastructure will lock us into travel and access patterns for the next 50 years. A decade-long programme of equity-focused transport health research[7–12] suggests a range of actions will be crucial for multi-solving in transport. These actions, summarised in order of urgency and priority in Figure 1, emphasise a shift in travel towards public and active transport that increases healthy access for those who need it most.

Although some of these priorities are acknowledged in the Commission's report, including the need to rebalance investment and to ensure that a just transition towards zero carbon mobility, the 'time critical necessary steps' identified in the report, which come with specific targets and policies, are to encourage the further uptake of (electric) privately owned motor vehicles, which will be neither equitable nor address transport's current health costs. The Commission signalled that investments in active and public transport are 'necessary'. But the accompanying policies are more vague; time critical policies have not been prioritised; and there is a lack of accountability targets. The report also demonstrates that the Commission is blind to the disruption that e-bikes are already causing to the urban transport status quo.[14] E-bikes have the potential for cheap and rapid upscaling, and already their uptake is far outpacing uptake of electric cars.

In addition to the multi-solving policies suggested by the evidence, acting on climate change as a public health issue will mean tackling the 'commercial determinants' of climate health: those global industries who have deliberately undermined healthy, equitable responses to climate change globally and nationally, leaving us with the long-play climate health crisis we now face. In the case of transport, that means explicitly adding car use to our list of major disease risk factors and acting accordingly to regulate oil-based transport industries, in the same

way that public health experts have recommended regulating tobacco, alcohol and highly processed food.[13] In practical terms, the Commission should recommend policies that regulate the advertising of the most climate and health-harming vehicles and reduce the social license for their sale and consumption, as well as eliminating the political influence of industry lobby groups on climate policy.

By taking the following effective actions on behalf of our patients and families and the communities we serve, medical professionals have a powerful voice to influence the final advice of the Commission and the Government's response:

- Put the Articles of te Tiriti, public health and health equity at the centre of submissions to improve the policy proposals by the Climate Change Commission—and encourage submissions from our professional colleges. The Commission is calling for input here.
- Call for climate-harming industries, including in transport, to be regulated in keeping with recommendations about the commercial determinants of health.
- Call for public health expertise, especially expertise in hauora Māori, and expertise in health equity to be represented on the Climate Change Commission and in climate policy development.

The changes being decided now will have systemic effects on the building blocks of health equity with long-term consequences. We need to ensure the policies being designed are an opportunity for wellbeing rather than locking us into further health harm.

Figure 1: Evidence-based actions to multi-solve for climate change, health and health equity in the transport sector in order of priority.

1. The National Land Transport Fund requires urgent reorientation. Building new roads should be replaced with major ongoing national investments in public and active transport infrastructure and services, including rapid inter-city zero carbon links
2. Electrified public transport needs major investment as a public good, rather than as private enterprise (much like the health system). It should be made free for under 25 year-olds, with reduced fares for other age groups, and see immediate improvements in quality and accessibility.
3. Car ownership and use will need to be actively curtailed to ensure the safety and success of the two strategies above. This includes lower vehicle speeds, reallocation of existing road space and rapidly constraining the import and urban use of high-emitting and oversized private vehicles (eg, large diesel SUVs and twin-cab utes), as they are energy- and space-inefficient and pose an unacceptable injury risk to other people.
4. The rapidly accelerating uptake of electric bicycles (e-bikes) needs to be further incentivised, supported with safe cycling infrastructure and made equitable and affordable for low-income households through share schemes and financial support.
5. A residual quota of car use will need to be reserved for households who have the least choice and the poorest access to the destinations needed for wellbeing. Investments in shared and affordable electric vehicles suitable for large families, disabled people and longer trips will be crucial for meeting health equity and climate goals.
6. Eliminating transport poverty and forced car ownership (having to own and run a car despite not being able to afford to do so) will require wider policies to end income and housing inequities, along with addressing structural injustices in urban planning and transport.

Competing interests:
Nil.

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Impact of burnout on empathy

Molly Reynolds, Andrew McCombie, Mark Jeffery, Roger Mulder, Frank Frizelle

ABSTRACT

AIM: Burnout has a damaging effect on both the wellbeing of medical professionals and patients alike. Empathy is an important part of the therapeutic relationship and could be damaged by burnout. We aimed to describe the prevalence of burnout, assess levels of empathy and explore the relationship between burnout and empathy among senior medical officers (SMOs). We hypothesised that there would be a negative correlation between empathy and burnout.

METHOD: This was a cross-sectional observational study involving SMOs from a variety of specialities. The focus is on SMOs with relatively prolonged contact times with patients. Email invitations were sent out requesting participation in an electronic survey on the QuestionPro platform. The survey comprised 42 questions enquiring about demographics, empathy (Jefferson Scale of Physician Empathy) and burnout (Copenhagen Burnout Inventory). Correlational analyses were performed.

RESULTS: Three hundred and fourteen invitations were sent out and 178 responses were received (56.7% response rate). Forty-five percent of SMOs surveyed were experiencing high levels of personal burnout. There was a statistically significant negative correlation between empathy and patient-related burnout (p=0.018).

CONCLUSIONS: The results show high levels of personal burnout among SMOs and suggest that empathy reduces as patient-related burnout increases. The nature of this relationship is a complex one, and other contributing variables should be considered.

Burnout—a syndrome that is characterised by emotional exhaustion, depersonalisation and low sense of personal accomplishment—has been associated with a higher frequency of medical errors, lapses in professionalism, impeded learning, problematic alcohol use and suicidal ideation. Burnout is important because it can damage doctors and impair patient care. Burnout is defined as "a state of physical, emotional and mental exhaustion that results from long-term involvement in work situations that are emotionally demanding."[1] Many variables contribute to the development of burnout, such as long hours of work, work-home conflicts, resourcing, managerialism and interpersonal relationships.[2,3]

Empathy helps with becoming a good doctor. It is an extensively discussed concept that plays a role in the therapeutic relationship, as does burnout. The common factor in most definitions of empathy is that it bridges the gap that exists between the self's experiences and the experiences of others.[4–6] Empathy has been described as a way of grasping another's emotions, and thereby it facilitates trust and disclosure in the patient–doctor relationship. Many doctors agree that empathy makes the practice of medicine more satisfying and meaningful.[6]

Our study had a particular focus on one aspect of burnout: that is, its association with empathy. Qualitative and quantitative research around the factors that contribute to burnout has been completed both internationally and in New Zealand.[2,7,8] The objective of this study was to explore the rates of, and relationship between, burnout and empathy among senior medical officers (SMOs). We hypothesised that there would be a negative correlation between empathy and burnout.

Methods

Study design

The study population of this observational cross-sectional study was SMOs employed by the Canterbury District Health Board (CDHB) who come from a variety of specialities and have regular face-to-face contact with patients. The participants were invited to complete an anonymous electronic survey using the QuestionPro platform (QuestionPro Inc. Beaverton, OR US). The survey was comprised of 42 questions enquiring about demographics, empathy (Jefferson Scale of Physician Empathy) and burnout (Copenhagen Burnout Inventory).

Category A ethics approval was granted from the University of Otago Human Ethics Committee (F17/017). The Ngāi Tahu Research Committee was consulted prior to the commencement of the study to ensure acknowledgment of the needs of Ngāi Tahu for Māori development. CDHB Local Authority was also granted.

Setting

The study was performed at the University of Otago (Christchurch campus), and CDHB Local Authority was used to contact CDHB employees via their email addresses. Participants were recruited via email invitation and asked to complete the online survey between 15 December 2017 and 29 August 2018.

Participants

SMOs from the CDHB were invited via mailing lists. Specialities were selected on the basis of having adequate contact time with patients. Speciality groups included those from anaesthesia, medicine, surgery and psychiatry. The surgery group included those who responded from general surgery, obstetrics and gynaecology, vascular, plastics and orthopaedics. The medicine group combined those who responded from general medicine, respiratory, cardiology, oncology and palliative care. As mentioned, we selected specialties that had a relatively prolonged contact time with patients, and specialties that included more substantial numbers of SMOs. The excluded specialties were dermatology, emergency medicine, endocrinology, infectious diseases, intensive care, neonatal medicine, neurology/neurosurgery, ophthalmology, radiology and pathology.

Variables

Empathy

The Jefferson Scale of Physician Empathy is a 20-question validated questionnaire created by Hojat et al at the Jefferson Medical College, Philadelphia, in 2001.[9] Each question is scored on a 7-item Likert-scale, with the total sum relating to each participant's level of empathy. A high level of empathy was defined as any total score greater than 1.5 standard deviations (SDs) above the mean. This is in accordance with the scoring algorithm provided by the authors of the scale.[10]

Burnout

The survey employed the Copenhagen Burnout Inventory (CBI), a 19-question validated questionnaire created in Denmark by researchers Borritz and Kristensen. This questionnaire enquires about burnout in three domains: personal burnout, work-related burnout and patient-related burnout.[11] Each question is scored on a 5-item Likert scale. A high degree of overall burnout is a score of 50 or more in each of the categories.[12] In December 2017, Chambers et al used the CBI to quantify levels of burnout among New Zealand SMOs.[2]

Data sources/measurement

The survey was established and disseminated using QuestionPro®, an online survey platform. We collated demographic data, including age, gender, speciality and ethnicity, as well as the time since the participant's last period of annual leave that was greater than one-week in duration. Scoring of each of the empathy and burnout scales was performed in accordance with scoring guidelines for each of the questionnaires.[10,12] The initial invitation was sent on 15 December 2017 and follow-up invitations (sent to all people who did not respond to the initial invitation) were sent on 23 April 2018 and 2 August 2018.

Study size

A sample size of approximately 180 participants would provide >80% power to show an R^2 of >0.05 for the association between empathy and burnout as statistically significant (2 tailed, α=0.05).

Statistical methods

SPSS version 23 was used for statistical analyses.[13] Frequencies were calculated for demographic variables, and Pearson's correlation coefficients were calculated between the empathy and burnout subscales. Missing answers were replaced using single imputation. Imputations made on the CBI involved completing missing answers with the average calculated from answers scored in the respective subscale. Those who responded to fewer than three or four questions in each subscale were classified as non-responders.[12] Missing answers on the Jefferson Empathy Scale were filled with the average score of completed answers. Those who answered fewer than 16 questions out of the 20-question total were classified as non-responders.[10]

Results

Participants

Three-hundred and fourteen invitations to participate were made. We received 178 responses (56.7% response rate). Table 1 shows the demographics of the 178 participants: 64.6% were male, 72.5% were New Zealand European and the most prevalent age bracket was 41–50 (37.6%). The specialty with the highest response rate was medicine (43.5%).

Main results

44.9% of participants were experiencing high levels of personal burnout, 29.2% were experiencing high levels of work-related burnout and 5.6% were experiencing high levels of patient-related burnout. Five percent of participants were experiencing high levels of burnout in all three domains (personal, work-related and patient-related burnout) (Table 1).

We found a statistically significant negative correlation between empathy and level of patient-related burnout (Table 2).

Other analyses

Specialties

Comparisons of burnout and empathy between specialties are shown in Table 3. These results show the surgery group scored highest in both personal and work-related burnout, with scores of 48.04 (SD 16.74) and 46.32 (SD 19.98) respectively, although this result is not statistically significant.

Table 1: Participant characteristics.

Characteristic	n (%)
Sex	
Male*	115 (64.6%)
Female	62 (34.8%)
Age	
>60	27 (15.2%)
51–60	57 (32%)
41–50	67 (37.6%)
31–40	27 (15.2%)
Ethnicity**	
NZ European	129 (72.5%)
Other	49 (27.5%)
Time since last annual leave	
< 1 month ago	49 (27.5%)
1–3 months ago	72 (40.4%)
3–6 months ago	43 (24.2%)
>6 months ago	11 (6.2%)
Decline to answer	3 (1.7%)
Specialty * (invited)**	
Anaesthesia (61)	29 (16.3%)
Medicine (110)	77 (43.3%)
Surgery (78)	34 (19.1%)
Psychiatry (61)	23 (21.3%)
High degree of burnout (CBI score >50)	
Personal	80 (44.9%)
Work-related	52 (29.2%)
Patient-related	10 (5.6%)
All three above 50	9 (5.1%)

*59% of Canterbury District Health Board SMOs are male.
** 'Others' includes ethnicities with populations < 10. These included Māori, both Māori and Pakeha, English/German, Indian, South African, European, Chinese and unknown mixed/prefer not to answer.
*** 'Medicine' includes: general medicine, respiratory, cardiology, gastroenterology, oncology and palliative care. 'Surgery' includes: general surgery, obstetrics and gynaecology, vascular, plastics and orthopedics.

Table 2: Correlation between empathy and burnout.

	Personal burnout, r (p)	**Work-related burnout , r (p)**	**Patient-related burnout, r (p)**
Jefferson empathy total	-.126 (0.093)	-.0.091 (0.228)	-.223* (0.003)
Personal burnout	1	.812* (0.00)	.513* (0.00)
Work-related burnout	-	1	.634* (0.00)
Patient-related burnout	-	-	1

* = statistically significant result ($p < 0.01$)

Table 3: Empathy and burnout by specialty.

Speciality (n)	**Jefferson empathy total, mean (SD)**	**Personal burnout, mean (SD)**	**Work-related burnout, mean (SD)**	**Patient-related burnout, mean (SD)**
Anaesthesia (29)	110.70 (12.14)	42.24 (15.22)	35.88 (15.31)	19.25 (12.81)
Medicine (77)	112.84 (11.03)	44.91 (18.84)	39.29 (17.82)	23.32 (17.00)
Psychiatry (38)	120.43 (7.54)	40.79 (18.10)	39.09 (16.41)	27.10 (17.33)
Surgery (34)	111.83 (11.48)	48.04 (16.74)	46.32 (19.98)	24.44 (14.33)
Total (178)	113.91 (11.14)	44.19 (17.77)	40.04 (17.76)	23.66 (16.00)
P-value	<0.01	0.33	0.11	0.26

Table 4: Age of SMOs and level of empathy and burnout t-tests.

	Age ≤50, mean (SD)	**Age >50, mean (SD)**	**t**	**p**
Empathy	112.52 (11.45)	115.46 (10.64)	-1.76	0.08
Personal burnout	47.87 (16.37)	40.08 (18.46)	2.99	0.003
Work-related burnout	42.79 (18.04)	39.92 (16.99)	2.22	0.03
Patient-related burnout	24.35 (16.15)	22.87 (15.89)	0.66	0.54

The psychiatry group scored the highest Jefferson empathy total mean score (120.43, SD 7.54). The Jefferson empathy totals were significantly different ($F(3, 174)=6.32$, $p<0.01$).

Age

We also found a statistically significant association between age of SMOs and level of burnout (Table 4). When age was split into ≤50 versus >50, those in the <50 bracket scored higher in two domains of burnout ($p<0.05$, personal and work-related).

Annual leave

Time since last annual leave had an insignificant effect on both the average empathy score and burnout score. See Appendix Table 1.

Qualitative feedback

As well as the survey completion, three people provided anecdotal feedback, which is shown in Appendix Figure 1.

Discussion

The aim of this study was to explore the rates of, and relationship between, burnout and empathy among consultant staff. Our study has found that the prevalence of high levels of personal burnout was 45%. Thirty percent of SMOs scored high levels of work-related burnout and 6% scored high levels of patient-related burnout. High levels of burnout in all three domains of the CBI (personal, work-related and patient-related burnout) was found in 5% of SMOs. Of the 178 subjects, 9 of the 10 patient-related burnout doctors also had personal and work-related burnout—that is, burnout in all three domains. This suggests that patient-related burnout may be a proxy measure of severe burnout. Moreover, there was a negative association between empathy and patient related burnout.

Though these rates of burnout may seem high, rates of burnout among doctors internationally range from 30–70%.[14,15] Chambers et al found in their study of burnout prevalence in New Zealand that 50% of senior doctors and dentists were experiencing high levels of personal burnout.[2]

Other analyses included exploring the relationship between SMO age and level of burnout. We found that those aged <50 were more likely to score higher in two of the domains of burnout. Similar research in New Zealand[2] and abroad[16] has found that those in younger age groups present as being most at risk of high burnout. It has previously been observed that burnout is negatively related to work experience.[17,18] This relationship is possibly due to the added responsibility and relative inexperience to those who are <50, having younger children at home during this period, older SMOs being better able to deal with work-related pressure or the number of hours that SMOs <50 years of age work. Furthermore, it may be that those who experience burnout when <50 go on to leave their job and seldom return—hence excluding them from our analyses in the >50 age bracket.

We found a statistically significant negative correlation between empathy and patient-related burnout. There are three theories that aim to describe the nature of the relationship between empathy and burnout:

1. Burnout reduces one's ability to be empathetic through sheer exhaustion and/or withdrawal.
2. Being empathetic leads to the development of burnout (ie, compassion fatigue).
3. By increasing work satisfaction and self-awareness, empathy may *protect* against burnout.[7,19]

A systematic review conducted by Wilkinson et al (2017) found 8 out of the 10 studies demonstrated a negative correlation between empathy and burnout.[19] The relationship between empathy and burnout is a complex and potentially multi-directional one. Although beneficial in terms of patient outcomes, high levels of empathy have been postulated to cause compassion fatigue and emotional exhaustion, which can lead to burnout.[7,8,19] On the other hand, Zenasni et al (2012) postulate that being empathetic creates a greater awareness of not only your patients' emotions, but also your own. This leads to more self-reflective and meaningful practices that can protect against burnout.[7] It is difficult to grasp how empathy could protect against burnout, but qualitative research in the field suggests this is also a possibility.[8] More likely, however, is that burnt-out (physically and emotionally exhausted) doctors may have a

reduced capacity to empathise with patients. These burnt-out doctors are more likely to withdraw themselves from the therapeutic relationship.[7,8]

Limitations and future directions

The cross-sectional nature of the study comes with limitations in finding causality. The relationship needs to be assessed longitudinally to evaluate causation. It may also be necessary to assess these factors qualitatively in order to gauge a clearer idea of the complex causes of burnout.

Our survey strategy deliberately excluded SMOs who had little to no patient contact. Future research could perhaps include these SMOs and have patient contact hours as an independent variable for predicting the various types of burnout.

Potential confounders that can contribute to levels of empathy and burnout were not controlled for. For example, ill-health and significant home-life stressors were not recorded. Future research should record these and perform a more detailed analysis. Although it's reasonable for this type of study, the response rate of 56.7% may have introduced selection bias. The limitations of our instruments used to assess levels of burnout (CBI) and empathy (Jefferson Scale of Physician Empathy) should be considered. However, we have used the CBI and Jefferson Scale of Physician Empathy because the current literature argues they are acceptable scales to use to measure their respective variables.

We received qualitative feedback addressing the other variables that contribute to burnout (See Appendix Figure 1), although they were not formally explored in this study. These variables have been explored in previous studies and include many factors external to individual SMOs, such as resourcing, work-load and interpersonal relations.[2,3] It would be vital to consider these contributing variables in future research in order to combat burnout and its manifestations.

Given the demonstrably high rates of burnout among SMOs, interventions for physician burnout should be deployed. Two recent editorials in the *New Zealand Medical Journal* have focused on this topic. Muthu[20] stated that "The evidence is clear that caring for others should not come at the expense of the caregivers own physical, mental, spiritual and social wellbeing across their life-course. A comprehensive strategic evidence-based solution with novel approach to the provision of healthcare is required for hospital-based doctors and those in the community," and Muthu described what this might look like. Likewise, Frizelle and Mulder[14] described how burnout might be may better avoided and managed and referred to nine organisational strategies the Mayo Clinic is currently applying to promote physician wellbeing. In addition, a systematic review that identified 13 studies, of which 4 were randomised controlled trials, reported that interventions for physician burnout should use a holistic approach and a wide range of techniques because of the wide range of causes, such as personality factors and the specific issues faced by each physician.[21] Examples of interventions that have shown promise include mindful communication,[22] art therapy and cognitive behavioural therapy (CBT)[23] and support group sessions.[24]

Conclusion

Our study shows high levels of burnout in senior medical officers (SMOs). It also confirms the negative association between empathy and burnout among SMOs. This relationship is an important one to understand in more detail because reducing burnout and enhancing empathy are associated with favourable outcomes for doctors and patients alike.

Appendix

Appendix Table 1: Time since last annual leave >1 week vs. empathy and burnout scores.

	Time since last annual leave (n*)	Mean (SD) **
Empathy	≤ 1 month (49)	114.01(11.79)
	> 1 month (126)	113.87 (10.90)
Personal burnout	≤ 1 month (49)	42.35 (16.78)
	> 1 month (126)	44.74 (18.33)
Work-related burnout	≤ 1 month (49)	40.11 (16.05)
	> 1 month (126)	39.85 (18.48)
Patient-related burnout	≤ 1 month (49)	23.72 (16.58)
	> 1 month (126)	23.45 (15.89)
	Time since last annual leave (n*)	**Mean (SD) ** **
Empathy	< 6 months (164)	113.81 (11.14)
	≥ 6 months (11)	115.45 (11.38)
Personal burnout	< 6 months (164)	44.16 (18.23)
	≥ 6 months (11)	42.80 (12.37)
Work-related burnout	< 6 months (164)	40.25 (18.17)
	≥ 6 months (11)	35.06 (9.69)
Patient-related burnout	< 6 months (164)	23.42 (16.24)
	≥ 6 months (11)	25.00 (13.18)

* Includes three 'Decline to answer'
** P-values all not significant (>0.05)

Appendix Figure 1: Anecdotal comments.

"Excellent survey but my perception of the causes of burnout among SMOs is almost entirely struggles with bureaucracy, inter-SMO conflict and lack of time for quality care. Most of my colleagues are stimulated and energized by patient care and interaction and their struggles are lack of autonomy to address the issues I have mentioned above. This is worth a survey as the causes of burnout."
"The definition of burnout is subjective – what one doctor calls burnout is different fromwhat another will. We manifest burnout in unique ways."
"Surveys are not a good way of getting a response from us. We get too many and they end up in my deleted box."

Competing interests:
Nil.

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Shared electric scooter injuries admitted to Auckland City Hospital: a comparative review one year after their introduction

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ABSTRACT

AIM: E-scooters were introduced to New Zealand in 2018 as a means of city transport. Since their introduction, their use has resulted in high injury rates. No studies have directly compared e-scooters to other forms of transport.

METHOD: The Auckland City Hospital trauma registry was retrospectively searched for patients admitted with an e-scooter injury. A comparison group of patients admitted with an injury secondary to cycling during the same period was collected.

RESULTS: 178 patients were identified: 69 with e-scooter injuries and 109 with injuries sustained while cycling. The hospitalisation rate for e-scooter injuries was 326 hospitalisations per million hours. There was a significant difference found in blood ethanol levels (18.6 vs 6.4% positive, p-value=0.01), mechanism of injury (isolated falls: 87 vs 60.6%), time of injury (55.1 vs 40.4% between 5pm–8am) and protective gear use (worn in 10.1 vs 78.9%). No differences were found in injury severity, ICU admissions, length of stay or mortality.

CONCLUSION: This study demonstrates a concerningly high e-scooter-related hospitalisation rate and suggests e-scooters are currently not as safe as cycling. Strategies to improve e-scooter safety are needed and could include zero tolerance for alcohol, mandatory protective gear, restricted operating times and changes in road laws.

An electric scooter (e-scooter) is a micro-mobility device with a small electric-powered motor allowing speeds exceeding 25km/hr. E-scooter popularity has increased worldwide following the introduction of shared e-scooter systems in the US in 2017. The shared e-scooter system was first introduced to Auckland in October 2018 following the decision by the Auckland City Council to grant a three-month trial period.[1]

Since their launch, there has been significant media attention covering the high rates of accidental injuries and fatalities associated with their use.[2] The Auckland City Hospital (ACH) trauma department has noticed a corresponding increase in admissions related to e-scooter use, and concern has been raised accordingly.

Multiple Auckland-based studies have investigated e-scooter-related injuries. The studies have included analysis of the pattern of injuries sustained, the impact on emergency department imaging, the regional healthcare cost and the burden of injury.[3–6] Because transport types have not been compared directly, it is currently unclear whether e-scooters pose a higher risk of injury when compared to similar, low-velocity methods of transport. The aim of this study is firstly to compare e-scooter- and bicycle-related injuries admitted to ACH, to determine whether the hospitalisation rate is truly higher, and secondly to compare injury factors, injury severity and hospital-specific factors.

Methodology

Study design

A retrospective analysis of patients admitted between 15 October 2018 and 15 October 2019 (the study period) was undertaken. Two groups, an e-scooter group and comparison group, were defined. The e-scooter group included any patient admitted with an injury caused while riding an e-scooter. The comparison group included patients admitted with an injury sustained while riding a bicycle in the same time period.

Data collection

The ACH trauma registry was retrospectively searched for injuries in the two groups defined above. The ACH trauma registry is a database that was established in 1994. The trauma department collects data prospectively on all admitted trauma patients. As of 31 December 2019, there were 35,821 patients in this database. Additional data was collected from clinical notes, discharge summaries and electronic records. This data included patient demographics, mechanism of injury, use of protective gear, time of injury, mode of transport to hospital, emergency department (ED) management, patient disposition, Injury Severity Score (ISS), Trauma and Injury Severity Score (TRISS), blood alcohol level, treatment details, length of hospital and intensive care unit (ICU) stay, discharge destination and mortality.

Auckland Transport was contacted to provide data regarding the number of e-scooter trips during the study period. During the study period, Auckland Transport were evaluating the licencing of e-scooter rentals and therefore were collecting data from the three operational shared e-scooter services: Lime, Flamingo and WAVE. Auckland Transport provided the data used as the denominator to calculate the hospitalisation rate.

Data analysis

Data was coded and entered into IBM SPSS for analysis. Descriptive statistics, including mean, frequencies and median, were calculated as appropriate. A Pearson Chi-Square test and, where appropriate, a Fisher's exact test was used to analyse nominal data, including ethnicity, sex, mechanism of injury, place of injury, whether protective gear was worn, time of injury, mode of transport to hospital, whether an ED trauma call was placed, patient disposition, blood alcohol level, whether an operation or a radiological intervention was required, discharge destination and mortality. Parametric data, including age, were analysed using a Student t-test. Non-parametric data, including ISS, TRISS and length of hospital and ICU stay, were analysed using Mann–Whitney U test. The null hypothesis was rejected when the p-value was less than 0.05.

Results

The ACH trauma registry contained 178 patients injured while riding e-scooters or bicycles during the study period. Of these, 69 were admitted with e-scooter related injuries and 109 were admitted with injuries sustained while riding a bicycle. 60 e-scooter injuries (87%) were confirmed to have occurred while on a ride-share e-scooter and in 9 (13%) patients it was unclear if this was a ride-share or personal e-scooter.

Group demographics

Table 1 shows a breakdown of demographic by group. There was no significant difference found for sex between groups. 71.3% of the study population were male, and a similar male predominance was seen in both groups: 69.6% of the e-scooter group and 73.4% of the cyclists. The median age of each group was significantly different: the median age of the e-scooter group was 31, and the median age for cyclists was 47 (p-value 0.002). A significant ethnicity difference was found (p-value 0.001).

Injury factors

The mechanism of injury was significantly different between the two groups (p-value 0.002), as seen in Table 2. There were more isolated falls in e-scooter riders (87 vs 60.6% for cyclists) and less collisions (11.6 vs 35.8% for cyclists). Protective gear was seldom worn in the e-scooter group (10 vs 78.9% for cyclists, p-value <0.001). For analysis purposes, the time of injury was divided into two groups: 8am to 5pm and 5pm to 8am. In the e-scooter group, more injuries happened between 5pm and 8am (55.1 vs 40.4% for cyclists, p-value 0.074); however, this was not statistically significant. Blood alcohol levels were tested in 39.1% of e-scooter

patients and 44.2% of cyclists. Of those tested, there was a significant difference in the number of patients who were positive for any detectable level of alcohol on testing: 48.1% in the e-scooter group and 15.2% in cyclists. (p-value 0.01). As seen in Figure 1, 18.8% of the e-scooter group and 6.4% of cyclist tested positive for ethanol. All those who tested positive in the e-scooter group were over the legal driving limit of 50mg/100ml of ethanol, and all but one in the cyclist group who tested positive were over the same legal limit for driving. In both groups, alcohol-related injuries predominantly happened between the hours of 5pm and 8am: 76.9% in the e-scooter group and 85.7% in cyclists.

Injury severity and inpatient care

As seen in Table 3, there were no statistically significant differences found between the two groups in any of the outcomes collected to measure injury severity. The median ISS was 5 in the e-scooter group and 9 in cyclists (p-value 0.097) and median TRISS was 0.994 in both groups (p-value 0.130). There was no difference in median inpatient length of stay or intensive care unit admission rate. There was no difference in number of deaths in each group, with one death in the e-scooter group and two in the cyclist group (p-value 0.846). The need for operative intervention was similar in the two groups: intervention was required in 62.3% of patients in the e-scooter group and 48.6% in the cyclist group (p-value 0.074).

Hospital-specific factors

Similar modes of transport to hospital were seen between the two groups. There was no difference in the rate of ambulance transfer for e-scooter riders (65.2 vs 64.2% for cyclists) or rate of private vehicle transfer (24.6 vs 21.1% for cyclists). There was a significant difference in the number of hospital emergency trauma calls placed (10.1 vs 26.6% for cyclists, p-value 0.025). The admitting team was significantly different between the two groups, with more e-scooter riders admitted under orthopaedics (73.9 vs 62.4% of cyclists), and more cyclists admitted under the trauma service at 28.4% compared with 13% of the e-scooter group (p-value 0.021). No difference in discharge destination or planned patient follow-up (including general practice, orthopaedics, hands service, neurosurgery, concussion clinic or other) was found.

Table 1: Group demographics.

	E-scooter (%)	**Cyclists (%)**	**Total (%)**	**p-value**
	69	109	127	
Age				0.002
Median	31	47	42.5	
IQR	23	23	26	
Sex				0.675
Male	48 (69.6%)	79 (72.5%)	127 (71.3%)	
Female	21 (30.4%)	30 (27.5%)	51 (27.8%)	
Ethnicity				0.001
Caucasian	39 (56.5%)	90 (82.6%)	129 (72.5%)	
Māori	4 (5.8%)	3(2.8%)	7 (3.9%)	
Pacific Island	2 (2.9%)	3 (2.8%)	5 (2.8%)	
Asian	20 (29%)	8 (7.3%)	28 (15.7%)	
Other	4 (5.8%)	5 (4.6%)	9 (5.1%)	

Figure 1: Blood alcohol test results by group.

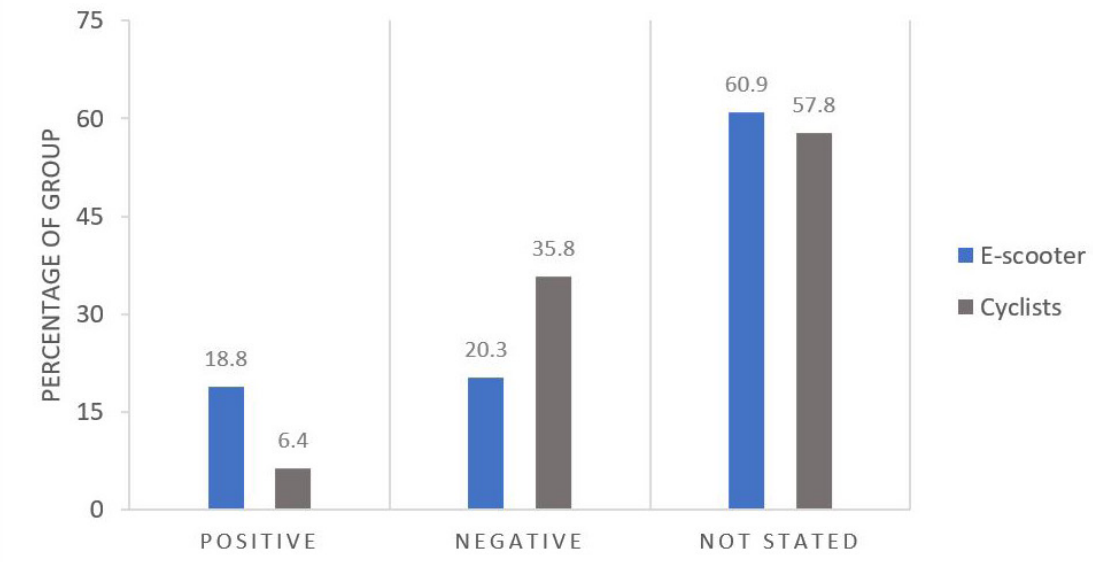

Table 2: Injury factors by group.

	E-scooter (%)	Cyclists (%)	Total (%)	p-value
Mechanism of injury				0.002
Isolated falls	60 (87%)	66 (60.6%)	126 (70.8 %)	
Collisions	8(11.6%)	39 (35.8%)	47 (26.4%)	
Other	1 (1.4%)	4 (3.7%)	5 (2.8%)	
Protective gear				<0.001
Yes	7 (10.1%)	86 (78.9%)	93 (52.2%)	
No	29 (42%)	12 (11%)	41 (23%)	
Not stated	33 (47.8%)	11 (10.1%)	44 (24.7%)	
Alcohol				0.010
Positive	13 (18.8%)	7 (6.4%)	20 (11.2%)	
Negative	14 (20.3%)	39 (35.8%)	53 (29.8%)	
Not stated	42 (60.9%)	63 (57.8%)	105 (59%)	
Time of injury				0.074
8am–5pm	29 (42%)	64 (58.7%)	93 (52.2%)	
5pm–8am	38 (55.1%)	44 (40.4%)	82 (46.1%)	
Unknown	2 (2.9%)	1 (0.9%)	3 (1.7%)	

Figure 2: Trend in number of admissions in 3-month time periods.

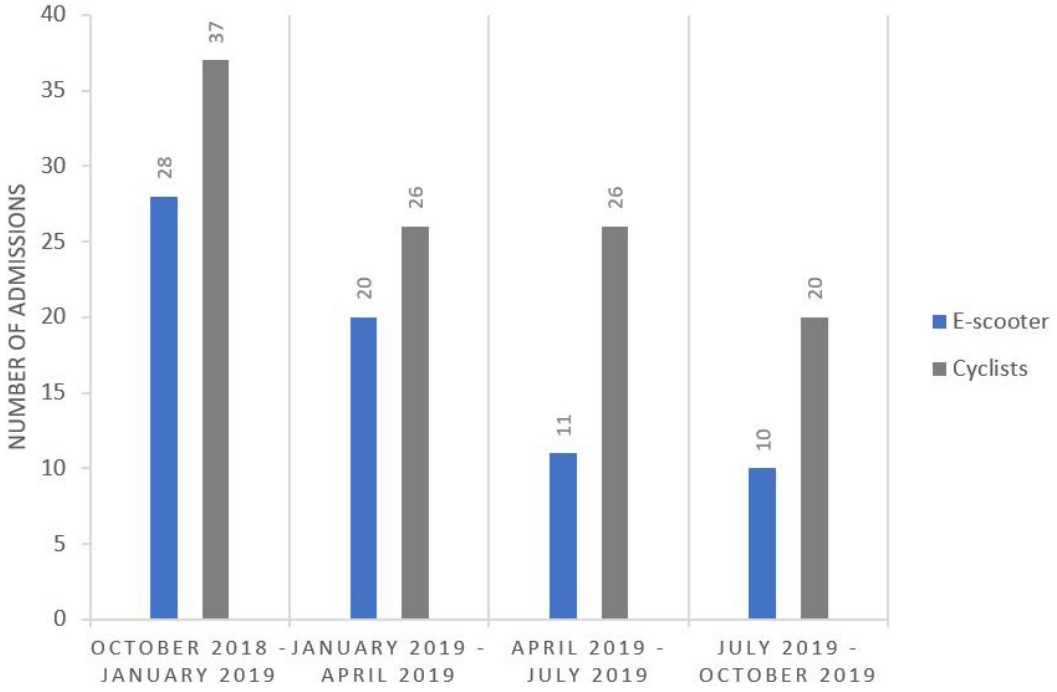

Table 3: Injury severity and inpatient care by group.

	E-scooter (%)	Cyclists (%)	p-value
Injury severity score			0.097
Median	5	9	
IQR	5	8	
Trauma and injury severity score			0.130
Median	0.994	0.994	
IQR	0.012	0.026	
Length of ward stay			0.556
Median	3	3	
ICU admission			0.296
Number of admissions	2 (2.9%)	7 (6.4%)	
Number of deaths			0.846
Fatality	1 (1.4%)	2 (1.8%)	
Number of operations			0.074
Operation	43 (62.3%)	53 (48.6%)	

Hospitalisation trend

As seen in Figure 2, the study period was divided into four quarters. A decreasing number of admissions in both groups was seen over the study period.

Hospitalisation rate

The hospital-admission rate for e-scooter accidents during the study period was calculated as 326 hospitalisations per million hours spent on an e-scooter and 115.5 hospitalisations per million e-scooter trips. This was calculated using data provided by Auckland Transport (1,674,575 shared-use e-scooter trips recorded during the study period, with an average trip length of 455 seconds).[7,8] Unfortunately, similar data were not available for the cyclists, so we were unable to calculate the hospitalisation rate for cyclists.

Discussion

E-scooters are a cheap and environmentally friendly way to travel short distances in cities. However, the high reported crash rates and the absence of relevant transport laws, have raised major concerns for the safety of the general public. Although the majority of the e-scooter injuries are treated and discharged from ED, patients admitted for e-scooter injuries add a burden to our public health system.[9] Becker et al estimated that, following the introduction of a shared e-scooter system to Auckland, the cost of the first seven months was approximately $1,303,155.[5]

The hospitalisation rate for e-scooter injuries was calculated as 326 hospitalisations per million hours spent on an e-scooter and 115.5 hospitalisations per million e-scooter trips. Tin et al found that, for cyclists in the Northland–Auckland region between 2003 and 2007, the hospitalisation rate was 78 per million hours spent cycling.[10] This comparison suggests a greater than four-fold higher risk of injury from e-scooters in the Auckland region. Only two additional studies were identified that reported a hospitalisation rate with a trip denominator for cyclists. Teschke et al reported a hospitalisation rate of 6.22 per million trips for cyclists in Canada, and Blaizot et al reported a rate of 4.43 per million trips for cyclists in France.[11,12]

Studies published locally and around the world have consistently found a lack of protective gear in hospitalised e-scooter patients.[3,13–15] This study supports these findings, with only 10.1% of the patients found to have been wearing protective gear. Comparatively, 78.9% of cyclists wore protective gear. It is a legislative requirement for a cyclist in New Zealand to wear a helmet—a requirement that is supported by literature that show wearing a helmet significantly reduces the severity of injuries.[16,17] Although no study to date has looked at the use of protective gear and its impact on injury severity in e-scooters, it is conceivable the results would mirror the reduction in severity seen in injuries sustained while cycling. This is especially pertinent given craniofacial injuries are common in e-scooter accidents and carry significant morbidity.[15]

The blood alcohol levels of patients admitted to ACH are only routinely tested if a trauma call is activated. Otherwise, blood alcohol levels are tested at the discretion of the treating physician. Less than half of patients admitted in both groups were tested for blood alcohol, which has likely resulted in an underrepresentation of the true percentage of alcohol-related injuries in the data. Despite this, there were almost twice as many alcohol related injuries in the e-scooter group. The association between e-scooter injuries and alcohol has been seen in national and international studies, and this association may in part account for the high hospitalisation rate.[3,14] Toxicology results were not examined, but illicit drugs may be a factor leading to injury. Kobayashi et al found positive urine toxicology in 31% of their US e-scooter cohort.[18]

E-scooter injuries were more likely to happen between the hours of 5pm and 8am, whereas cyclists were more likely to be injured between 8am and 5pm. Variation by weekday was not examined in our study; however, a peak in the time of injury—5pm on Friday to Sunday night—was noted by Vernon et al.[19] This peak in presentations, at a time when ED is already busy, may place additional strain on the hospital. Given the novelty of e-scooters in Auckland, e-scooters are likely more often used for recreation than for commuting, and vice versa in the comparison group.

The lack of protective gear and higher positive blood ethanol rates in e-scooter riders was not reflected in a higher ISS or TRISS on comparison, as would be expected. This is possibly due to the significant difference in mechanism of injury between the two groups, with more isolated falls in e-scooter riders and more collisions in cyclists. Collisions, compared with isolated falls, are associated with an increased blunt force and injury severity and, in this study, were predominantly cyclists traveling at high speeds.[20] The over representation of isolated falls is possibly due to the inexperience of e-scooter riders and the influence of alcohol. A study from the Austin Public Health Department after the introduction of a shared e-scooter system found that 33% of people in their study group were injured on their first time riding an e-scooter.[21] The trend of decreasing admission rates over the study period is expected and coincides with the change of season from summer to winter.[22] The decrease in admissions in the e-scooter group may in part be due to people gaining more experience and, subsequently, becoming less prone to injury. However, this will need further investigation.

The limitations of this study include the inability to directly compare the hospitalisation rate between the two groups, because a cyclist group denominator (million hours spent or number of trips on a bicycle) could not be collected. Tin et al's study used to provide a comparison hospitalisation rate for cyclist sets only an estimate of the current injury rate per million hours spent cycling. It studied Auckland and Northland together and the data was gathered between 2003 and 2007. Between 2015 and 2018, Auckland City Council invested $200 million in cycle lanes and road safety campaigns, which likely resulted in a lower injury rate than previously reported.[23]

ACH is one of the four hospitals servicing Auckland City. The hospital covers the central business district and almost all areas where e-scooters were available for public use. However, patients presenting to the other Auckland hospitals are not captured in the data. Therefore, this study likely underestimates the hospitalisation rate, as the data only includes injured patients presenting to ACH. Auckland's paediatric hospital was not included in this study, because e-scooters are prohibited for use by persons under the age of 18. Despite this, paediatric injuries should be investigated in the future because paediatric injuries have been observed in areas with similar prohibitions.[24] This study only evaluates patients admitted with an injury while operating an e-scooter and does not include non-rider injuries. Blomberg et al found 17% of patients presenting to hospital with an e-scooter related injury were non-riders. This group, who were often elderly patients sustaining moderate to severe injuries, are not captured in this dataset.[25]

In conclusion, this study demonstrates a concerningly high e-scooter-related hospitalisation rate, compared to the hospitalisation rate for cyclists. The high hospitalisation rate found in this study suggests e-scooter transport is currently not as safe as cycling. Shared e-scooter systems are becoming commonplace in many cities across New Zealand, and therefore investigation is required to understand this difference. Strategies to improve e-scooter safety are needed and could include zero tolerance for alcohol consumption, laws regarding protective gear, restrictions on using e-scooters after 5pm and changes in road laws.

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Nil.

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Multidisciplinary Pigmented Lesion Clinic at Auckland District Health Board: impacts on melanoma diagnosis and treatment outcomes

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ABSTRACT

AIM: To investigate the outcomes and effect of a multidisciplinary 'see and treat' pigmented lesion clinic, run jointly by dermatology and general surgery, on the diagnosis and treatment of melanoma at Auckland District Health Board (DHB).

METHOD: All patients attending the newly established Pigmented Lesion Clinic (PLC) between 1 March 2019 and 31 August 2019 were included in the study. They were compared against a retrospective cohort of patients seen for suspected or biopsy-proven melanomas during the same corresponding period in 2016.

RESULTS: 251 new patients attended the PLC, compared to 148 new patients seen at Auckland DHB in 2016. There was a significant reduction in proportion of pigmented lesions requiring biopsy (35.2% vs 64.3%, p<0.001), with a benign-to-malignant ratio of 2.4:1. Fifty-three melanomas were treated through the PLC, with a significant reduction in mean waiting time from referral to first specialist assessment (22.6 vs 35.1 days, p=0.038), and from referral to wide local excision (50.6 vs 99.1 days, p<0.001). 86.5% of patients received full skin check, from which additional skin malignancies were detected in 1-per-5.3 patients.

CONCLUSION: The novel PLC model has led to reduction in unnecessary excisional biopsies of benign pigmented lesions, while streamlining and improving timely access to specialist review and surgical treatment for patients with melanomas.

Australasia has the highest rates of melanoma worldwide.[1] In New Zealand, melanoma is the fourth most common cancer and sixth most common cancer resulting in death.[2] In 2016, there were 216 cases of malignant melanomas diagnosed within Auckland District Health Board (DHB), which is an increase from 164 in 2014.[2] Importantly, this does not capture in-situ melanomas, which have an incidence almost equal to that of invasive melanomas.[3] As melanoma survival is strongly linked to its thickness and depth of invasion, morbidity and mortality can be reduced by both earlier and improved accuracy of diagnosis and improved access to specialist treatment.[4] Confronted with increasing demands, the optimal model of healthcare delivery must be one that is efficient, cost effective and which provides patients with timely treatment.

In Auckland DHB prior to 2018, there were varied care pathways for patients referred for pigmented lesions suspected of being melanomas. Those referred to dermatology attended a first specialist assessment (FSA) with a dermatologist and, if necessary, returned for a second appointment for an excisional biopsy. If the lesion were proven

to be a melanoma, these patients would return for a third appointment for wide local excision (WLE). A select group were also required to wait for an additional FSA with general surgery to discuss sentinel lymph node biopsy (SNB). Alternatively, patients were referred directly to general surgery and progressed through a similar step-wise process of multiple waiting lists and appointments, which added to delays in their diagnosis and treatment. Whichever specialty the patients attended was at the discretion of their referrer.

In 2018, dermatology and general surgery pooled their resources together to establish a novel multidisciplinary Pigmented Lesion Clinic (PLC) at Auckland DHB - the only one of its kind in New Zealand. The PLC is modelled on a 'see and treat' service, where patients referred for a suspected melanoma attend their FSA with dermatology and/or general surgery, and are offered excisional biopsy at the same appointment. Full skin checks are performed on this high-risk population, which is further complemented by support and education provided by a clinical nurse specialist. If required, patients return to the same clinic to discuss SNB. Otherwise, those with confirmed melanomas proceed directly to WLE. Thus, the treatment of melanomas is streamlined to as few as two appointments.

Similar models have been employed overseas for both pigmented lesions and non-melanoma skin cancers, with enhanced outcomes across multiple facets, including patient satisfaction, waiting time, tumour thickness and overall survival.[5–7] We hypothesise that the multidisciplinary PLC will unify the treatment of melanoma within Auckland DHB into one service that enhances timely access to specialist assessment, accuracy of diagnosis and overall quality of care.

Method

All patients who attended the PLC between 1 March 2019 and 31 August 2019, for either suspected primary melanomas or further management of biopsy-proven melanomas, were included in the study. Both melanoma in-situ and malignant melanomas were analysed. Clinical records were reviewed to collect demographic, clinical and histopathological information. This included waiting times from referral through to wide local excision, performance of full skin check, delivery of skin cancer prevention education, clinical and histological diagnosis, benign-to-malignant ratio and Breslow thickness.

To assess the impact of PLC on melanoma diagnosis and treatment outcomes, a retrospective review of patients referred for suspected primary melanomas or further management of biopsy-proven melanomas in 2016 was performed to serve as comparison. Specifically, the same parameters were collected from clinical records of these patients referred to either dermatology or general surgery at Auckland DHB during the corresponding time period of 1 March 2016 to 31 August 2016.

Statistical analysis was performed using SPSS version 22. Chi-square analyses were used to test for significant differences in categorical variables. One-way ANOVA was used to demonstrate significant difference in mean waiting times. A p-value of <0.05 was considered statistically significant.

Institutional approval was granted by the Auckland DHB Research Review Committee (A+ 8431).

Results

In total, 251 patients attended the PLC for their FSA between 1 March and 31 August 2019. By comparison, 148 patients were referred for FSA with either dermatology or general surgery for suspected or biopsy-proven melanomas during the corresponding period in 2016.

Demographic variables are presented in Table 1. There were no significant differences between the PLC and retrospective cohort in regards to gender (43.8% male vs 48.6% male) and mean age (57.4 years vs 56.7 years). The majority of patients were of European descent (77.2% vs 80.4%).

Patients attending the PLC were referred for 278 pigmented lesions (range 1–4), compared to 157 (range 1–4) in 2016. General practitioners (GPs) were the main referral source (95.7% vs 98.7%). Suspected melanomas accounted for the majority of referral indication (85.6% vs 96.2%), with an increase in patients referred for further management of pigmented lesions already biopsied by their GPs (14.4% vs 3.8%).

Treatment outcomes for the retrospective cohort in 2016, stratified by specialty, are presented in Table 2. Depending on whether patients were referred to dermatology or general surgery, there were significant differences in the mean waiting time to attend FSA (37 days vs 26 days, p=0.002), the proportion of pigmented lesions that required biopsy (48.4% vs 88.7%, p<0.001) and the number of patients who received full skin checks (80.4% vs 3.6%, p<0.001). The benign-to-malignant ratios were 1.6:1 and 3.2:1 for dermatology and general surgery, respectively.

A comparison of clinical and histological information between patients attending PLC and patients in 2016 is presented in Table 3. The PLC had a significantly reduced mean waiting time from referral to attending FSA (20 days vs 34 days, p<0.001) and from referral to biopsy where needed (36 days vs 57 days, p<0.001). The proportion of pigmented lesions biopsied at the same appointment as FSA increased (70.4% vs 6.9%, p<0.001), while the proportion of lesions requiring biopsy significantly reduced (35.2% vs 64.3%, p<0.001). The benign-to-malignant ratios were 2.4:1 and

Table 1: Demographics of patients with suspected or biopsy-proven melanomas referred to Auckland DHB in 2016 and 2019.

		2016 (n=148)		2019 (n=251)	
Gender	Male, n (%)	72	(48.6%)	110	(43.8%)
	Female, n (%)	76	(51.4%)	141	(56.2%)
Age	Mean (years)	56.7		57.4	
	Range (years)	16–91		17–97	
Ethnicity	NZ European, n (%)	110	(74.3%)	157	(62.5%)
	Other European, n (%)	9	(6.1%)	37	(14.7%)
	Māori, n (%)	6	(4.1%)	12	(4.8%)
	Pacific Islander, n (%)	8	(5.4%)	8	(3.2%)
	Asian, n (%)	10	(6.8%)	29	(11.6%)
	Other, n (%)	5	(3.4%)	8	(3.2%)

Table 2: Treatment outcomes for patients with suspected or biopsy-proven melanomas referred to dermatology (92 patients with 95 lesions) and general surgery (56 patients with 62 lesions) at Auckland DHB in 2016.

		Dermatology		General surgery		
Waiting time (referral to FSA)	Mean (days)	37		26		p=0.002
	Median (days)	33		21		
Lesion biopsied	Yes, n (%)	46	(48.4%)	55	(88.7%)	p<0.001
	No, n (%)	49	(51.6%)	1	(1.6%)	
Histology	Benign, n (%)	28	(60.9%)	42	(76.3%)	p=0.093
	Malignant, n (%)	18	(39.1%)	13	(23.7%)	
Full skin check	Yes, n (%)	74	(80.4%)	2	(3.6%)	p<0.001
	No/decline, n (%)	18	(19.6%)	54	(96.4%)	

2.3:1 for patients who attended PLC and patients in 2016, respectively.

There was an increase in the proportion of patients receiving full skin checks in the PLC (86.5% vs 51.4%, p<0.001), from which it was found that 1-in-5.3 patients had additional skin malignancies. Skin cancer prevention and self-skin examination education was imparted by the clinical nurse specialist to 51 patients.

There were 53 melanomas treated through the PLC, compared to 28 during the same time period in 2016 (Table 4). They were similar in gender (52.8% male vs 50% male), mean age (63.5 years and 64.9 years) and proportion of in-situ melanomas (47.2% vs 46.4%). Of the invasive melanomas, no significant difference was noted in mean Breslow thickness (0.96mm vs 0.93mm). The PLC had significantly shortened mean waiting times from referral to attending FSA (22.6 days vs 35.1 days, p=0.038), from FSA to excisional biopsy (2.2 days vs 21.3 days, p<0.001) and from referral to completion of treatment (50.6 days vs 99.1 days, p<0.001).

Notably, 35 of the melanomas treated through the PLC were referred with biopsy results available, which is an increase from 6 in 2016. These were excluded from our analysis of the waiting time between referral and biopsy. There was a significant difference in mean waiting time from referral to completion of treatment for melanomas referred with biopsy results available, compared to those that were referred for clinical assessment (59.9 days vs 38.3 days, p<0.001). Both remained significantly shorter than the corresponding 99.1 days in 2016.

Table 3: Features of care pathway and histology of patients referred with suspected or biopsy-proven melanomas in 2016 and PLC.

		2016		Pigmented Lesion Clinic		
Referrer	GP, n (%)	155	(98.7%)	266	(95.7%)	p=0.084
	Other, n (%)	2	(1.3%)	12	(4.3%)	
Referral reason	Suspected MM/MIS	151	(96.2%)	238	(85.6%)	p=0.005
	Biopsied MM/MIS	6	(3.8%)	35	(12.6%)	
	Biopsied atypical naevi	0	(0%)	5	(1.8%)	
Waiting time (referral to FSA)	Mean (days)	34		20		p<0.001
	Median (days)	26		15		
Waiting time (referral to biopsy)	Mean (days)	57		36		p<0.001
	Median (days)	47		20		
Lesion biopsied	Yes, n (%)	101	(64.3%)	98	(35.2%)	p<0.001
	No, n (%)	50	(31.8%)	140	(50.4%)	
Biopsy timing	Same day, n (%)	7	(6.9%)	69	(70.4%)	p<0.001
	Post-clinic, n (%)	94	(93.1%)	29	(29.6%)	
Histology	Benign, n (%)	70	(69.3%)	69	(70.4%)	p=0.611
	Malignant, n (%)	31	(30.7%)	29	(29.6%)	
Full skin check	Yes, n (%)	76	(51.4%)	217	(86.5%)	p<0.001
	No/decline, n (%)	72	(48.6%)	34	(13.5%)	

MM: malignant melanoma; MIS: melanoma in-situ.

Discussion

In this study, the PLC at Auckland DHB has been shown to enhance the diagnosis and treatment of melanomas on multiple fronts. Importantly, the retrospective analysis has highlighted a disparity in care that was previously provided to patients with pigmented lesions, depending on the specialty they had been referred to. By establishing a multidisciplinary clinic run jointly by dermatology and general surgery, Auckland DHB unified the melanoma patient pathway to ensure there is a single and equitable cancer pathway for all Auckland DHB melanoma patients.

Of the 238 lesions referred by GPs to the PLC as suspected melanomas, only 35.2% proceeded to an excisional biopsy. This proportion is further reduced from 2016, when 48.4% of suspicious pigmented lesions reviewed by dermatologists, and 88.7% reviewed by general surgeons, required an excisional biopsy. These figures highlight not only the enhanced diagnostic accuracy of the PLC, but also the important role a dermatologist plays in the diagnosis of pigmented lesions to minimise unnecessary surgery. Previously published rates of concordance in clinical diagnoses between GPs and dermatologists have varied between 42% and 54%.[8,9] The lower concordance seen through PLC may be accounted for by a heightened index of suspicion from GPs given the high incidence of melanoma in New Zealand, which contrasts against the trained use of dermatoscopy by the supervising dermatologists with whom the general surgeons can collaborate—dermatoscopy being an

Table 4: Clinical and histologic features of melanomas referred to Auckland DHB in 2016 and 2019.

		2016 (n=28)		Pigmented Lesion Clinic (n=53)		
Gender	Male, n (%)	14	(50%)	28	(52.8%)	
	Female, n (%)	14	(50%)	25	(47.2%)	
Age	Mean (years)	64.9		63.5		
	Median (years)	63		66		
Site	Head/neck	5	(17.9%)	12	(22.6%)	
	Chest/abdomen	2	(7.1%)	4	(7.5%)	
	Back	9	(32.1)	13	(24.5%)	
	Upper limb	3	(10.7%)	11	(20.8%)	
	Lower limb	9	(32.1%)	13	(24.5%)	
Histology	Malignant melanoma	15	(53.6%)	28	(52.8%)	
	Melanoma in-situ	13	(46.4%)	25	(47.2%)	
Breslow thickness	Mean (mm)	0.93		0.96		p=0.94
	Median (mm)	0.60		0.55		
Waiting time (referral to clinic)	Mean (days)	35.1		22.6		p=0.038
	Median (days)	25.0		16.0		
Waiting time (clinic to biopsy)	Mean (days)	21.3		2.2		p<0.001
	Median (days)	21.5		0.0		
Waiting time (referral to WLE)	Mean (days)	99.1		50.6		p<0.001
	Median (days)	97.0		41.0		

invaluable tool in correctly separating melanomas from benign pigmented lesions.[10]

The diagnostic accuracy of the PLC is further evidenced by the benign-to-malignant ratio of 2.4:1. This compares very favourably to internationally published figures, which range from 4 to 14 for dermatologists and 20 to 40 for GPs.[11] Maintaining a similar benign-to-malignant ratio from 2016 (2.3:1) through to PLC, while reducing the proportion of lesions being biopsied, represents the striking of an ideal balance between performing too many unnecessary biopsies and performing too few biopsies at the risk of missing a melanoma. To mitigate the risk of the latter, the PLC allows for clinical follow-up of patients to monitor for evolution or stability, if it is required, and provides all discharged patients with information regarding self-skin examination, and that any changing pigmented lesion warrants a further review with their GP. The reduction in unnecessary surgery improves the efficiency of the service and makes available otherwise expended resources, such as surgical appointments, to enable faster access to WLE for patients with confirmed melanomas. Ultimately, this translates into reduced patient morbidity and reduced resource wastage while achieving both time and monetary cost savings.

Establishment of the PLC and its 'see and treat' model has led to significant reductions in waiting time for patients to attend their FSA, to undergo excisional biopsy when there is clinical suspicion and to complete treatment with WLE when melanoma is confirmed. Rapid-access clinics dedicated to pigmented lesions in England and Ireland have similarly led to a reduction in treatment times and consequent reductions in tumour thickness and improved overall survival, though this was not observed in our study.[5,12] In a New Zealand context, delivery of a see-and-treat clinic for skin lesions was first described by McGeoch et al as a coordinated service between GPs and plastic surgeons in Canterbury.[13] This, and data from overseas see-and-treat clinics for non-melanoma skin cancers, have also reported reduced waiting times, as well as an enhanced perception of convenience and overall satisfaction.[6,7] The benefits of the timely access to FSA and treatment are further compounded by enhanced compliance to the Ministry of Health's 62-day target for faster cancer treatment.[14] Whereas this target stipulates initiation of treatment within 62 days of receiving a high suspicion of cancer referral, patients treated through PLC had initiation of their treatment (WLE) on average 50.6 days after the referral date. For melanoma in-situ and early stage invasive melanomas not requiring adjuvant immunotherapy or radiation therapy, surgical excision (WLE) also represents completion of their treatment.

The advantages of the PLC model are not limited to enhanced diagnostic accuracy and timely access to treatment. The multidisciplinary model allows inter-specialty collaboration, which has led to improved outcomes in other tumour streams.[15,16] Collaboration between dermatology and general surgery allows all patients to have ready access to services provided by general surgery, including surgery under general anaesthetics where required and SNB, without having to undergo previous external referral pathways. There were too few patients requiring SNB in the retrospective cohort to produce meaningful comparison. The clinical nurse specialist plays a key role in patient education, as well as being the point of contact and breaking bad news. The incorporation of a full skin exam as a standard of care has led to initiation of treatment for otherwise undetected skin malignancies in approximately one out of five patients. The importance of total body examination, rather than focusing only on the referred index lesion, has been highlighted previously by a UK study of over 1,800 patients, in which over one third of melanomas are detected as incidental lesions when the patient was referred for a separate and often benign lesion.[17]

Notably, 28 invasive melanomas over a six month period represent a small proportion of melanomas occurring within Auckland DHB. In 2016, there were 216 new melanomas reported within the same geographic area. Correspondingly, an Australian study has previously shown that only 20% of melanoma patients are reviewed by dermatologists, with a significant proportion treated by combination of GPs and surgeons.[18] The PLC thus appears to be

under-utilised. Increased awareness of the PLC among GPs may increase patient access to this publicly funded service.

In summary, a multidisciplinary approach between dermatology and general surgery, which incorporates dermatoscopic assessment of pigmented lesions, has led to enhanced diagnostic accuracy and a reduction in unnecessary surgeries. The development of a single pathway within Auckland DHB, combined with a see-and-treat approach, has led to significant reductions in waiting times for FSA, excisional biopsies and WLE. Other secondary and tertiary centres in New Zealand may also consider adopting this novel model of care, shown here to enhance multiple facets of melanoma diagnosis and treatment outcomes.

Competing interests:
Nil.

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Attitudes towards and use of cannabis in New Zealand patients with inflammatory bowel disease: an exploratory study

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ABSTRACT

INTRODUCTION: Inflammatory bowel disease (IBD) includes a group of chronic diseases of the gastro-intestinal tract, such as Crohn's disease (CD) and ulcerative colitis (UC). Although there is currently no evidence supporting a disease-modifying effect of cannabis on IBD, there are plausible biological mechanisms by which it could improve symptoms. Currently in New Zealand, cannabis is not an ap-proved medication for IBD, and there is little research assessing whether people are using cannabis to try and manage their IBD.

AIMS: We aimed to assess the use of and attitudes towards cannabis use (medicinal and recreational) by people with IBD in New Zealand.

METHODS: People with IBD were invited to complete an anonymous online questionnaire. Participants were recruited via postal mail using a hospital database of patients with IBD (developed by the Gas-troenterology Department at Dunedin Public Hospital) and via online recruitment (advertised on the Crohn's and Colitis New Zealand website, Facebook page and e-mail list). Inclusion criteria were ages 18+ and self-reported confirmed IBD diagnosis.

RESULTS: In total, 378 participants completed the questionnaire, with 334 eligible responses. Partici-pants were predominantly New Zealand European (84%) and female (71%). Sixty-one percent of re-spondents had CD and 34% UC. Overall, 51% of respondents reported having ever used cannabis. Of those, 63% reported use as recreational and 31% for reduction of IBD symptoms. Users were more likely to be younger (on average by 6.4 years), with on-going symptoms, unemployed or self-employed and current or ex-smokers. There were no differences by disease status or severity. Symp-toms most reported as improved by cannabis use were abdominal pain/cramping, nausea/vomiting and loss of appetite. Fifty-four percent of participants reported that if cannabis were legal, they would request it for medicinal use to help manage their symptoms.

CONCLUSIONS: Overall, our research aligns with previous observational research that reports im-provements in symptoms of IBD with cannabis use. Studies of a higher evidence level (eg, RCTs) would be needed to guide prescribing. In the meantime, this research provides useful background to clini-cians about patients' views and experiences.

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Inflammatory bowel disease (IBD) includes Crohn's disease (CD) and ulcerative colitis (UC), two chronic diseases of the gastrointestinal system. They are thought to be caused by a combination of genetic predisposition, environmental triggers and immune responses that culminate in a poorly controlled inflammatory response.[1] Patients typically experience flare-ups followed by symptom-free periods. The most common symptoms include diarrhoea, fatigue and abdominal pain.[2] Quality of life is reduced in patients with IBD compared to controls.[3] Improved insights into the pathogenesis of IBD[4] have led to the development of new medical therapies. Current therapies include aminosalicylates, antibiotics, corticosteroids, immunomodulators and biologic medications. Despite treatment, many patients continue to experience symptoms or adverse effects as a result of taking these medications.[5] Hence patients may seek alternative treatments to manage their symptoms, and some have identified cannabis as an option.[5]

Cannabis is the most widely used illegal drug in New Zealand and worldwide.[6] A 2012/2013 survey reported that 42% of New Zealand adults aged 15 and over used cannabis at some point in their lifetime and 11% used cannabis over the previous 12 months.[7] Forty two percent of those who used cannabis reported that their use in the previous year was for medicinal purposes.[7] Currently, Sativex (a combination of cannabidiol and tetrahydrocannabinol) (GW Pharmaceuticals) and cannabidiol (CBD) products (defined as >98% CBD and containing no other controlled drug or active ingredient)[8] can be prescribed in New Zealand, with certain restrictions.[9,10] There is an increasing interest in cannabinoids as an alternative medicinal resource for patients with chronic disease.[11]

Large-scale observational studies based in the US showed that patients with IBD were more likely to have tried cannabis than controls,[12] and that many were using medicinal and/or recreational cannabis for symptom management.[13] A plausible biological mechanism by which cannabis could be beneficial for those with IBD is the body's endocannabinoid system. Both endogenous and exogenous cannabinoids have been shown to interact with receptors in the gastrointestinal tract that are involved in regulating motility, secretions and inflammation.[14–18]

However, randomised controlled trial (RCT) evidence on the efficacy of cannabinoid products in IBD is limited. Several small RCTs reported no significant difference in remission rates between intervention and control groups,[19–21] although a significant improvement in pain and appetite with THC-containing cigarettes in patients with CD was noted in one study,[19] and an improvement in patient-reported quality of life with CBD extract was reported in a multi-centre RCT of UC patients.[21] Overall, these RCTs have included small numbers of participants and used different formulations of cannabis, different types of IBD and different concentrations of active components, which makes comparisons difficult. Recent Cochrane reviews concluded that there was insufficient evidence that cannabis and cannabinoids were either efficacious or safe for treating UC or CD.[22,23]

There are unanswered questions regarding how many patients with IBD in New Zealand are using cannabis, and how effective they consider cannabis to be. Our anonymous survey aimed to investigate the attitudes towards, use of and perceived effects of medicinal cannabinoids by people with IBD. This should help inform the upcoming referendum regarding the legalisation of cannabis for personal use in New Zealand[24], by providing perspectives from patients with IBD. Our study will also be of interest to New Zealand clinicians who may be in a position to prescribe cannabinoid products to patients with IBD in the future.

Methods

Approval for this study was obtained from the University of Otago Human Ethics Committee (Health) (reference H20/017). Māori consultation was undertaken with the Ngāi Tahu Research Consultation Committee as part of the research ethics process.

Population

The source population was self-reported adult (18 years and older) New Zealand patients with a confirmed IBD diagnosis. Data were collected between 7–19 February 2020 using an anonymous online questionnaire through the LimeSurvey platform. The survey was advertised using(a) invita-

tions mailed to 444 known patients with IBD (identified via the Southern District Health Board (SDHB) gastroenterology department database) and (b) via the online advertising of the patient support organisation Crohn's and Colitis New Zealand (CCNZ). Specifically, we advertised the study via the CCNZ website, Facebook page and email list. Informed consent was obtained before the completion of the online questionnaire.

The survey was unintentionally shared on a New Zealand medicinal cannabis awareness Facebook group, but it was removed from there within 24 hours. Due to questions on participants' district health boards (DHBs) and types of survey invitation (mailed or online), we were able to identify known patients with IBD from the Dunedin database (the 'SDHB Letter Group'), and hence we could compare their responses with the rest of the sample. Further details regarding this analysis are found in Appendix Figure 1.

Analysis

Once the survey closed on the 19 February 2020, the data were exported from the LimeSurvey platform to a Microsoft Excel datasheet. Ineligible responses were removed: those that did not meet or did not answer questions about inclusion criteria (ie, they were younger than 18 or did not have a confirmed diagnosis of IBD). The analysis was done using Microsoft Excel and Stata. To investigate whether there were any differences between the SDHB Letter Group responses and other responses on cannabis use, reported symptom relief from cannabis use or intention to use cannabis if it was legalised, these groups were compared using Chi-squared tests. Chi-squared tests were also used to test for differences in proportions between the categorical variables of interest. Where there were concerns about the distribution assumptions Fisher's exact test was used. Independent samples t-tests were used to compare the average age of cannabis users to non-users.

Results

In total, there were 378 participants recruited over a 12-day period. Among those, 89% (334) were included in the analysis. Of these 334, 87 identified as residing in the SDHB region and were recruited via postal mail. Hence the response rate among in the 444 who were mailed invitations was 19.6% (87/444). Comparative analyses with that group of 87 confirmed that there was likely no contamination of the results from those taking part via other social media sources. In particular, there was no evidence of differences in cannabis use, reported symptom relief from cannabis use or intention to use cannabis if it was legal. Therefore, it was considered reasonable to use data from the whole group (n=334) for the analysis. Demographic characteristics of the responders are shown in Table 1.

Participants were predominantly New Zealand European (84%) and female (71%). Sixty-one percent (192) had Crohn's Disease, and 34% (108) had ulcerative colitis. Twenty-seven percent of respondents reported their disease as mild, 34% as moderate, 13% as severe and 26% as in remission. Thirty-seven percent reported a mild impact on their lives, 43% a moderate impact, 14% a severe impact and 6% no impact.

The most prevalent reported symptoms from the previous six months were tiredness and fatigue (82%), abdominal pain and cramps (74%), urgency (63%) and frequent diarrhoea (54%). Other symptoms included nausea and vomiting (45%), loss of appetite (40%) and fevers (21%).

Cannabis use

Fifty-one percent of respondents (160 people) reported having ever used cannabis. Forty-nine percent of those with CD and 52% of those with UC reported prior use (Pearson $Chi^2(2)=1.18$, P=0.55, Fisher's exact p-value=0.10). There was no evidence of a difference in the proportion of males who had used cannabis (57%) compared to females (48%) (P=0.15). Those who had used cannabis were, on average, 6.4 years younger than those who had not (95% CI 3.1 to 9.7, P=0.0002). Although use was higher among Māori participants (60%) than New Zealand Europeans (50%), there was no evidence of a statistical difference (Fisher's exact p-value=0.86).

There was evidence of a difference in cannabis used by smoking status. In current smokers, the use of cannabis was higher (81%) than those who were ex-smokers (63%) or never smokers (36%) (Pearson $Chi^2(3)=36.0$, P<0.005, Fisher's exact p-value<0.001). There was also evidence that those who drank alcohol had higher

Table 1: Demographics of respondents.

Characteristic	% (number)
Gender	
Female	71.3 (238)
Male	27.8 (93)
Other	0.6 (2)
Did not answer	0.3 (1)
Age	
18–19	2.4 (8)
20–29	20.1 (67)
30–39	24.9 (83)
40–49	21.9 (73)
50–59	14.7 (49)
60–69	10.5 (35)
>70	5.7 (19)
Ethnicity	
NZ European	83.8 (280)
Māori	6.3 (21)
Pacific	0.6 (2)
Asian	0.9 (3)
Middle Eastern/Latin American/African	1.2 (4)
Other	6.9 (23)
Education level	
High school	22.8 (76)
Tertiary (university)	47.3 (158)
Tertiary (other)	26.1 (87)
No formal qualification	2.7 (9)
Did not answer	1.2 (4)

cannabis use (57%) than those who did not drink (45%) (Pearson $Chi^2(2)=9.45$, P=0.0009, Fisher's exact p-value=0.005).

Cannabis use was highest among those who were unemployed (73%), followed by the self-employed (71%), those on the benefit (55%), paid employment and students (both 50%) and retirees (9%) (Pearson $Chi^2(6)=33.7$, P<0.001, Fisher's exact p-value=0.000). There was no evidence of a difference in time since the onset of IBD between cannabis users and non-users.

Recreation was the most common reason for cannabis use (63%), and 38% reported use for social reasons. Forty-one percent of respondents reported relief of IBD symptoms with cannabis use, and 31% reported improved sleep. Other reasons for cannabis use included coping with IBD aside from symptom relief (15%), improvement in other medical conditions (13%) and being able to use less prescribed medication (12%).

The main reported route of administration for cannabis was inhaled (77%), such as joints (35%), bongs (15%), pipes (15%), vaporisers (6%) and mixed with tobacco (6%). Other routes of administration of cannabis included cooked and eaten (11%), oil capsule (7%), tincture or tea (3%) and balm (3%).

Participants mainly obtained cannabis from friends and relatives (54%) or bought it from someone else (36%). Nine percent grew their own and just 1% accessed cannabis products on prescription from a doctor.

Cannabis use in IBD

There was no evidence of a difference in having ever used cannabis for those who currently had IBD symptoms (52%) compared to those who did not (32%) (Pearson Chi2(1)=2.94, P=0.09, Fisher's exact p-value=0.10). When comparing use in those experiencing specific symptoms, use was similar across all symptoms (Table 2). Diarrhoea, loss of appetite and fatigue were the only symptoms associated with a significantly larger proportion of those experiencing these symptoms using cannabis (Table 2).

Effects of cannabis

Among those who had used cannabis, 74% of users reported an improvement in quality of life: 25% "very much improved", 26% "moderately improved" and 22% "somewhat improved".

Among those who did not use cannabis, the main reason cited was the illegality of cannabis (63%). Other reasons included believing cannabis was not good for them (28%), accessibility (26%), cost (6%) and worsening IBD symptoms (2%). Twenty-five percent reported "other" reasons for not using cannabis, which included worsening anxiety and paranoia, not wanting to risk interactions with other medications and not enjoying the feeling of being "high".

A variety of symptoms was reported to be improved by the use of cannabis by patients. The symptoms most reported as improved by cannabis use were abdominal pain/cramps (96%), loss of appetite (80%) and nausea and vomiting (79%) (Table 3). Overall, of the 66 respondents who reported using cannabis to help them deal with symptoms, 59 (89%) considered that it did help relieve symptoms, and five (8%) did not know. Specific symptoms that were affected by the use of cannabis are included in Table 3.

Attitudes

Fifty-four percent of participants reported that, if cannabis were legal, they would request it for medicinal use to manage their symptoms. A further 15% reported that they would not request cannabis, and 35% said they did not know.

A similar distribution of responses was shown for intentions regarding the upcoming referendum for the legalisation of cannabis in New Zealand. Sixty-one percent of participants reported that they would support legalisation, 17% reported they would not and 21% were unsure.

Discussion

We collected data on cannabis use and attitudes in over 300 people with IBD across New Zealand. We gained insights into their usual practices and challenges and the reasons for their behaviours, as well as self-reported quality of life and clinical implications. Overall, people reported that using cannabis improved their IBD symptoms such as abdominal pain and cramping, nausea and vomiting and loss of appetite. Along with the effect on the specific symptoms, many respondents felt better able to cope with their diagnosis, an important and perhaps under-acknowledged aspect of living with a chronic condition.

In our survey, the IBD community reported a higher rate of having ever used cannabis (51%) than the general population in 2012/2013 (42%).[7] Among our survey respondents who had ever used cannabis, 41% reported they used it to reduce their IBD symptoms, and 74% reported that it improved their quality of life to some degree. This is consistent with existing New Zealand data that showed that 42% of those who used cannabis did so for medicinal purposes.[7] For abdominal pain and cramps, the symptom for which there is perhaps the most clear explanation for an effect of cannabis, 96% of users considered cannabis either "very effective" or "moderately effective" for relief.

Recent Cochrane reviews have found insufficient evidence that cannabis and cannabinoids are either efficacious or safe for treating UC or CD.[22,23] Although there is an absence of clear evidence from randomised controlled trials (RCTs) to say whether cannabis therapy is safe or effective, our observational study provides useful background for prescribers on patients' experiences and views. In the absence of sufficient RCT data, it is premature to say how our results might relate to the future legislative framework for medicinal cannabis use in New Zealand. At the moment, there is not enough evidence to comment, and there is a need for RCTs to assess efficacy and adverse effects.

To our knowledge, this is the first study of its kind in New Zealand. This is timely given the upcoming 2020 referendum on legalising cannabis for personal use in New Zealand, and this study offers a step towards further study. Our findings also provide information for prescribers on patients' current usage of cannabis products and their experiences in relation to their disease and symptoms. It cannot, however, comment on the safety or efficacy of cannabis in this population.

Strengths of this study included a good number of responses, with 334 eligible responses over the 12 days the survey was open. Another strength was the participation from respondents around New Zealand, not just the SDHB. However, the likelihood of people responding may have been biased by what they perceived the benefits of cannabis products to be. For example, people who support cannabis legalisation and have ever used cannabis may have been more motivated to take part than those who had never used cannabis.

One limitation was the self-selection aspect in the study design, although this was important for recruitment of the participants. As discussed above, because the link for the survey was open, it was shared to a

Table 2: Use of cannabis in the last six months by IBD symptom.

Symptoms	Ever used cannabis, percentage (number)	Never used cannabis, percentage (number)	Fisher's exact p-value
Abdominal pain/ cramps	53.0 (123)	47.0 (109)	0.16
Frequent diarrhoea	58.7 (101)	41.3 (71)	0.002
Urgency	55.3 (110)	44.7 (89)	0.36
Fevers	57.8 (37)	42.2 (27)	0.21
Loss of appetite	58.3 (74)	41.7 (53)	0.03
Nausea and vomiting	55.2 (79)	44.8 (64)	0.14
Tiredness/fatigue	53.4 (140)	46.6 (112)	0.04
Other	55.2 (75)	44.9 (61)	0.17

Table 3: Effects of cannabis on IBD symptoms.

Symptoms	Very effective, % (n)	Moderately effective, %(n)	Not effective at all, %(n)	I do not suffer from this symptom, %(n)	I don't know, %(n)
Abdominal pain/cramps	56.5 (39)	39.1 (27)	0.0 (0)	1.5 (1)	2.9 (2)
Frequent diarrhoea	10.3 (7)	26.5 (18)	30.9 (21)	10.3 (7)	22.1 (15)
Urgency	11.6 (8)	30.4 (21)	26.1 (18)	11.6 (8)	20.3 (14)
Fevers	11.9 (8)	19.4 (13)	10.5 (7)	32.8 (22)	25.4 (17)
Loss of appetite	46.3 (31)	34.3 (23)	3.0 (2)	13.4 (9)	3.0 (2)
Nausea/vomiting	41.2 (28)	38.2 (26)	1.5 (1)	11.8 (8)	7.4 (5)
Tiredness/ fatigue	8.7 (6)	39.1 (27)	34.8 (24)	2.9 (2)	14.5 (10)
Other (eg, joint pain, skin conditions, eye inflammation)	39. (26)	37.8 (25)	3.0 (2)	10.6 (7)	9.1 (6)

New Zealand medicinal cannabis awareness Facebook group, and it may have also been shared elsewhere, outside our original recruitment venues. Although there was no evidence of any difference with regard to their use of cannabis, perceived effect of cannabis on IBD symptoms or quality of life, some degree of bias may have been introduced to our data. The likely impact of this would be to overestimate the perceived benefits of cannabis use.

Another limitation of this study relates to cannabis itself. As with other studies looking at cannabis use, it is difficult to accurately measure dose and effect, as "botanical cannabis" preparations contain varying strengths of active ingredients. Furthermore, different methods of use may produce slightly different effects. This study is also limited by the demographics of those who participated, skewing our results towards the experiences of this group.

The legal and political context surrounding cannabis use may have influenced the response rate to this survey. While care was taken to ensure anonymity of participants, some potential participants may have been dissuaded from completing the survey due to concerns about being asked about their use of an illegal substance.

Conclusion

This study suggests that a higher proportion of those with IBD have used cannabis than the general public, and that patients report that cannabis is helpful for relieving a number of IBD symptoms, in particular abdominal pain and cramps, decreased appetite and nausea and vomiting. This is in keeping with a potential biological mechanism for the relief of these symptoms.[15–18]

Further studies with a stronger design (eg, RCTs) would be needed to comment on the efficacy and safety of cannabis in relieving IBD symptoms. In the meantime, with medicinal cannabis being topical in New Zealand currently and a common topic of patient enquiry, it is important that medical practitioners are aware of what cannabinoid products are available within New Zealand and that they can respond to relevant questions asked by their patients.

Addendum, 12 February 2021

This survey was conducted in February 2020 and the 2020 New Zealand cannabis referendum, a non-binding referendum, held on 17 October 2020, prior to this study being accepted for publication. Legalisation of cannabis use was rejected by a narrow margin with 50.7% of voters opposing legalisation and 48.4% in support. There was a lot of publicity around the topic in the months prior to the referendum.

Appendix

Appendix Figure 1: Details of validation of the sample following sharing outside of target population.

A source of potential bias was the survey link being shared to a New Zealand medicinal cannabis awareness Facebook group three days after the survey went live. The link was removed within 24 hours, when we became aware of it. Due to the anonymous nature of our study, and no time stamps on responses, it was impossible to identify and exclude any responses that might have been sourced from the page that shared our link. The survey did, however, include questions about which District Health Board (DHB) respondents were from and how they heard about the survey (via postal mail, or via CCNZ, or both). Respondents who said they were both from SDHB and had been notified of the study by a written letter were considered likely to have been recruited from the Otago IBD database, and therefore likely to have diagnosed IBD and represent our intended source population. Therefore we decided to keep the survey open for nearly two weeks as originally intended, and then to compare responses from this subset (referred to as SDHB Letter Group) with those from the remainder of the eligible responses (referred to as Remainder of Whole Group) for key questions that would be expected to display differences should there have been significant bias from a cannabis awareness group. This allowed us to assess the validity of analysing the larger dataset comprising all eligible responses to answer our study questions, compared to restricting analysis to the SHDB Letter Group.

Competing interests:
Nil.
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The 777 Planner: improving the resuscitation call experience at North Shore Hospital

Daniel Gibbons, Dushiyanthi Rasanathan, Naomi Heap, Jonathan Wallace

ABSTRACT

BACKGROUND: This is a baseline quality improvement project conducted at North Shore Hospital in Auckland, New Zealand. We designed a *777 Planner* meeting and template for members of the resuscitation team who were designated to respond to 777/resuscitation calls in the hospital after hours.

AIM: To ensure that staff at North Shore Hospital are competent and confident in the roles that they are performing during a 777 call, and to improve leadership and teamwork within the resuscitation team.

METHODS: We introduced two *777 Planner* meetings each day at 4pm and 10pm at North Shore Hospital, with a *777 Planner* template to guide the meeting. The *777 Planner* enabled members of the team to meet, introduce themselves and allocate roles in preparation for resuscitative events prior to later calls. We conducted pre- and post-implementation surveys to evaluate the experience of 777 calls prior to and after implementation of the 777 Planner.

RESULTS: 68% of respondents felt that the *777 Planner* improved their experience of 777 calls, and 78% found it a useful part of the handover. 50% of pre-implementation survey respondents were not clear what other team members roles were in emergency calls, and 53% were not aware who was leading the emergency call. Following the implementation of the intervention, this improved to 74% reporting clarity on roles and 79% stating they knew who was leading the 777 call.

CONCLUSION: The *777 Planner* ultimately improved members of the resuscitation teams experience of 777 calls at North Shore Hospital, particularly concerning leadership, communication and clarity of roles.

Resuscitation events in hospital are invariably high-stake challenging situations that require effective communication, leadership and coordination. A qualitative study by Nallamothu and colleagues, exploring the experiences responders to in-hospital cardiac arrest teams, found that teams, not individuals, are ultimately responsible for providing resuscitation at hospitals.[1] Resuscitation is a team endeavour that requires several healthcare professionals of varying experience and backgrounds to coordinate their activities and ensure optimum performance as a team.[2] Immediate and effective resuscitation is vital for improving the mortality and morbidity rates of patients for whom resuscitation calls are made.[3] As such, the effectiveness of resuscitation teams is an important determinant of patient safety and survival outcomes.[1] At North Shore Hospital, which is one of two main hospitals at Waitematā District Health Board (DHB) in Auckland, New Zealand, we established the *777 Planner* as an intervention to improve the experiences of team members in resuscitation calls.

Performance in a resuscitation situation is dependent on quality leadership, good communication and team structuring.[3] In a study examining 16 teams participating

in a simulation of witnessed cardiac arrest, absence of leadership characteristics and the failure to explicitly allocate tasks were linked with poor team performance.[2] Clearer leadership from the team leader is associated with superior task performance and more efficient cooperation within the resuscitation team.[3] Inadequate communication during a resuscitation call is also one of the most commonly identified underlying causes of clinical errors and adverse patient outcomes.[4] The literature suggests that communication between members of the resuscitation team, before and after an event, is generally poor.[5] Communication used during an acute emergency situation can often be non-specific, such as failing to use team members' names or not directly allocating tasks to a person.[4] Erroneous communication can contribute to a delay in initiating life saving measures, such as commencement of cardiopulmonary resuscitation (CPR) or the administration of adrenaline. These can have a significant impact on a patient's outcome.[3] Communication can also be a barrier in the ongoing training and skill development of resuscitation team members, as members lose opportunities to successfully volunteer for roles and gain valuable feedback from colleagues.[6] Lastly, the lack of clarity between resuscitation team members' awareness of their fellow team members' roles, skill-sets and specialities is also identified as an inhibitor of effective teamwork during resuscitations. A feature of effective resuscitation includes specifically assigned roles, so that individual responders commit to responsibilities immediately upon arrival at a resuscitation event.[1] Thus leadership, communication and role allocation are modifiable determinants of resuscitation calls.

Every hospital has its own protocol concerning the organisation of resuscitation calls and who is designated to respond to them. At North Shore hospital, emergencies and resuscitation calls are termed '777 calls'. The resuscitation team consists of an anaesthetic technician, intensive care unit registrar, on-call medical registrar, on-call house surgeon/junior doctor, cardiology nurse, orderlies/porters and a critical care outreach team (CCOT) nurse for each shift. As part of a clinical governance project conducted at Waitematā DHB, we examined the process of 777 calls. Analysis of the six-month period between June and November 2019 indicated that 76.8% of all 777 calls at North Shore Hospital were made out of hours (between 4pm to 8am, including weekends). The same six month period had 30 in-hospital cardiac arrests, and 80% of these also occurred after hours.

We also found that there were several potential areas for improvement of resuscitation calls. Members of the resuscitation team vary between shifts, and the start of a new shift did not entail any introduction to the other team members. Often, members of the team met for the first time at the bedside of a deteriorating patient. In such a time-dependent situation, knowledge of the roles, the levels of experience and even the names of fellow members were not readily established. Without sufficient knowledge of fellow members, team members were required to work effectively and make important decisions collaboratively to improve a patient's condition. This is a commonly described feature of hospital resuscitation calls in the literature.[6]

Traditionally, the response to medical emergencies such as cardiac arrests has been a reactive one.[7] According to Hunziker and colleagues, the process by which the resuscitation team forms and functions materially influences the quality of the resuscitative effort, independent of the individual team members' skills in resuscitation.[9] Advice from the UK Resuscitation Council states that team members must meet for introductions and designate roles and responsibilities before attending actual events.[8] However, studies show that resuscitations rarely have any formal briefing.[8] Thus, while not unusual, what was commonly occurring at North Shore Hospital was not preferred practice.

We investigated two similar UK-based interventions designed to address similar issues. The studies were carried out in Surrey and Sussex (Redhill) and Brighton and Sussex University Hospital NHS Trust. The Surrey and Sussex Healthcare NHS Trust initiated a 'Ten Minute Meeting' core huddle at 9am between members of the cardiac arrest and medical resuscitation team. This meeting involved the allocation of roles, such as who will conduct chest

compressions or arterial blood gas sampling. It also identified the potential leaders for resuscitation calls.[7] Research conducted by Claire Rowley from the Surrey and Sussex Healthcare NHS Trust found that these meetings were associated with improved leadership, reduced commotion and overall improved patient safety during resuscitation events.[7] Brighton and Sussex University Hospital NHS Trust also found that team members reported feeling less stressed as a result of having better knowledge about their fellow team members.[9]

As part of our research, we established that the practice for resuscitation events at Waitematā DHB was comparable to that of the NHS Trust. We initiated the *777 Planner*, an intervention that was designed to address the issues with resuscitation calls previously discussed when team members meet for the first time in an acute setting. We then surveyed staff to assess its local effectiveness.

The aim of this intervention was to ensure that members of the resuscitation team are competent and confident in the roles that they are performing during a resuscitation call, and to improve leadership and teamwork within the resuscitation team.

Methods

Implementation of 777 Planner

The implementation of our intervention followed Kotter's Eight Step Model of Change.[10] The format of the intervention was based on the work of the previously described two UK-based interventions. The aim of the change was to introduce and embed two 3–5 minute *777 Planner* meetings each day at 4pm and 10pm to allow for shift change over. The first of these meetings took place in the acute diagnostic unit at North Shore Hospital in Auckland, New Zealand on 3 March 2020. We designed a *777 Planner* template to guide the meeting (Figure 1). The template was designed to allow members of the team to meet, introduce themselves and allocate roles in preparation for resuscitative events prior to later calls. As medical staff rotate between departments and hospitals throughout the year, the *777 Planner* and completion of the template was led by the clinical nurse manager, which allowed for continuity of leadership and had the added benefit of alleviating the norms of hospital hierarchy.[7]

Surveys

Prior to the introduction of the *777 Planner*, we conducted a pre-implementation survey among relevant departments to identify perceptions of 777 calls. Data was collected between 30 January and 17 February 2020. Two months after the start of the intervention, we conducted a post-implementation survey among the same groups. The same questions were used for both the pre- and post-intervention surveys, with the addition of two questions concerning the format of the *777 Planner* template in the post-implementation survey (Figure 2). The post-intervention survey was conducted between 4 May and 20 May 2020. The surveys were designed to assess the aims of this project. Both surveys were anonymous to allow for truthful feedback. The local research and knowledge centre aided in the design, and there were no ethical requirements for these surveys. The responses to the questions were collected on a Likert scale. The survey was sent to all members of the adult resuscitation teams. Notably, the orderly team declined to participate in this intervention and were therefore not included in the survey.

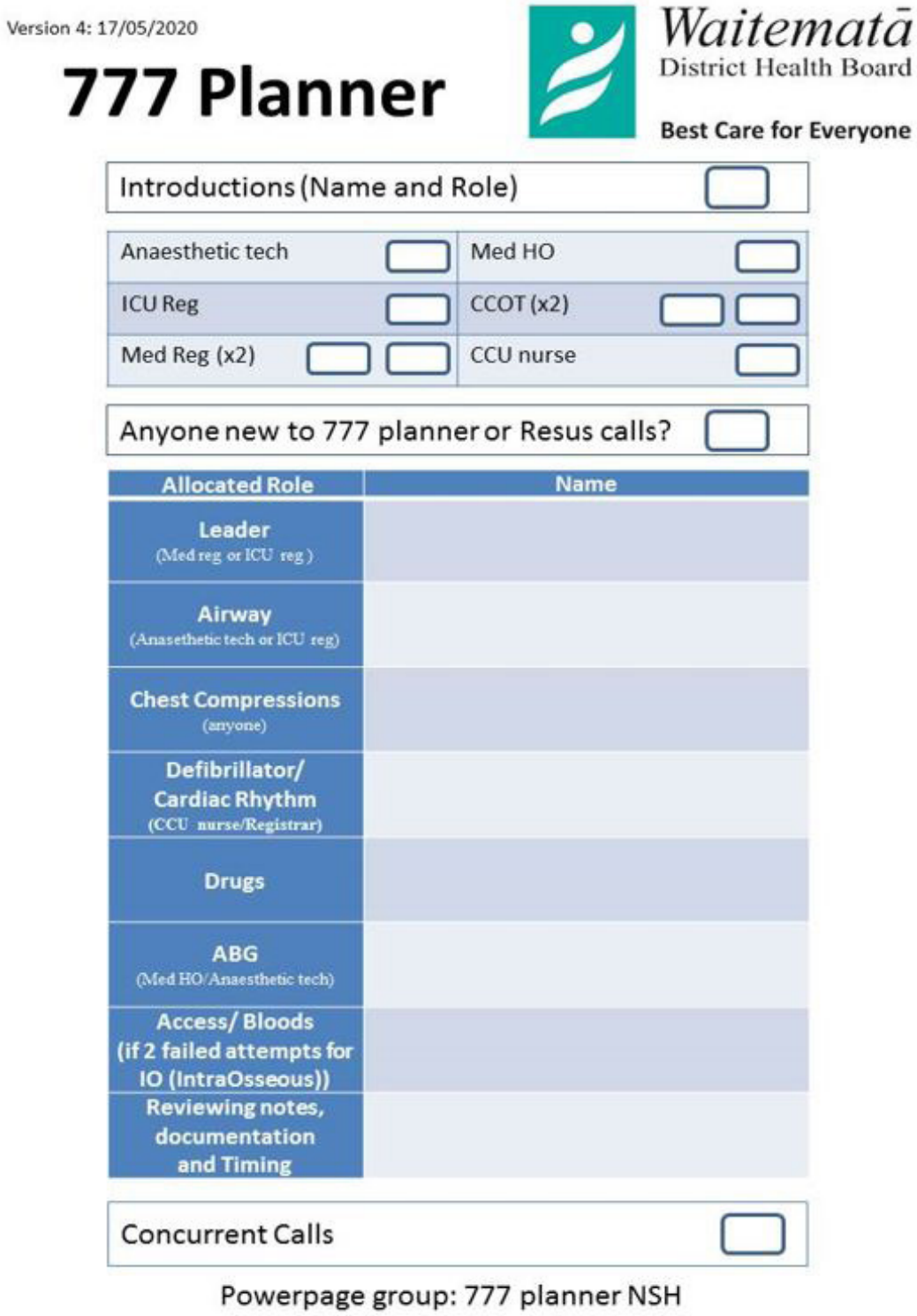
Results

The total number of respondents to the pre-implementation survey was 61 and the post-implementation survey was 62.

In the post-implementation survey, staff reported higher rates of agreeableness in every question in comparison to the pre-implementation survey. Specifically, the number of responses of 'completely agree' improved significantly, illustrating that team members had greater clarity regarding their roles and the roles of others.

Fifty percent of pre-implementation survey respondents were not clear what other team members roles were in emergency calls, with 53% not aware who was leading the emergency call. Following the introduction of our intervention, this improved to 74% reporting clarity on roles and 79% stating they knew who was leading. The proportion of respondents

Figure 1: *777 Planner* template to be completed during the *777 Planner* meeting.



Version 4: 17/05/2020

777 Planner

Waitematā District Health Board

Best Care for Everyone

Introductions (Name and Role) ☐

Anaesthetic tech	☐	Med HO	☐
ICU Reg	☐	CCOT (x2)	☐ ☐
Med Reg (x2)	☐ ☐	CCU nurse	☐

Anyone new to 777 planner or Resus calls? ☐

Allocated Role	Name
Leader (Med reg or ICU reg)	
Airway (Anaesthetic tech or ICU reg)	
Chest Compressions (anyone)	
Defibrillator/ Cardiac Rhythm (CCU nurse/Registrar)	
Drugs	
ABG (Med HO/Anaesthetic tech)	
Access/ Bloods (if 2 failed attempts for IO (IntraOsseous))	
Reviewing notes, documentation and Timing	

Concurrent Calls ☐

Powerpage group: 777 planner NSH

Table 1: Number of staff who responded to the pre-implementation and post-implementation surveys based on job title.

	Pre-implementation survey (n)	**Post-implementation survey (n)**
Medical registrar	10	10
Medical house surgeon	14	11
Intensive care registrar	2	4
Critical care outreach nurse	14	8
Anaesthetic technician	9	13
Cardiology burse	9	8
Clinical nurse manager	2	7
Prefer not to say	1	1
Total	61	62

Figure 2: Questions used in the pre-implementation and post-implementation surveys.

1. At a 777 call, I am clear what roles there are to be performed.
2. At a 777 call, I am clear what my role is.
3. At a 777 call, I perform a role most suited to my competencies/scope of practice.
4. At a 777 call, I knew what the other team members' roles were.
5. I was introduced to the rest of the resuscitation team prior to or during the 777 call.
6. I knew who was leading the 777 call when I was with the patient.
7. I feel as though the 777 team work effectively as a team.

Two further questions added to the post-implementation survey:

8. Overall, the 777 Planner at handover improved my experience of 777 calls.
9. I have found the 777 Planner a useful part of handover.

Responses were scored using a Likert scale:

- completely agree
- somewhat agree
- somewhat disagree
- completely disagree.

who were not introduced to the rest of the team before or during emergency calls reduced from 87% to 23%. Only 16% of respondents completely agreed with the statement that the team worked effectively pre- intervention. This rose to 32% following the introduction of the *777 Planner*. The post-implementation survey also included questions related to how staff perceived the usefulness of our intervention. Sixty-eight percent of respondents felt that the *777 Planner* had improved their experience of 777 calls, and 78% of our respondents found it a useful part of the handover.

Discussion

This intervention showed that the simple addition of the *777 Planner* meeting with a set format had the effect of improving interprofessional practice, team experience, confidence in roles and clarity of responsibilities in resuscitation events at North Shore Hospital. This adds to the weight of the existing literature concerning this topic.

The strengths of this intervention include its simplicity and that it is a low-cost measure to implement and maintain. The *777 Planner* is easily reproducible in other healthcare settings with similar resusci-

Figure 3: Pre-implementation survey results.

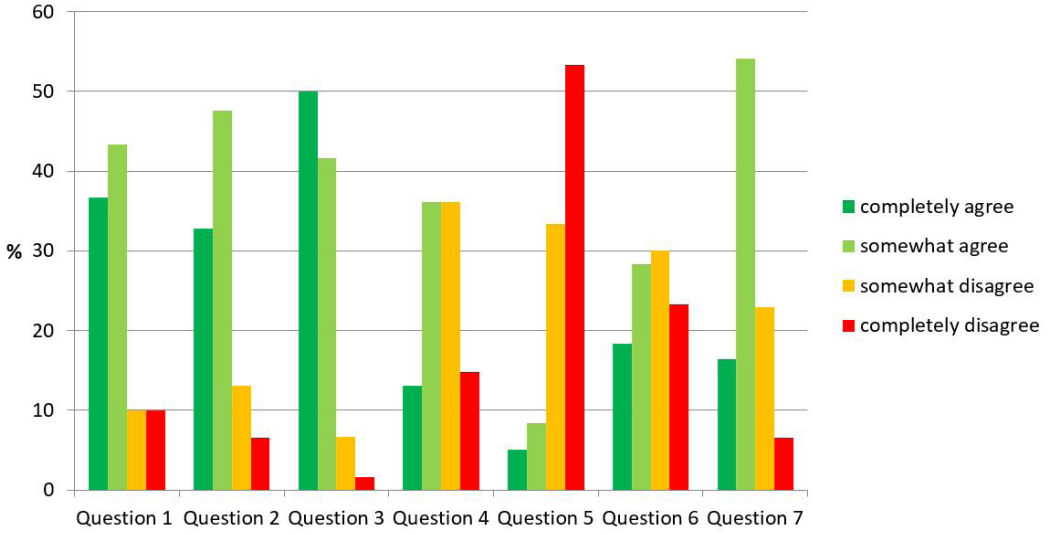
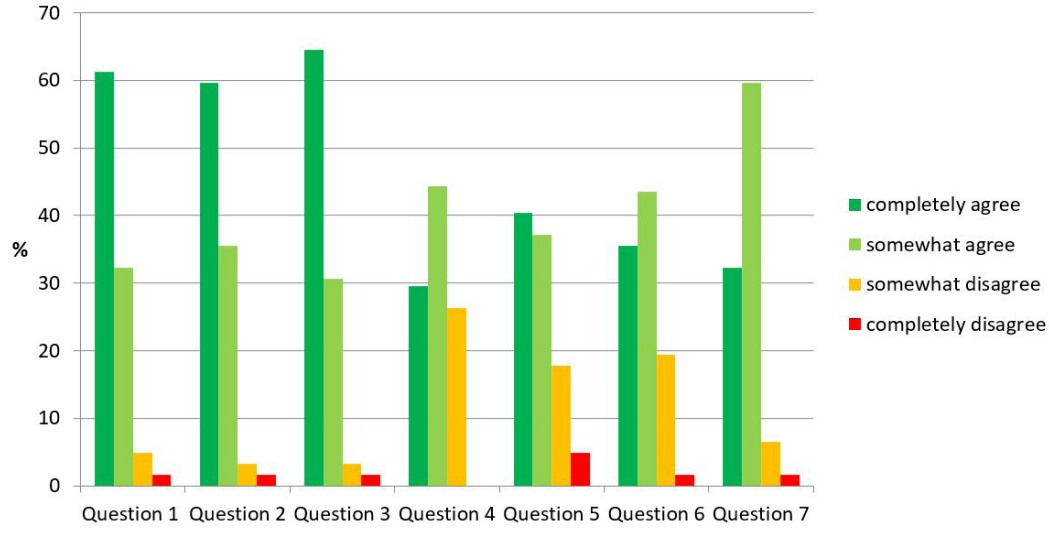


Figure 4: Post-implementation survey results.



tation call requirements. A feature also noted was the learning opportunity that this intervention presents for the consolidation and development of collaborative skills. The prior planning of the resuscitation call lends the opportunity for junior members to step up to leadership responsibilities under supervision, which by necessity may have previously been assumed by senior colleagues. The *777 Planner* provides the opportunity to foster and enable learning because the situation is more anticipated and less stressful. Members have had the chance to meet prior to 777 calls and discuss their learning needs. As such, junior staff may more readily volunteer themselves for greater responsibility. Thus, the simplicity, low cost reproducible nature of the *777 Planner*, as well as the opportunities for skills development that it provides, are the key strengths of this intervention.

The engagement of the resuscitation team was necessary for success in this project. One of the early issues with implementation was attendance, especially at the 4pm *777 Planner*. Discussion with stakeholders enabled us to learn that the main reason was the availability of intensive care unit (ICU) staff. Junior house surgeons and registrars also often reported being tied up with ward work from the day shift, and many forgot to attend. We responded by sending reminders through the hospital pager system and by email. Through these means and with time the workplace culture gradually shifted; the value of the meetings became understood and staff started to diligently attend.

The limitations of this intervention include that there was no 8am *777 Planner*. We did investigate the idea of a morning *777 Planner* that coincided with the morning medical handover. However, the feedback among stakeholders was that there was a perception of contested time in the mornings, at the start of the busy day shift. Ultimately, our rationale for avoiding a morning *777 Planner* also took into account that the majority of 777 calls tended to be out of hours. The 4pm and 10pm *777 Planners* were designed to coincide with shift handovers for ease of attendance among members. Another area that could have been measured concurrently with the staff surveys were patient outcomes in resuscitation calls during this period. This should ideally be measured once the *777 Planner* is a more established part of the local culture, and may indeed be done in the coming months.

Other limitations of our project include the small sample size of the surveys in comparison to the overall staff size. This could be a source of bias in the results measured; however, it is unclear whether and how this may have skewed the results. Finally, whether our two surveys had the exact same respondents is unknown. This is owing to the anonymised nature of the surveys, and that post-implementation survey respondents were not asked whether they had previously completed the pre-implementation survey. We therefore have no indication regarding the potential paired nature of our data. This also entailed that statistical analysis was not possible with our dataset; given the unknown number of participants who responded to both surveys, predications based on tests of independent proportions are inappropriate.

An unanticipated event during our intervention was the COVID-19 pandemic. We began our intervention on March 3 2020, and New Zealand went into Level 4 lockdown on 25 March 2020. As a result of increased risk to staff and the greater personal protective equipment required, the hospital resuscitation guidelines were revised. The lockdown was a time of uncertainty when resuscitation became a very topical issue. We found that the *777 Planner* became a means of discussing these changes and conveying staff feedback about changing protocols and new guidelines. As a result, the *777 Planner* became highly acknowledged by the incident controllers and senior executives as a crucial part of daily operations. Therefore, the possibility also exists that the COVID-19 period made potential respondents more interested in participating in the surveys, at least more than in usual circumstances.

On completion of the post-implementation survey and analysis, this project was formally handed over to the Resuscitation Committee of Waitematā District Health Board. There are several prospective areas for future development. For example, a formalised debriefing session following resuscitation calls has been proposed. This

is where a review of role allocation could take place and provide further educational opportunities for feedback. Additionally, the *777 Planner* could be a means of conveying relevant announcements of the upcoming shift. Formally investigating the impact of the *777 Planner* on the outcomes of resuscitation events has also been considered for future research. The simplicity and generalisability of the intervention makes it possible to adopt and adapt by other district health boards, and indeed other hospitals internationally.

Overall the *777 Planner* was an intervention designed to improve the experience of resuscitation calls locally. Our data indicated that respondents felt the *777 Planner* improved their overall experience of resuscitation calls, particularly concerning clarity of leadership, communication and confidence.

Conclusion

The addition of the *777 Planner* to North Shore Hospital improved team members experiences of 777/resuscitation calls. Following the implementation of our intervention, adult resuscitation team members were clearer about their roles and who was leading the emergency response. They also perceived that the team became more effective as a result of this work.

Competing interests:
Nil.

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Pasifika Prediabetes Youth Empowerment Programme: learnings from a youth-led community-based intervention study

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ABSTRACT

AIM: Using a co-design approach, we describe exploratory findings of a community-based intervention to mobilise Pasifika communities into action, with the intent of reducing the risk factors of prediabetes.

METHOD: A group of 25 Pasifika youth aged 15–24 years from two distinctive Pasifika communities in New Zealand were trained to lead a small-scale, community-based intervention programme (among 29 participants) over the course of eight weeks. The intervention, which targeted adults aged 25–44 years who were overweight or obese, employed both an empowerment-based programme and a co-design approach to motivate community members to participate in a physical-activity-based intervention programme.

RESULTS: Findings show significant reductions in total body weight and waist circumference, as well as improved physical activity.

CONCLUSIONS: The strength of this intervention was evident in the innovative approach of utilising Pasifika-youth-led and co-designed approaches to motivate communities into healthier lifestyles. The approaches used in this project could be utilised in a primary healthcare setting as a community-wide strategy to reduce diabetes risk, particularly among Pasifika peoples.

Prediabetes is a common condition in which blood glucose levels are higher than normal but not high enough to be defined as type 2 diabetes (T2DM). It is defined as having an haemoglobin A1C (HbA1c) between 41–49mmol/mol and no formal diagnosis of T2DM,[1] although it is recognised that increasing levels of HbA1c are associated with an ongoing risk of progression to T2DM.[2] Among obese adults (having a body mass index (BMI)≥30), 32.2% will have prediabetes and, without any intervention, the likelihood of developing T2DM is high.[1] The New Zealand Society for the Study of Diabetes has endorsed the need for opportunistic screening of prediabetes among younger adults (25+ years), and they have also identified other groups at risk of prediabetes, including: early onset of familial T2DM, women with a past history of gestational diabetes, children and young adults who are obese, particularly if they are Māori or Pacific, and women with polycystic ovarian syndrome.[2]

Prediabetes is not a medical condition per se, but it is often accompanied by other serious co-morbidities, such as hypertension and high cholesterol, which often never display physical symptoms. Prediabetes is especially elevated in Pacific peoples. Among youth aged 15–24 years, 13.6% have prediabetes (vs 7% of New Zealand Europeans (NZE)), and in the Pacific working-age adults (25–44 years), 29.6% (vs 16%

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of NZE) have prediabetes.[1] Yet, very little is known about the working-age group of younger adults with prediabetes (defined here as 25–44 years old), such as how they manage and cope with the lifestyle challenges imposed by this condition. This age group is particularly important for Pacific peoples and women (who have high rates of obesity and prediabetes),[1,3] particularly as it encompasses the 'reproductive age' for New Zealand women:[4] Pacific women are more likely to start their own families at a younger age (median age 26 years and 28 years, respectively) compared to their New Zealand European counterparts (median age 31 years),[4] and, therefore, they are at an increased risk of onset of health problems (eg, gestational diabetes)[4] at an earlier age, with long term implications for the development of chronic conditions in the future.

In New Zealand, there is a critical need for effective, sustainable programmes that can be self-managed by communities, in order to enable independent health and wellbeing and reduce the prevalence of prediabetes. Previous programmes have shown that community-based and community-led programmes that are 'fit for purpose' and relevant to the sociocultural environment are advantageous for improving the health and independent living of certain communities.[11,12] Community-based partnerships are essential to address inequities, such as barriers to care, and to explore culturally appropriate services that are community-based, particularly for underserved populations.[13]

Empowering Pacific communities to participate in all stages of any proposed research will enhance intervention development, engagement and uptake and provide evidence-based knowledge that can help inform: (i) how to partner with and mobilise communities; (ii) how to initiate and sustain behavioural change; and (iii) how to explore other research-related questions that may arise as a result of the dynamic nature of the research approach. It is also a unique opportunity for community and researcher partnerships to be established, with a view of progressing a long-term collaboration to develop an in-depth reservoir of knowledge and capability building.[14] There have been several recent examples of community-based partnerships that involved empowering indigenous communities to take the lead in creating effective prevention approaches.[6,15–18] Between 2017 and 2018, a large cluster randomised control trial (OL@-OR@ mobile health (mHealth) programme) using Pasifika and Māori kaupapa research methodology was co-designed with both Māori and Pasifika communities in New Zealand to support healthy lifestyle behaviours.[15] The study investigated whether the use of their mHealth programme improved adherence to health-related guidelines among a sample of 1,224 adults. Results showed their co-designed mHealth programme did not improve overall adherence to health-related behaviour guidelines among Māori and Pasifika. However, it was clear that the intervention participants who engaged with the programme showed significant improvement relative to the study controls.[19] A recent health intervention programme, Mana Tū, was developed in response to current ethnic and social inequities facing patients with high prevalence rates of T2DM and wider sociocultural determinants.[20] Mana Tū is an initiative to address access issues from within the health system. It focuses on enhancing health services and patient factors that can positively impact on the whānau ability to 'stand with authority' when living with non-communicable diseases (NCDs). Key learnings from Mana Tū highlighted the need to develop individual capacity to use tools and skills for healthy lifestyles and establish a framework for change that brings individuals, whānau (ie, family), health services and systems together to improve short- and long-term outcomes, such as improving understanding of the wider determinants and improving the engagement and experience of services and outcomes. By developing the capacity of individuals and whānau to work closely with the health service provider, Mana Tū has shown to be successful in addressing health inequities for Māori and Pasifika peoples.

More recently, research approaches that include young people (often described as 'youth-led', 'peer-led', 'research actors' or 'agents of change') as a potential step-change movement in health promotion, or to improve the health status (eg, sexual health, mental health, alcohol and drug use) of young people themselves and their respective communities, have been imple-

mented and analysed systematically.[21] The reported findings considered peer-led interventions as particularly useful for knowledge capacity development in young people, because they are more likely to be 'relatable' and have a high level of interaction, which can have a positive effect on behavioural and mind-set change.[21]

This paper presents overall findings from phase two of the Pasifika Prediabetes Youth Empowerment Programme (PPYEP) project, which is a scaled-up approach from our pilot work.[22] In short, the research approach uses an established empowerment framework that was uniquely designed to build the health-leadership capacity of Pasifika youth, transform their knowledge and skillsets into actionable knowledge and ultimately mobilise their communities towards a common purpose. This approach is participatory action research,[23] which includes a suite of modules aimed to build the capacity and understanding of the youth in the following topics: (1) the health status, including lifestyle patterns, of Pasifika people in New Zealand; (2) leadership qualities and identifying how to enhance these skills in a group setting; (3) the supermarket context and budgeting and food literacy skills; (4) the root causes of health and lifestyle issues related to prediabetes; (5) the basic concepts of social change; and (6) how to set-up action plans (using co-design processes). As well as identifying necessary resources, this module also included identifying key stakeholders or potential allies/partners that could enable and enhance the sustainability of an action plan. Accessing the participants' wider community and other networks was also essential for action planning.

These were the specific aims of the anonymised project:

1. Empower young Pasifika peoples' capacity to gain research and health promotion knowledge on their behavioural, personal, social and cultural experiences of healthy lifestyles.
2. Co-design the key features of a small scale community-based intervention, led by the Pasifika youth.
3. Implement and evaluate the short-term success of the interventions.

The project received ethical approval from Health and Disability Ethics Committee (17/CEN/289), New Zealand.

This paper focuses primarily on aims 2 and 3. Note that we have employed the term 'Pasifika', defined here as a collective group of people representing different Pacific Island nations predominately from the South Pacific region. We acknowledge the diversity of Pacific ethnic groups in New Zealand, and in consultation with our community partners, it was decided that a Pasifika approach was relevant for this project due to the growing diversity of Pacific and other ethnic groups; thus the use of the term 'Pasifika'.

Methods

The study comprised two phases. In the first phase, we recruited a convenience sample of 41 young Pasifika youth (15–24 years) from our community partners: (1) urban health provider The Fono, Auckland (a large urbanised community), and (2) rural health provider South Waikato Pacific Islands Community Services Trust (a small rural community, in New Zealand). Our convenience sample underwent an empowerment programme and co-designed action plans to reduce prediabetes risk factors in their communities. In the second phase, the youth translated these action plans into community-based intervention programmes and delivered them in their communities.

Prior to the start of the PPYEP project, our Pasifika facilitators (n=4) were trained extensively to upskill their expertise on how to engage with Pasifika youth, facilitate discussions and deliver the piloted empowerment modular programme. The youth participated for 2–2.5 hours per week throughout the five-month empowerment programme, where they developed practical skills and knowledge through the modules, which were described earlier, and previously published.[22]

Co-design

The community intervention development followed similar processes that underpinned the pilot study.[22] The action planning module builds on the youths' knowledge developed through the empowerment programme and adjoins their individual and collective skills and talents, matched with specific predia-

betes health issues. From here, the youth proceeded through a series of processes that triaged-out the plans that were impractical, so that finally the action plans included only those plans that were achievable and realistic for the timeframe of the planned community-based intervention.

During several gatherings further attended by research team members, key decisions were made regarding the intervention aims, design, primary and secondary outcome measures, recruitment methods and timelines. In this process, our two Pasifika community providers led the engagement processes with their respective youth.

Study design

With the aid of the two research assistants and two community facilitators, the Pasifika youth co-designed each intervention programme as a cross-sectional based programme, which included preparing work for the intervention launch, such as: meeting with the community partners; developing intervention resources, promotion materials, logos and posters; developing a participant recruitment method; conducting participant recruitment; promoting the intervention via social media pages (Facebook) and at community meetings; collecting and processing data, which included establishing a timeline of daily healthy dietary and nutritional habits over the intervention period; and following up with the research team on the progression of the action plan overall. The full details of the co-design approach of the overall project and the empowerment programme will be published separately.

Phase two of the overall project involved translating these action plans into community-based intervention programmes. Two similar co-designed, community-based intervention programmes were established. Unanimously, both communities decided to focus on 'reducing the risk factors for developing prediabetes', which included: (1) increasing physical activity; (2) enhancing the awareness of nutritional habits; and (3) building knowledge of health and wellbeing. Studies have shown that, through these mechanisms, behavioural change interventions are successful in reducing the risk of developing T2DM by more than 50% when targeting modest weight loss, such as 30 minutes of walking a day.[24–26]

To be eligible, participants needed to be at high risk of developing prediabetes (eg, being overweight or obese; having high blood pressure; having a parent or sibling with T2DM; having a history of cardiovascular problems and/or polycystic ovarian syndrome and/or high cholesterol levels; having been diagnosed with prediabetes on a previous test;[27] being physically inactive; being Pasifika and/or Māori aged between 25-44 years old), reside within the targeted community where the anonymised project was located and be motivated to make behavioural changes. The eight-week community-based intervention programme, developed by the community facilitators and the youth who participated in phase 1 of the project, was co-designed to reduce risk factors for prediabetes. The programme was also determined by the community partners, as they were not able to commit to a longer time frame, given their other community-based responsibilities. However, the intervention involved weekly group meetings that included a fitness activity (eg, Zumba class or a walking group) at a group level; and at an individual level, each participant had a physical goal of achieving 10,000 stepts per day, starting from 3,000 steps. Educational cards were developed to present to the participants each week and included the following topics: (1) what is prediabetes; (2) dietary knowledge (water vs fizzy drinks); (3) dietary habits (home cooking vs eating out); (4) dietary knowledge (de-mystifying the ideas on carbohydrates); (5) physical activity (30 minutes at various levels); (6) sleep (the importance of sleep and recovery); (7) weight management (avoiding fad diets); and (8) heart health (understanding the consequences of high (and low) blood pressure). The community facilitators were responsible for delivery of the intervention programme, after they had spent a day in a training workshop with the youth (ie, learning about data collection processes, etc).

Participant Recruitment

Part of the co-design planning was recruitment of study participants. Within each community, participant recruitment was led by the youth and supported by the community facilitators. We employed the snowball approach, whereby each youth

identified and recruited one or two people within their neighbourhood who met the eligibility study criteria, described above. Once the initial contact was recruitment, the intervention participants were given the requirements of being involved with the study, and, at the initial intervention gather, they signed consent forms for their participation. The community facilitators provided the support and infrastructure of the intervention and used other recruitment methods, such as inviting potential participants to the initial intervention gathering, using social media (eg, Facebook), using posters and brochures and and word of mouth.

Study procedures

Potential participants were invited to attend an initial meeting regarding the programme, where further information was provided and any questions about the study could be answered. People who were interested and met the eligibility criteria signed up for the study by providing a signed consent form.

Community-based intervention design and outcome measures

The intervention was co-designed to help Pasifika peoples to improve their health by making small, positive and culturally relevant changes to their lifestyle in order to reduce the risk of prediabetes. Various action-planning methods, such as brainstorming intervention ideas, identifying personal and community resources to sustain the intervention, researching written educational materials on prediabetes and self-reflection, were used to achieve the needs of the Pasifika communities and inform the development of the study intervention.

To increase their physical activity, participants were encouraged to take at least 3,000 steps every day and add 1,000 steps a week until they accumulated 10,000 steps per day. For example: week 1: 3,000 steps, week 2: 4,000 steps, and so on. Every week there was an organised intervention session where the participants gathered and participated in an organised physical activity (eg, a 4km walk or a dance class), and educational business cards were discussed with the participants. The purpose of these sessions were to keep the participants engaged in the intervention and ensure their weekly physical activity data was collected and recorded, as well as to provide an opportunity for participants to raise any questions about the intervention. Information cards were co-developed with the research team to focus on increasing awareness and knowledge of better nutritional habits, and they were disseminated on a weekly basis.

Baseline assessments

At baseline, the following data was collected from each participant:

- *Demographics*: gender, date of birth, predominant ethnic group.[28]
- *Anthropometrics*: current weight (kilograms) was measured using an electronic scale (Tanita, Body Composition Analyser BC-418) and a standard tape measure was used to document height and waist and hip measurements (centimetres);[29] blood pressure was collected by measuring participants'right arms while they were seated and had been at rest for at least five minutes (using the standard Sprague stethoscope kits).
- *Health status*: self-reported health condition(s) defined as being diagnosed by a doctor that they have asthma, hypertension, heart troubles, diabetes, stroke, thyroid or psychological or sleep problems.[30]
- *Self-examination* of perceived body size using somatotype pictures[31] (data not presented here).
- *Lifestyle behaviours* (cigarette smoking frequency)[32] and physical activity: 10,000 steps per day,[33] measured using pedometers.

We did not measure nutritional habits, as it was manageable to focus on the physical activity component of the intervention. Additionally, we did not include a food frequency questionnaire, and we did not want to over-burden the youth and community facilitators with more research processes than were necessary.

Post-intervention assessment

At the end of the eight-week intervention period, anthropometric data and the step-count data were re-assessed to identify health and behavioural pre- to post-intervention changes.

We also conducted one-to-one interviews with 26 participants to obtain in-depth understanding of the intervention programme from each participant's perspective, which helped identify logistic and pragmatic knowledge for future co-design programming improvements.

Primary outcome measure

The primary outcome was participant adherence at 8-weeks to reduce the key risk factors: modest goal of bodyweight loss of >3%[34] of baseline bodyweight; increased step-counts from 3,000 to 10,000 steps per day, as a proxy measure of daily physical activity;[33] and improved knowledge and awareness of prediabetes, and about the intention of the intervention.

Secondary outcome measures

Secondary outcome measures were collected at 4–8 weeks post-intervention period via face-to-face interview with the community facilitator. We investigated intervention–user engagement based on each user's understanding; enablers and barriers of the intervention; and future provisions for sustainability. These findings will be published separately.

Statistical analyses

At baseline and at 8-weeks, data collected from all participants were summarised collectively, and by intervention site. Continuous variables were presented as numbers observed, means and standard deviations. Categorical variables were presented as frequencies and percentages. Since any difference may have occurred due to chance, we conducted formal significance testing of baseline differences, basing our tests on non-parametric tests. Statistical analysis were performed using SAS version 9.4 (SAS Institute Inc., Cary, NC, US). All statistical tests were two-sided T-tests at a 5% significance level.

Results

Intervention findings

Table 1 presents the baseline demographics of the intervention participants. Thirty-two participants were recruited and enrolled in the study, with the majority being recruited from the South Waikato intervention site. The youth collected the data at the weekly intervention gatherings.

Table 1: Baseline characteristics.

	N	%
Intervention site 1	15	46.9
Intervention site 2	17	53.1
Male	5	15.6
Female	27	84.4
Ethnic group		
Māori	1	3.4
Samoan	1	3.4
Cook Islands Māori	10	34.5
Tongan	14	48.3
Niuean	1	3.4
Other	2	6.9
Missing n=3		
Comorbidity		
Asthma	1	3.1
High blood pressure	2	6.25
Diabetes	1	3.1
Smoker		
Ever	6	18.7
Never	19	59.3

The majority of participants self-identified as being Tongan and Cook Islands Māori. The average age was 33.3 years. The weight range recorded at the start of the intervention was diverse and ranged from 63.8–186 kilograms (kg), and the mean body mass index (BMI) was 37kg/m^2. The participants also have risk factors for prediabetes as determined by their health profile: obese (BMI>30kg/m^2) and Pasifika ethnicity; comorbidity characterised as having pre-high to high blood pressure; and being within the targeted pre-diabetes risk age-range (25–35 years old). By the end of the eight-week intervention, 26 of the 32 (81%) participants completed the study and provided sufficient data for analyses. We did not use the data from the six missing participants, because their data was not complete.

Table 2 shows the participants' pre- to post-intervention changes in anthropometric and physical activity measures. For those participants that provided complete

data (n=29/32), there were significant positive changes, as evident by the mean percent change in weight loss (-2.43%), mean percent change in waist circumference reduction (-1.58%) and total average number of steps (range: 14,817–80,182 steps) accumulated from the start of the intervention (p<0.001). Note that data on blood pressure was not consistently provided, and as a result it was no longer included in the analyses. Furthermore, although the data is not presented here, there were significant improvements (for 26 participants who provided full data), as characterised by a negative change in percent body weight loss, negative percent change in waist circumference and a high number of average step-counts between the two Pasifika community intervention sites. The rural community achieved a higher mean difference in weight loss and waist circumference, although they accumulated less steps on average, compared to the urban community.

Finally, Table 3 compares 'high steppers' to 'low steppers', as a proxy measure of physical activity levels. Previous studies have defined lower level of physical activity, or low active, sedentary, as achieving ≤7,300 steps per day.[35,36] The study participants sustained a lower level of step-count (by ~1,900 steps), and the percent change in weight loss steps (-3.12% weight loss) was higher among those who accumulated less steps, than those who achieved higher step counts (-2.20% weight loss).

Table 2: Pre- to post-intervention change in anthropometric and physical activity measures.

Variables	N*	Mean %	95%CL for mean	SD	95%CL for SD	P-value
% change in weight	29	-2.43%	-3.65 , 1.20	3.22	2.55 , 4.36	0.0004
% change waist circumference	29	-1.58%	-3.15 , -0.01	4.14	3.28 , 5.59	0.0491
% change in hip girth#	29	-0.98	-3.09 , 1.12	5.54	4.39 , 7.48	0.347
Total step#	26	47,252	40,462 , 54,043	16,811.1		<0.001

N*=Missing numbers between 3-6; %=percent; #=average; 95% CL=95% confidence limits.

Table 3: Differences between high and low steppers.

Stepper	Mean	95% CL for mean
High steppers (n=19)		
% change in weight	-2.20	-4.03 , -0.36
% change waist circumference	-0.93	-2.29 , 0.44
% change in hip girth#	-0.04	-1.19 , 1.84
Low steppers (n=7)		
% change in weight	-3.12	-5.77 , -4.46
% change waist circumference	0.36	-4.40 , 5.13
% change in hip girth#	-4.89	-13.24 , 3.44

%=percent; #=average; 95%CL=95% confidence limits.

Discussion

This study presents the initial findings of an innovative approach to public health and community-based intervention that uses co-design and Pasifika youth as the main catalysts in mobilising their communities into action to reduce prediabetes risk. In this small community-based study, the intervention phase of the project resulted in significant improvements in health behaviour change, particularly in weight loss (>2.4%), reducing waist circumference (1.5%) and increasing total number of step-counts. Although the participants did not meet the primary outcome (>3% total bodyweight loss), we think this short, small-scale intervention was trending other successful studies, in which a 3–7% weight loss occurred over a longer time period.[33] Previous studies[19,26,37] have shown that a longer time frame may yield more significant results. However, given the exploratory nature of the co-designed approach and focus on Pasifika youth-led work, this project provided useful observations and understanding on the role of 'youth health advocacy' and 'community mobilisation'. For example, developing and utilising the capacity development of young people within a community has shown to be successful in this study, and the reason behind this is likely due to the employment of local social capital, the acceptability of the intervention, the community culture and the availability of resources and support from within communities themselves. Anecdotally, the Pasifika youth and the community established a sense of belonging and ownership of the project, and as such this project may not have yielded significant positive results if the youth had not established relationships or held familial connections within their community.

Few studies have reported on engaging minority (eg, Pasifika) or indigenous (eg, Māori) youth groups in co-designing and leading community-based health interventions. A recent systematic review of youth peer-led health promotion in Canada, New Zealand and Australia and the US reported limited high-quality evidence of youth-led interventions in health promotion.The majority (n=20) of these studies focused on sexual health interventions and the limitations of engaging indigenous populations due acceptability, culture, available resources and materials and the social deprivation of the target population.[21] Our study was able to show the success of building youth and community capacity for transforming knowledge and skills into actionable knowledge. As an example, at the conclusion of the project intervention, some youth utilised these skills and knowledge and planned and implemented their own intervention at their church (The Fanongo ki he Ui Biggest Loser Challenge) to support the efforts of their own community. Their eight-week programme focused on health education, diet and nutrition and health and exercise. Further insights and examples of actionable knowledge will be published separately.

Although the study was not set up to rigorously compare outcomes between the two intervention communities, we conducted an exploratory analysis of the changes in weight, waist circumference and physical activity/steps between the communities. These findings suggest differences between the rural and urban community intervention sites. Specifically, results show that the intervention had a greater impact in the rural community, as indicated in the higher negative percent changes in weight and in waist circumference, compared to the urban community. This finding may be explained, in part, by the rural community being observed operating more collectively as a social cohesive unit and being made up of families and neighbours who know each other well; therefore, they provided better support and motivation than the urbanised community, where the neighbours and family nucleus was not a key factor in the make-up of the youth or intervention groups. An unexpected and counterintuitive finding was that those participants who did not attain a high volume of step counts showed a higher percent weight loss compared to those who reported a higher volume of step counts (-3.12% vs -2.20%, respectively). This could, in part, be explained by issues with the pedometers in providing accurate measurements, or the limited timeframe of the physical-activity-based intervention (eight weeks) compared to other intervention-based studies, which ranged in duration from 36

weeks to 12 months.[33,38] Additionally, our study found that the 10,000 steps per day programme, defined as the 'prescribed approach to promoting increased physical activity' (particularly among overweight and obese middle-aged adults),[33] was a struggle for our intervention participants to achieve. Yet, our participants achieved a minimum level of physical activity and continued to show a significant improvement in weight loss (achieving the primary outcome of >3% bodyweight loss particularly for the rural community participants). Regardless, the overall average number of step-counts achieved approximately 67% of the targeted 70,000 steps over a seven-day period, and the significant weight loss achieved in a short period of time re-affirmed the success of the co-designed and youth-led intervention approach.

Limitations

There were evidently limitations to this study:

- The small sample size of the community-based interventions, and the non-responders (defined as those participants that did not provide sufficiently complete data (n=6) for all variables) meant that the findings are only relevant to those study participants that completed the intervention.
- There was a lack of research protocol in ensuring the youth and community facilitators recorded data efficiently and completely, which was in part due to the exploratory nature of the study aimed at allowing youth and communities to take more ownership of the intervention and data. However, we think this will strengthen over time, as communities build their research capacity.
- There was a lack of information to measure nutritional habits, as the young researchers deemed it manageable only to focus on the physical activity component of the intervention. Additionally, we did not include a food frequency questionnaire, so to avoid over-burdening the youth and community facilitators with more research processes than were necessary.
- The restricted timeframe to implement the intervention (eight weeks) meant that the benefits of the intervention were short-lived for both the youth and participants. Co-design planning will need to consider future provisional plans for the sustainability of the intervention.
- The co-design approach to planning the intervention resulted in the inability to control for confounding factors in the analyses due to the aforementioned limitations.

Despite these limitations, the research team have gleaned significant learnings for future co-designed community-based intervention projects that involve young people and indigenous communities. The learnings achieved, and the lived-experiences of the participants, youth and their communities, are considered as perceived advantages of the co-designed and youth-led approaches to community-based interventions of prediabetes risk, and arguably this should be viewed as outweighing the limitations of the study.

Conclusions and recommendations

The success of our intervention was based on the co-designed approach of the study. It enabled Pasifika youth and their respective communities to confidently lead the intervention using their own resources and tailoring the intervention to meet the needs of their community. Thus they developed a sense of ownership of the intervention programme. The achievement of more than 2% weight loss over a short period of timeis a strength compared to longer studies, and this is indicative of the capability of the youth and community facilitators to motivate behavioural change. Another important learning of this study was shown in the high retention of the intervention participants, which provided pragmatic results (26 of the 32 completed the intervention) over the eight-week study. This can be attributed to the close connection between the youth and community facilitators and the participants in the communities. These learnings, and the experiences of the participants, youth and their communities, are considered as perceived

advantages of the co-designed and youth-led approach to our community-based intervention of prediabetes risk, and arguably this should be viewed as outweighing the limitations of the study. Finally, we recommend to researchers who work closely with indigenous and minority communities to consider a co-designed approach, which enables community partners to take on an equal role as partners when developing community-based interventions.

Competing interests:
Nil.
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Exploring admissions for Māori presenting with major trauma at Christchurch Hospital

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Injury remains one of the leading causes of years of life lost worldwide.[1] In 2015, the New Zealand Major Trauma Registry was developed to provide a comprehensive data registry within New Zealand for looking at the outcomes and determinants of major trauma. It has published yearly major trauma reports since its founding.

The relevant findings from the national trauma network annual reports include a higher incidence of trauma in Māori patients and a higher incidence rate of trauma in the South Island. Unfortunately, the analysis for Māori patients either excluded or was not specific to the South Island [2]. Therefore, despite Māori constituting 8.5% of the total Canterbury population, there is limited knowledge of specific demographics, patterns and outcomes for Māori patients presenting with major trauma. The health of Māori has been described as the poorest of any New Zealand group:[3] Injury is a more prevalent cause of death for Māori compared to non-Māori. Māori can experience injury-specific mortality up to 40%,[4] as well as higher rates of physical, psychological and financial disability at 3 months and 12 months post injury[5,6].

This study has attempted to quantify the burden of trauma experienced by Māori within the Canterbury region. The aims of this study were to establish the basic demographics of Māori patients with major trauma presenting to Christchurch Hospital, compare the mechanisms of major trauma and admitting team and compare the major trauma incidence rates of Māori and the total Canterbury population.

Methods

This study was a retrospective review of the Christchurch hospital trauma database between 1 June 2016 and 31May 2018. Additional information not contained within the trauma database was supplemented from online patient notes.

Measurement of ethnicity

The concept of ethnicity is complex and multidimensional. The current working concept adopted by Stats NZ and the Ministry of Health is a "social construct of group affiliation and identity." There are several factors that can influence ethnicity. Ultimately, however, it is a self-defined concept that can include several ethnicities at once.[7,8] A "prioritised" output for ethnicity data has been used in this analysis. Prioritised ethnic groups involve each patient being allocated to one ethnic group on the basis of the ethnic groups they have identified with. This study prioritised Māori ethnicity ahead of the other ethnicity selections.

Inclusion and exclusion criteria

The inclusion criteria were admissions with (1) an injury severity score (ISS) greater or equal to 13 or (2) in-hospital mortality due to trauma irrespective of ISS.

Exclusion criteria were:

- injuries that are the result of pathological conditions
- late trauma transfers, where a patient is transferred from another hospital where his/her initial treatment was expected to have been definitive

- admission for injuries that occurred one week or more prior to the time of presentation to hospital
- hanging and drowning
- elderly patients who sustain femoral neck fractures for simple falls or other minor injuries when admission is primarily related to an associated co-morbidity
- foreign bodies that do not cause injury
- poisoning or drug ingestion that does not cause injury
- injuries secondary to medical procedures
- patient death established at the scene or en route to hospital.

All traumas admitted to Christchurch hospital, irrespective of the location of the first presentation, were included in the analysis because Christchurch hospital is a tertiary centre that provides many services spanning the district health board (DHB) boundaries.

Calculation of incidence rate

Numerator values were derived from the available dataset. Denominator values for Māori and the total population were derived from Stats NZ's population projections for the Canterbury region; this value included South Canterbury.[10,11] The incidence rate is expressed per 100,000 persons years.

Results

There were 702 cases of major trauma recorded with 63 cases of trauma in Māori patients (9%). There was a total of 485 male cases (69% of total cases) and 217 female cases (31% of total cases). Māori patients consisted of 47 male cases (75% of trauma in Māori patients) and 16 female cases (25% of trauma in Māori patients). Motor vehicle accidents (MVA) (314 total, 28 Māori) and falls (207 total, 17 Māori) predominated as the leading mechanisms of injury in both total and Māori populations, approaching 75% of all trauma cases. Māori patients admitted with injuries from assault accounted for 32% of total patient admissions from assault (12 cases from a total of 38). The results were largely similar for mean ISS, mean length of stay, mean intensive care unit days, admitting service and discharge location. Total patient mortality was 10.7% and mortality in Māori patients was 4.8%. The total incidence rate for Canterbury was 57.3/100,000 and the incidence rate for Māori was 57.9/100,000.

Discussion

This study has attempted to describe and quantify the demographics and outcomes of major trauma patients in Canterbury, focussing specifically on Māori patients admitted with major trauma. This study sought to fill a gap in trauma knowledge that was acknowledged in the national trauma network annual reports. The results for Māori and total incidence rates are consistent with previous studies of trauma incidence in the South Island, which highlights the higher incidence of trauma compared to the North Island.

Gender distributions are similar between Māori and non-Māori and reflect the trend seen in the North Island, which is a predominating number of male cases (approximately 2:1 ratio). Age distributions share similar peaks in adolescence and in middle age. There was a noticeable absence of Māori trauma cases in the 60+ age group, with only four admissions in this demographic from a total of 230. A contributing factor would be the different age structure for Māori: only 5.2% of the Māori population are above 65 years of age, compared to 15.7% of non-Maori.[12] Additionally, there is a lower proportion of people who identify as Māori within Canterbury; Māori constitute 8.5% of the total Canterbury population, whereas they constitute 17.6% of the total population of the North Island. Despite this, age bracket proportions remain very similar between Canterbury and the North Island, particular for the 65+ age group, who make up to 4.4% in Canterbury and 5.3% in the North Island.[12]

A difference was observed between the mortality rates of Māori and non-Māori (4.8% compared to 10.7%) despite similarities in ISS of these demographics. The mortality rate for Māori was lower than the total mortality and the Māori-specific mortality rate observed in the North Island.[2] The Māori-specific mortality rate is similar to other comparatively low total mortality rates for major trauma in Australasia.[13] This could be a result of the different age

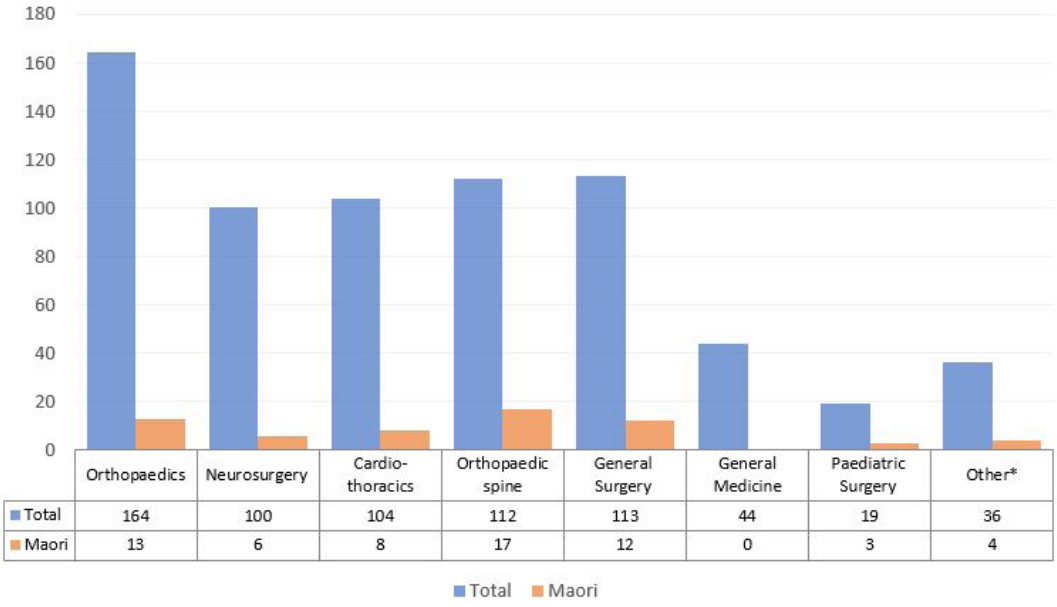
Table 1: Baseline demographics.

	Māori	**Total**
	63	702
Gender		
Male	47 (75%)	485 (69%)
Female	16 (25%)	217 (31%)
Age		
0–9	3 (4.8%)	22 (3.1%)
10–19	3 (4.8%)	46 (6.6%)
20–29	19 (30.2%)	118 (16.8%)
30–39	10 (16%)	79 (11.3%)
40–49	13 (20.6%)	98 (14%)
50–59	11 (17.5%)	109 (15.5%)
60–69	1 (1.6%)	74 (10.1%)
70–79	2 (3.2%)	69 (9.8%)
80+	1 (1.6%)	87 (12.4%)
Trauma category		
Motor vehicle accident	28 (44.4%)	314 (44.7%)
Fall	14 (22.2%)	207 (29.5%)
Pushbike	3 (4.8%)	59 (8.4%)
Assault	12 (19%)	38 (5.4%)
Equestrian	1 (1.6%)	29 (4.1%)
Intentional self-harm	1 (1.6%)	11 (1.6%)
Burns	1 (1.6%)	5 (0.7%)
Plane	0	3 (0.4%)
Sports	2 (3.2%)	7 (1%)
Other	1 (1.6%)	29 (4.1%)
Mortality	3 (4.8%)	75 (10.7%)
Median ISS and interquartile range	17 (16 – 25)	17 (14–25)
Mean length of stay	8.2	8.5
Mean intensive care unit days	4.5	6.5

structure and relative size of the Māori population in Canterbury. The highest mortality rates for trauma patients are in the 65+ age bracket, with the leading cause being falls, which overall contributed 46% of all fatal trauma presentations in the North Island.[2,14] In this study, the majority of Māori patients were within the 20–59 age bracket, who have different patterns of injury and lower mortality rates. Although ISS can usually be correlated with expected mortality, a relative under-representation of fatal and low ISS trauma would result in a lower mortality rate for a given mean ISS.

Young age and male gender are risk factors for Māori trauma. In this study, 65% of admissions were male and 35% were between 20–29 years of age. Unintentional injury is the most common cause of death for Māori aged 15–24.[15] Sargent et al[16] concluded that male Māori aged 15–39 constituted 49% of non-fatal and 39% of fatal road traffic incidents, which is disproportionate representation given that this age group constitutes 21% of the total population. Similarly, Midlands DHB's 2016–17 annual report[17] demonstrated that Māori have a trauma incidence 1.7 times that of

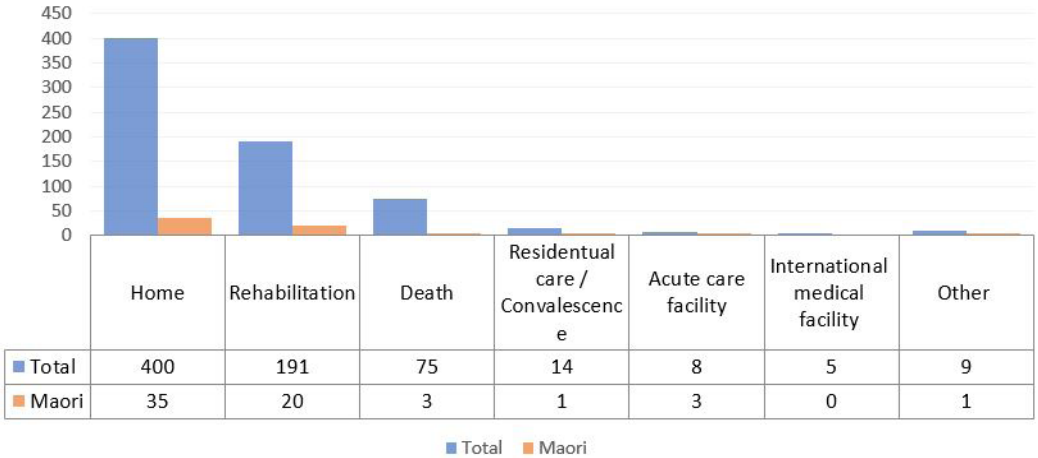
Figure 1: Admitting service.



	Orthopaedics	Neurosurgery	Cardio-thoracics	Orthopaedic spine	General Surgery	General Medicine	Paediatric Surgery	Other*
Total	164	100	104	112	113	44	19	36
Maori	13	6	8	17	12	0	3	4

*Services included: otorhinolaryngology, plastic surgery, maxillofacial, urology, cardiology, emergency department, intensive care unit and ophthalmology.

Figure 2: Discharge location.



	Home	Rehabilitation	Death	Residentual care / Convalescence	Acute care facility	International medical facility	Other
Total	400	191	75	14	8	5	9
Maori	35	20	3	1	3	0	1

non-Māori. The majority of this difference is attributed to Māori males aged 15–24 years. Socioeconomic factors further amplify the effects in this young, high-risk group. Hosking et al concluded that household deprivation had a stratified interaction with injury risk following MVA depending on age bracket. Adults aged 25–64 had an 11% increase in injury risk per decile of deprivation, compared to 3% in the 65+ age group and 9% in the 0–14 age group.[18] While generalised interventions to reduce unintentional injury incidence rates have lowered Māori incidence rates[18], the continuing disparity suggests that Māori-specific initiatives are also required to reduce this further towards the rate of the general population.

Several pre-injury risk factors for increased post injury disability have been identified.[19,20] Among the strongest predictors of disability at 24 months were having greater than two chronic conditions, reduced access to healthcare post injury and inadequate pre-injury household income. Alcohol use, illicit drug use and mental health were other predictors. As Māori experienced increased rates of post-injury disability, the collection and analysis of these variables could be a helpful factor in identifying populations of Māori patients who are at high risk for ongoing disability post hospital discharge. The Cochrane Equity Method Group has suggested developing a framework for the collection and individual consideration of these socioeconomic factors that contribute to variations in health equity [21]. Finally, a number of Māori patients are being transferred large distances from other areas of New Zealand and being isolated from whānau and other mental and spiritual supports required for their wellbeing.[21] Local organisations or provisions to address these aspects of Māori health could have benefits to Māori-inpatient outcomes and long-term disability.

Limitations

The accuracy of these results relies on the quality of data entered into the registry. Mortality data was occasionally missing in patient datasets, including those of several Māori patients. One case was excluded from the mean ISS analysis due to missing data. Scott et al[22] identified incorrect ethnicity entry data in the Waikato trauma registry and suggested a revision of the protocols being used. Similar data-entry issues were possible in this study and may warrant further investigation.

There is a difference in methodology in the attribution of cases compared to the national trauma registry. This potentially reduces how comparable the results of this study are compared to those obtained in the national trauma network annual reports. But, despite this difference, the calculated incidence rate of trauma in the South Island in these two studies is very similar.

The denominators used for the calculation of incidence rate were based on population projections derived from previous census data. There is an inherent inaccuracy when utilising this method, because the denominator numbers are not an exact measure of population.

Conclusion

In both the Māori and total populations, the incidence rate of major trauma in Canterbury is higher compared to the rates in the North Island. The incidence rate of major trauma in Māori patients in Canterbury is comparable to the overall incidence rate of major trauma. The cause for the increased rate of major trauma in the South Island remains uncertain. Motor vehicle accidents and falls remain the predominant mechanisms driving incidence rate, and falls in the 65+ age group contribute most to mortality.

Competing interests:
Nil.

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New Zealand COPD Guidelines: Quick Reference Guide

Robert J Hancox, Stuart Jones, Christina Baggott, David Chen, Nicola Corna, Cheryl Davies, James Fingleton, Jo Hardy, Syed Hussain, Betty Poot, Jim Reid, Justin Travers, Joanna Turner, Robert Young

ABSTRACT

The purpose of the Asthma and Respiratory Foundation of New Zealand's *COPD Guidelines: Quick Reference Guide* is to provide simple, practical, evidence-based recommendations for the diagnosis, assessment, and management of chronic obstructive pulmonary disease (COPD) in clinical practice. The intended users are health professionals responsible for delivering acute and chronic COPD care in community and hospital settings, and those responsible for the training of such health professionals.

Chronic obstructive pulmonary disease (COPD) encompasses chronic bronchitis, emphysema, and chronic airflow obstruction. It is characterised by persistent respiratory symptoms and airflow limitation that is not fully reversible.

COPD is associated with a range of pathological changes in the lung. The airflow limitation is usually progressive and associated with an inflammatory response to inhaled noxious particles or gases.[1,2]

Symptoms include cough, sputum production, shortness of breath, and wheeze. At first, these are often ascribed to "a smokers cough", "getting old" or being "unfit". Cough and sputum production may precede wheeze by many years. Symptoms may worsen and become severe and chronic, but not all of those with cough and wheeze advance to progressive disease.

Patients with COPD often have exacerbations, when symptoms become much worse and require more intensive treatment. These exacerbations have a significant mortality.

Many patients have extra-pulmonary effects and important co-morbidities that contribute to the severity of the disease. Important co-morbidities include asthma, bronchiectasis, lung cancer and heart disease. COPD can lead to debilitation, polycythaemia, osteoporosis, cachexia, depression and anxiety.

COPD is often confused with asthma. They are separate diseases, although some asthmatics develop irreversible airflow obstruction and some patients with COPD have a mixed inflammatory pattern. Asthma–COPD overlap (ACO) may be present when it can be difficult to distinguish between the diseases, or in patients who have both conditions.[3]

Guidelines review

The following documents were reviewed to formulate this *Quick Reference Guide*: COPD-X Australian and New Zealand Guidelines 2020[1] and the Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2020.[2] A systematic review was not performed, although relevant references were reviewed when necessary. Readers are referred to the COPD-X and GOLD documents for the more comprehensive detail and references that they provide. References are only provided when they differ from the COPD-X guidelines.

Grading

No levels of evidence grades are provided, due to the format of the *Quick Reference Guide*. Readers are referred to the above documents for the level of evidence on which the recommendations in this *Quick Reference Guide* are based.

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Guideline development group

This group included representatives from a range of professions and disciplines relevant to the scope of the guidelines. The group did not include consumer representation.

Robert J Hancox, Stuart Jones, Christina Baggott, James Fingleton, Jo Hardy, Syed Hussain, and Justin Travers are respiratory physicians. Robert Young is a general physician. David Chen is a respiratory physiotherapist. Cheryl Davies is manager of the Tu Kotahi Maori Asthma Trust. Nicola Corna and Betty Poot are respiratory nurse practitioners. Jim Reid is a general practitioner. Joanna Turner is a pharmacist and research and education manager at the Asthma and Respiratory Foundation of New Zealand.

Peer review

The draft guidelines were peer-reviewed by a wide range of respiratory health experts and representatives from key professional organisations, including representatives from Asthma New Zealand, the Australian College of Emergency Medicine, Hutt Valley District Health Board, the Medical Research Institute of New Zealand, the New Zealand Medical Association, the New Zealand Nurses Organisation Te Rūnanga o Aotearoa, the NZNO College of Respiratory Nurses, Physiotherapy New Zealand, the Royal New Zealand College of General Practitioners, the New Zealand branch of the Thoracic Society of Australia and New Zealand, and Wellington Free Ambulance.

Dissemination plan

The guidelines will be translated into tools for practical use by health professionals and used to update health pathways and existing consumer resources. The guidelines will be published in the *New Zealand Medical Journal* and on the Asthma and Respiratory Foundation of New Zealand (ARFNZ) website, as well as being disseminated widely via a range of publications, training opportunities, and other communication channels to health professionals, nursing, pharmacy and medical schools, primary health organisations, and district health boards.

Implementation

The implementation of the guidelines by organisations will require communication, education, and training strategies.

Expiry Date

The expiry date for the guidelines is 2025.

COPD in Māori

Māori rights in regard to health, recognised in Te Tiriti o Waitangi and other national and international declarations, promote and require both Māori participation in health-related decision making as well as equity of access and health outcomes for all New Zealanders.

- The burden of COPD among Māori is one of the most significant health disparities in New Zealand: hospitalisation rates for Māori are 3.5 times higher than non-Māori, non-Pacific, and non-Asian rates, and COPD mortality for Māori is 2.2 times higher.[8]
- Māori whānau also have greater exposure to environmental triggers for COPD, such as smoking and poor housing.
- This burden of COPD translates to large inequities in lost years of healthy life and underscores the urgent need for health service models to address high and growing need for COPD treatment in Māori.
- Māori should be considered a high-risk group requiring targeted care. This should address risk factors such as poor housing, overcrowding, health literacy, inadequate tailoring of health information, obesity, smoking, and poor access to pulmonary rehabilitation and healthcare services.
- Māori have much worse lung function for given levels of smoking,[9] and the burden of COPD affects Māori 15–20 years younger than non-Māori.[10] This makes smoking cessation even more important for Māori, and COPD should be considered at a younger age among Māori smokers.
- There is a very high incidence of lung cancer among Māori.

Major barriers to good COPD management for Māori include poor access to care, inattention to culturally accepted practices, discontinuous and poor-quality care, and inadequate provision of understandable health information. As Māori place a high

value on whakawhanaungatanga (the making of culturally meaningful connections with others), the absence of culturally appropriate practices can hinder attendance in mainstream pulmonary rehabilitation programmes.[11] Cultural safety and a pro-equity approach is essential.

It is recommended that:

- Healthcare providers should undertake clinical audit or other quality-improvement activities to monitor and improve COPD care and outcomes for Māori.
- A systematic approach to health literacy and COPD education for Māori whānau is required.
- Healthcare providers should support staff to develop cultural safety skills for engaging Māori with COPD and their whānau.
- Assess patients using a Māori model of care: https://www.health.govt.nz/our-work/populations/maori-health/maori-health-models.

Māori leadership is required in the development of COPD management programmes, including pulmonary rehabilitation, to improve access to COPD care and facilitate 'wrap around' services that address the wider determinants of health (such as housing, financial factors, access to health care and access to pulmonary rehabilitation programmes) for Māori with COPD.

COPD in Pacific people

Similar considerations apply to Pacific people, who also have a disproportionate burden of COPD. Pacific people's hospitalisation rates are 2.7 times higher than those of other New Zealanders.[8]

It is recommended that:

- Pacific people should also be considered a high-risk group requiring targeted care.
- The approach should include addressing risk factors such as poor housing, overcrowding, health literacy, obesity, smoking and poor access to pulmonary rehabilitation and healthcare services.
- Healthcare providers should consider using a Pacific model of care, such as a Fonofale model:
  - https://thehub.swa.govt.nz/resources/pacific-mental-health-services-and-workforce-moving-on-the-blueprint/
  - https://whanauoraresearch.co.nz/wp-content/uploads/formidable/Fonofalemodelexplanation1-Copy.pdf

Pathogenesis

Most people with COPD will have smoked cigarettes or inhaled noxious particles causing lung inflammation. Airway inflammation is a normal response to smoking but seems to be accentuated in those who go on to develop COPD. Some people develop COPD without smoking or apparent exposures. COPD may also develop in patients with other chronic lung diseases such as asthma.

The inflammatory process in COPD is mostly neutrophil, macrophage, and T-lymphocyte mediated. This inflammation leads to narrowing of peripheral airways and destruction of alveoli, causing airflow obstruction and decreased gas transfer.

Inflammation, fibrosis, and sputum production in small airways causes air trapping during expiration leading to hyperinflation. This reduces inspiratory capacity and causes shortness of breath on exercise.

In patients presenting at a young age (particularly those younger than 40), alpha-1 antitrypsin deficiency should be considered. This genetic defect causes a reduction in the major anti-protease in lung parenchyma, leaving the lung susceptible to the destructive effects of neutrophil elastase and other endogenous proteases, which are released as part of the inflammatory response to smoking.

Diagnosis

A diagnosis of COPD should be considered in anyone who presents with cough, sputum production, wheeze, or shortness of breath, particularly those above the age of 40 years. There is usually a history of cigarette smoking or exposure to smoke other noxious substances.

- Physical examination and chest x-ray are rarely diagnostic in early COPD, but they may be valuable in excluding other diagnoses and co-morbidities

such as lung cancer, pulmonary fibrosis and cardiac failure.

- Other causes for the patient's symptoms should always be considered, as common comorbidities such as heart disease and obesity may co-exist with COPD and in some patients will be the dominant cause of breathlessness.
- The diagnosis of COPD should be confirmed by spirometry (see *Spirometry*). If this is not available in primary care, patients should be referred for this. There are few contra-indications, but a small proportion of patients cannot do adequate spirometry.
- Spirometry should be avoided during infections, because of the risk of transmitting infections such as influenza, SARS-CoV-2 (COVID-19), or tuberculosis.
- Peak flows are not useful for diagnosing or managing COPD.
- Usually asthma and COPD are easy to differentiate. Asthma is an episodic disease and usually, but not always, presents at a younger age or with a history of being "chesty" as a child. However, a mixed pattern of asthma-COPD overlap (ACO) exists, and it is sometimes difficult to distinguish which is the principal cause of airway limitation (see section *Asthma and COPD overlap (ACO)*).

Assess severity

Spirometry assesses the severity of airflow obstruction. Used in conjunction with the severity of symptoms, this helps to assess the severity of COPD (Table 1). Although Table 1 also shows the typical symptoms, the severity of the symptoms does not necessarily correspond to the severity of airflow obstruction.

The effect of breathlessness on daily activities can be quantified using the modified Medical Research Council (mMRC) Dyspnoea Scale (Table 2).

The COPD Assessment Test (CAT) is an eight-item questionnaire that can measure the symptomatic impact of COPD and response to treatment (Appendix 2).

Functional tests, such as the six-minute walk test, shuttle walk tests and sit-to-stand tests, can help to assess functional limitation, disease progression and response to treatment.

Spirometry

Spirometry is the most useful test of lung function to diagnose and assess the severity of COPD. This may be done both before and after a bronchodilator to assess reversibility, but the diagnosis and severity are determined by *post-bronchodilator* measurements.

- Irreversible airflow obstruction is indicated by a *post-bronchodilator* forced expiry volume in once second to forced vital capacity (FEV_1/FVC) ratio<0.70 (see footnote on page 81).
- The *severity* of the obstruction is diagnosed using the post-bronchodilator FEV_1 as a % of the predicted value (Table 1).
- It is possible to have airflow obstruction with an FEV_1/FVC ratio<0.70 (see footnote on page 81) but an FEV_1 in the normal range.
- A restrictive pattern on spirometry is not consistent with a diagnosis of COPD and, if it is not due to technically inadequate spirometry, suggests an alternative cause of symptoms (eg, morbid obesity, neuromuscular weakness, or interstitial lung disease). Patients with a restrictive pattern may benefit from specialist referral for further investigation.
- Some patients with COPD cannot blow out long enough to do a true FVC. The Forced Expiratory Volume at 6 seconds (FEV_6) can be used as an approximation of the FVC.
- A small subset of patients with normal spirometry have evidence of emphysema on CT scan and impairment of gas exchange. There is limited evidence to guide management in these patients, but if they are symptomatic or having exacerbations, we recommend treatment for COPD according to this guideline.

Reversibility testing

When performing reversibility testing, the first measurements should be done before bronchodilators:

- Bronchodilators should be withheld for the duration recommended in the

Table 1: Severity classification for COPD. (Adapted from Lung Foundation Australia's Stepwise Management of Stable COPD available at https://lungfoundation.com.au/wp-content/uploads/2018/09/Information-Paper-Stepwise-Management-of-Stable-COPD-Apr2020.pdf.)

Classification of severity of chronic obstructive pulmonary disease (COPD)			
	Mild	**Moderate**	**Severe**
Typical symptoms	Few symptoms	Breathless walking on level ground	Breathless on minimal exertion
	Breathless on moderate exertion	Increasing limitation of daily activities	Daily activities severely curtailed
	Little or no effect on daily activities	Recurrent chest infections	Exacerbations of increasing frequency and severity
	Cough and sputum production	Exacerbations requiring oral corticosteroids and/or antibiotics	
Lung function	FEV_1≈60–80% predicted	FEV_1≈40–59% predicted	FEV_1<40% predicted

FEV_1=forced expiratory volume in one second. PaO_2=partial pressure of oxygen, arterial. $PaCO_2$=partial pressure of carbon dioxide, arterial.

Table 2: Modified Medical Research Council (mMRC) Dyspnoea Scale for grading the severity of breathlessness during daily activities.*

Grade	**Symptom complex**
0	I only get breathless with strenuous exercise
1	I get short of breath when hurrying on level ground or walking up a slight hill
2	On level ground, I walk slower than people of the same age because of breathlessness, or I have to stop for breath when walking at my own pace on the level
3	I stop for breath after walking about 100 metres or after a few minutes on level ground
4	I am too breathless to leave the house or I am breathless when dressing or undressing

* The mMRC Dyspnoea Scale is very similar to the original MRC Scale, which ranges from 1 to 5 rather than 0 to 4 (ie, MRC grade 3=modified MRC grade 2).

consensus ATS/ERS guidelines.[4] This ranges from 4–6 hours for a short-acting beta agonist (SABA) to 48 hours for an ultra long-acting beta agonist (LABA).

- Spirometry is repeated at least 15 minutes after giving a bronchodilator (usually 400mcg salbutamol via spacer).
- Many patients with COPD will have some improvement after a bronchodilator ("partial reversibility"), but if spirometry becomes normal (FEV_1/FVC>0.7* and FEV_1>80% predicted), COPD is excluded (by definition).
- The consensus definition of a significant bronchodilator response is arbitrarily defined as a ≥12% change from baseline with an absolute improvement of ≥200ml, but this does not predict who will benefit from bronchodilator treatment.
- If the response to bronchodilator is substantial (>400mL improvement in FEV_1) then asthma or Asthma-COPD Overlap is likely.

Non-pharmacological management (Box 1)

Smoking cessation

Stopping smoking is the most important treatment for COPD: every person who is still smoking should be offered help to quit. Reducing smoking-related health risks requires complete cessation of all tobacco and other smoked products, including marijuana/cannabis.

- All forms of nicotine replacement therapy, in association with smoking cessation support, are useful in aiding smoking cessation and increase the rate of quitting.
- Oral bupropion, varenicline, and nortriptyline have been shown to be effective and should be considered in those patients struggling to give up despite nicotine replacement therapy.
- Most of these are fully funded in New Zealand and a prescription for this should be discussed with a health professional.
- Referral to a local smoking cessation support service is recommended.

E-cigarettes and vaping are probably less harmful to health than smoking, but short-term studies suggest that they are not risk free.[5] E-cigarettes and vapes that contain nicotine are highly addictive.

- E-cigarettes used *within the context of a supportive smoking cessation programme* have been shown to aid in smoking cessation in selected groups of motivated patients.
- The long-term safety of e-cigarettes and vaping have not been shown. Smokers using e-cigarettes or vaping to quit smoking should be advised to stop using e-cigarettes and vaping as soon as possible after quitting smoking.
- No e-cigarette or vape is currently approved as a smoking cessation tool.
- E-cigarettes and vapes should never be used near an oxygen source, as this is a fire risk.

Physical activity

Patients with COPD benefit from physical activity and should be encouraged to:

- Be active on most, preferably all, days of the week.
- Do at least 20–30 minutes of exercise per day. More is better.
- Exercise to an intensity that should cause the patient to "huff and puff" or

*Note: There is disagreement about the criteria for airflow obstruction. The FEV_1/FVC ratio naturally declines with age, and defining airflow obstruction by an FEV_1/FVC ratio <0.70 may miss mild airflow obstruction in younger patients and over-diagnose it in the elderly. Some guidelines recommend using an age-specific lower limit of normal. But for clinical purposes, the <0.70 cut-point is easy to apply and unlikely to greatly influence management in those with mild airflow obstruction. The grading of severity also varies between guidelines, with the GOLD guidelines using different categories to COPD-X (in Table 1). But this is also unlikely to greatly influence clinical management.

feel breathless: Getting out of breath will not cause harm.

- Do muscle strengthening activities on two or more days each week.

Pulmonary rehabilitation

Pulmonary rehabilitation should be offered to all patients with COPD. Although there may be barriers to attending pulmonary rehabilitation classes, there are a variety of ways to deliver pulmonary rehabilitation to patients in different settings depending on local respiratory services and patient preferences.

- Pulmonary rehabilitation reduces breathlessness, improves quality of life, and reduces depression in patients with COPD.
- Patients gain significant benefit from rehabilitation regardless of the degree of breathlessness, but the most breathless patients benefit the most.
- Exacerbations of COPD are an indication for referral to pulmonary rehabilitation and an early return to pulmonary rehabilitation after exacerbation should be encouraged. This has been shown to reduce further hospitalisations and may reduce mortality.
- Exercise training is the cornerstone of pulmonary rehabilitation, and regular post-rehabilitation exercise is required to sustain the benefits.
- The benefits of pulmonary rehabilitation decline over time and repeat attendance at pulmonary rehabilitation programmes should be encouraged in patients with functional decline or exacerbations.
- If someone is unable to access a pulmonary rehabilitation programme, an in-home exercise programme should be considered.

Breathlessness management strategies

In addition to pulmonary rehabilitation, patients may benefit from seeing a respiratory physiotherapist for individualised breathing exercises or breathless management strategies:

- Diaphragmatic breathing and pursed lips breathing exercises may benefit some patients. These support and correct the breathing pattern disorders caused by COPD and improve exercise capacity, but they have inconsistent effects on dyspnoea or health-related quality of life scores.
- Constant load threshold inspiratory muscle training improves inspiratory muscle strength, quality of life, dyspnoea, and exercise capacity.
- Hand-held fan therapy: the airflow and cooling effects of the fan, alongside other breathlessness management strategies, such as relaxation, pacing, and positioning, can reduce dyspnoea.

Other things that may help:

- Hospital clinical teams working with the primary healthcare team can help enhance quality of life and reduce disability for patients with COPD.
- Patients may also benefit from local support groups.
- Consider including a cognitive behavioural component in the self-management plan to assist with reducing anxiety and breathlessness.
- Consider screening for urinary incontinence related to cough.

Other useful resources are given in Appendix 4 and 5.

Sputum management/sputum clearance techniques

Patients with chronic sputum production may benefit from seeing a physiotherapist (ideally a respiratory physiotherapist) for an individualised chest clearance plan. Airway clearance techniques enhance sputum clearance, reduce hospital admissions, and improve health-related quality of life, and they may also improve exercise tolerance and reduce the need for antibiotics.

- A wide variety of airway clearance techniques are available. No one technique is superior for all patients.
- The choice of technique should be based on the clinician's assessment, resource availability, and patient acceptability.

Nutrition

Both malnutrition and obesity are common and contribute to morbidity and mortality in COPD. Poor eating habits, sedentary lifestyles, smoking, and cortico-

steroid use further compromise nutritional status.

- The key goals of nutritional management are to eat a balanced diet, to achieve and maintain a healthy weight, and to avoid unintentional weight loss. Consider referral to a dietician, or high-calorie nutritional supplements, for those who are malnourished.
- There is evidence that weight loss is beneficial for those who are obese.
- Unintentional weight loss should be investigated for potential malignancy.

Housing

There is good evidence that a warm, dry, and smoke-free home is associated with better asthma control, and it is likely that the same is true for COPD.

Assisted ventilation

Non-invasive ventilation (NIV) with bi-level positive airway pressure reduces mortality and need for intubation in patients admitted to hospital with acute hypercapnic respiratory failure as a result of an exacerbation of COPD (see section *Management*). In most instances, NIV is not required once the patient has recovered.

- People who have chronic hypercapnic respiratory failure, despite adequate treatment, and have needed assisted ventilation (invasive or non-invasive) during an exacerbation, or with worsening hypercapnia on long-term oxygen therapy, should be referred to a specialist centre for consideration of long-term NIV.
- Red flags to consider for need for home NIV:
    - Previously required assisted ventilation
    - Obstructive sleep apnoea
    - Obesity hypoventilation
    - Persistent nocturnal hypoxia
    - Neuromuscular conditions
    - Spinal/chest wall deformities

Interventional approaches to the management of COPD

Thoracic surgery is rarely performed for COPD. The two situations where it may be considered are bullectomy or lung volume reduction surgery. Neither procedure increases life expectancy. Both have significant complication rates and are only performed in specialist centres after careful multi-disciplinary assessment.

Bullectomy

Bullectomy can be considered where there is a very large bulla compressing other lung tissue. Removing the bulla allows the preserved lung tissue to function better.

Lung volume reduction surgery

Lung volume reduction surgery can improve exercise capacity in people with upper-lobe predominant emphysema. The surgery has a significant early mortality, but there is no difference in long-term mortality.

Interventional bronchoscopy

Bronchoscopic lung volume reduction approaches have been developed as alternatives to lung volume reduction surgery. These aim to reduce gas-trapping and improve lung mechanics in advanced emphysema, which can lead to improved lung function, symptoms, and quality of life in carefully selected patients. Endobronchial valve therapy has the most evidence and is available in New Zealand. It is only effective in those with intact fissures and no collateral ventilation as one-way valves are inserted to cause collapse of lung segments. Endobronchial valve therapy does not reduce mortality and has significant complication rates.

Lung transplantation

Consideration for lung transplantation is appropriate in younger patients (usually <65) with very severe obstruction and severe symptoms, or progressive deterioration despite optimised management, including smoking cessation and pulmonary rehabilitation. Referral to the transplant service should be made by a respiratory specialist.

Improving patient understanding

Identify and manage social and cultural issues

Health literacy, cultural context, and the degree of social isolation or support are key factors affecting a person's understanding of and attitude to COPD. See also sections *COPD in Māori* and *COPD in Pacific people*.

Box 1: Key messages for non-pharmacological management of COPD.

A four-step consultation plan for COPD is shown in Appendix 1.

Recommendations:

- Smoking cessation is the most important component of management, and every patient who is still smoking should be offered help to quit.
- Offer pulmonary rehabilitation to all patients with COPD.
- Promote regular exercise (20–30 minutes per day).
- Address obesity and under-nutrition.
- Some patients will benefit from review by a respiratory physiotherapist and breathing exercises.
- Individual breathlessness plans, including handheld fan therapy, can help manage symptoms.
- A subset of carefully selected patients may benefit from thoracic surgery, endobronchial valve therapy or referral for transplantation. These options should be considered as part of respiratory specialist review in secondary care.

- These factors impact on COPD management, appropriate inhaler technique, adherence to treatment and appropriate use of self-management plans.
- These factors also have a considerable impact on the success of smoking cessation.
- Awareness of the social and cultural factors will enhance communication between clinicians and patients and improve health outcomes.
- There are many practical challenges for people living with COPD, such as completing everyday tasks, holding down a job, and having access to transport. Awareness of these challenges and referral to support services where available can be beneficial.

Optimise knowledge of COPD and adherence to treatment

- Patient understanding of the disease, appropriate inhaler technique and adherence to treatment are important factors in COPD management.
- There are many inhalers available to treat COPD, and people can easily get confused about these. Demonstrate the use of the inhalers and ensure that patients can use them correctly.
- Clinicians should ask about the patient's understanding of the disease and the rationale for treatment, to clarify misunderstandings, and to work to remove barriers to adherence and good self-management. It is important to provide information to the patient and whānau in a format that they can understand.

Develop an action plan

Personalised action plans (self-management plans) improve quality of life and reduce hospital admissions and should be offered to all people with COPD.

- Action plans should be personalised and focus on recognising and treating deteriorating symptoms.
- Patients at risk of exacerbations may be offered antibiotics and prednisone to have at home as part of their action plan. The patient should be advised of a timeframe for clinical review once they have started these medicines for an acute exacerbation of COPD.
- Action plans should be checked at each COPD review.

The Asthma and Respiratory Foundation of New Zealand's COPD Action Plan is shown in Appendix 3.

Electronic versions are available at: www.nzrespiratoryguidelines.co.nz.

Develop a breathlessness plan

- A breathlessness plan can reduce the severity and impact of breathlessness.

Interventions and techniques that can improve breathlessness include self-management education, breathing exercises, sitting upright and leaning forwards ('positioning'), using pursed lip breathing, and a hand-held fan.

- Oxygen is *not* an effective treatment for breathlessness in patients who are not hypoxic.
- Smoking cessation also improves breathlessness.

Asthma and Respiratory Foundation of New Zealand's 'Breathlessness Strategies for COPD' is shown in Appendix 4 and is available at www.nzrespiratoryguidelines.co.nz.

Pharmacological management (Box 2)

The purpose of pharmacological management in COPD is symptom control and prevention of exacerbations, with the aim of improving quality of life.

- Check inhaler adherence and inhaler technique regularly. Make sure that these are optimal before escalating treatment.
- Treatment escalation should follow a stepwise approach based on breathlessness and exacerbation frequency. It should take into account patient preferences, regimen complexity, cost, and side effects.
- Effects of treatment on dyspnoea should be apparent within six weeks.
- Effects on exacerbation frequency may need to be assessed over 6 to 12 months.

Inhaled medication for COPD

- Short-acting beta$_2$ agonists (SABA: salbutamol or terbutaline) and the short-acting muscarinic antagonist (SAMA: ipratropium), either individually or in combination, can be taken as-needed to provide short-term relief of breathlessness. Short-term response to SABA or SAMA (reversibility testing) does not predict benefit from long-acting bronchodilator therapy.
- For patients with ongoing dyspnoea despite as-needed SABA, SAMA, or combination SABA/SAMA, a regular long-acting muscarinic antagonist (LAMA) such as tiotropium, glycopyrronium, or umeclidinium is recommended, unless there is evidence of asthma/COPD overlap (see *Asthma and COPD overlap (ACO)*). Do not continue to use ipratropium in patients taking a LAMA, except in emergencies.
- It is not necessary to have a trial of regular short-acting bronchodilators before starting a LAMA if symptoms, exacerbation history or spirometry suggest that a long-acting bronchodilator is desirable.
- Both LAMAs and LABAs improve lung function, symptoms and quality of life, but LAMAs are recommended as the first-line long-acting medication for COPD because they reduce exacerbation risk and have fewer side effects. If LAMAs are contra-indicated, a long-acting beta agonist (LABA) such as salmeterol, formoterol, or indacaterol is recommended.
- In patients who remain breathless or who continue to exacerbate despite treatment with a single long-acting bronchodilator, dual LAMA/LABA therapy is recommended (eg, glycopyrronium/indacaterol, umeclidinium/vilanterol, or olodaterol/tiotropium). Combination therapy with a LABA and LAMA improves lung function, reduces symptoms, and reduces exacerbations compared to either drug alone.
- LABA/LAMA is preferred over inhaled corticosteroid (ICS)/LABA as initial therapy for *most* patients with frequent exacerbations because ICS increases the risk of pneumonia.
- These medications may have risks, particularly at higher doses in patients with cardiac disease. If there is no evidence of benefit, consider stopping them.
- Patients with an eosinophilic pattern of disease may benefit from ICS/LABA instead of LABA/LAMA. Retrospective analyses suggest that blood eosinophil counts predict the benefit of ICS in preventing exacerbations: people with blood eosinophil counts <100cells/μL are least likely to benefit and people

Box 2: Key messages for pharmacological management of COPD.

A suggested four-step consultation plan for COPD is shown in Appendix 1.

Recommendations:

- Inhaler technique, device suitability, and adherence to treatment should be reviewed regularly and before any medication changes.
- SABAs and SAMAs can be used for symptom relief.
- We suggest a LAMA as the first-line long-acting bronchodilator, both for breathlessness and reduction of exacerbation risk.
- Escalate to LABA/LAMA if LAMA does not control breathlessness/exacerbations.
- The main role for ICS is to prevent exacerbations in patients with frequent exacerbations.
- Higher blood eosinophils are associated with a greater response to ICS and may identify patients who should receive ICS/LABA in preference to LABA/LAMA.
- Patients with Asthma/COPD overlap should receive ICS irrespective of blood eosinophils, lung function, and exacerbation frequency: preferably as combination ICS/LABA
- Within each drug class, choice of treatment should be guided by a patient's preference for inhaler device.
- Treatment may be escalated more quickly for patients with severe COPD or frequent exacerbations.
- Provide all patients with a written/electronic personalised COPD action plan (see appendix)

Do not*:

- Do not routinely prescribe a SAMA to patients on a LAMA.
- Do not prescribe long-term oral corticosteroids as maintenance therapy for COPD.
- Do not routinely prescribe theophylline.
- Do not use short-term response to bronchodilator (eg, reversibility testing) to predict benefit from long-term bronchodilator therapy.
- Do not routinely prescribe nebulised therapy in patients with stable COPD.
- Do not withdraw ICS in patients with asthma/COPD overlap or raised blood eosinophils.

**Do not recommendations are intended as guidance to highlight prescribing practices that are rarely appropriate. Clinicians must consider the circumstances of individual patients to decide whether they apply in a specific case.*

with counts ≥300cells/μL are most likely to benefit. A single blood test may not be representative as eosinophil counts can vary over time. Blood eosinophil counts performed when a patient is taking oral steroids will not be informative.

- An ICS should form part of the regimen for any patient with asthma/COPD overlap. This should usually be prescribed as an ICS/LABA combination inhaler to avoid the risk of LABA monotherapy in patients with poor adherence to a separate ICS inhaler.
- Prescriptions should be based on drug class. Choice of specific LABAs and LAMAs should be guided by patient preference and their ability to use the inhaler device. A list of inhalers available in New Zealand is available at www.nzrespiratoryguidelines.co.nz. Dry-powder inhalers have a substantially lower impact on greenhouse gases than pressurised metered-dose inhalers.
- Six weeks is a reasonable timeframe to assess improvement in breathlessness following a medication change.
- The COPD assessment test is an eight-item questionnaire that can be used to measure the symptomatic impact of COPD and response to therapy (see *Assess severity* and Appendix 2).

Role of triple therapy (LABA/LAMA/ICS)

- Escalation to triple LABA/LAMA/ICS therapy should be considered in patients who continue to exacerbate (twice or more a year) despite adherence to dual LAMA/LABA or ICS/LABA therapy and optimal inhaler technique.
- A subset of patients with persistent breathlessness and exercise limitation, despite LABA/LAMA combination therapy, may benefit from triple therapy with LABA, LAMA, and ICS. However, the increased risk of pneumonia with regular ICS should be considered.
- Direct escalation to dual or triple therapy, without stepwise up-titration, may be reasonable in the setting of a severe or recurrent exacerbations.

ICS withdrawal

- The risk of pneumonia in patients with severe COPD is increased with regular ICS. Withdrawing ICS should be considered if:
  - There is no evidence of benefit from ICS in terms of improved symptoms or fewer exacerbations.
  - The patient develops pneumonia or other ICS adverse effects.
  - The patient does not have a history of frequent exacerbations and is stable.
- If ICS treatment is withdrawn, the patient should be reviewed at 4–6 weeks to ensure that this doesn't cause a deterioration in symptoms.
- Withdrawal of ICS may not be appropriate if the blood eosinophil count is elevated. A blood eosinophil count ≥300cells/μL has been shown to be associated with an increased exacerbation risk after ICS withdrawal.

Table 3: Simplified maintenance inhaler management of COPD.

When treating	Start with	If needed, move on to
COPD without frequent exacerbations	LAMA	LABA/LAMA
COPD with frequent exacerbations	LAMA	LABA/LAMA (consider ICS/LABA if eosinophilia), then LABA/LAMA/ICS
Asthma/COPD overlap	ICS/LABA	ICS/LABA plus LAMA

- ICS should not be withdrawn in patients with a diagnosis of asthma/COPD overlap (see section *Asthma and COPD overlap (ACO)*).

Additional therapies

- There is no evidence that routine use of nebulisers is beneficial in patients with COPD.
- Theophylline has not shown consistent benefits on exacerbation, lung function, symptoms, or quality of life in randomised controlled trials. In view of the narrow therapeutic index and side-effect profile of theophylline, we do not recommend its routine use in the management of COPD.
- There is no evidence of benefit from long-term oral corticosteroids.
- Long-term macrolide antibiotics, such azithromycin and erythromycin, can reduce risk of exacerbations over one year in former smokers who have exacerbations despite optimal inhaled treatment. Azithromycin is not currently funded in New Zealand for this indication. Long-term macrolide therapy is associated with significant risks, including bacterial resistance, gastrointestinal and cardiovascular side effects, and hearing impairment. Long-term macrolides should rarely be initiated without specialist advice.
- Regular treatment with mucolytics (eg, erdosteine, carbocysteine, or N-acetylcysteine) may reduce the risk of exacerbations in some patients. These treatments are not currently funded in New Zealand.
- In patients with severe and very severe COPD and a history of exacerbations, PDE4 inhibitors (eg, roflumilast) improve lung function, reduce the risk of exacerbations, and have modest benefits for symptoms and quality of life. They have significant gastrointestinal side effects. These treatments are not currently funded in New Zealand
- Alpha-1 antitrypsin augmentation therapy may slow the progression of emphysema in patients with alpha-1 antitrypsin deficiency. This is not currently funded in New Zealand.

Oxygen therapy

- Oxygen is a treatment for hypoxia, not dyspnoea. Oxygen does not reduce the sensation of breathlessness in patients who are not hypoxic. Oxygen may not improve breathlessness even in those who are hypoxic.
- Oxygen is a drug therapy and should be prescribed.
- Long-term oxygen therapy has survival benefits for COPD patients with severe hypoxaemia. It must be used for at least 16 hours a day. The survival benefits are not apparent until months or years after starting treatment.
- Evaluation of the patient and consideration for long-term oxygen therapy supply should be done by a specialist respiratory service (Box 3). The causes of the hypoxia should be explored, and the patient's pharmacological and non-pharmacological management should be optimised. A target saturation range and oxygen flow rate should be established.
- Patients should adhere to the amount of oxygen prescribed and be monitored for adverse effects.

Flying with oxygen

Flying is generally safe for patients with COPD, including those with chronic respiratory failure who are on long-term oxygen therapy.

- Before flying, patients should ideally be clinically stable.
- Supplemental oxygen is unlikely to be required if the resting oxygen saturation is ≥95%, and is likely to be required if oxygen saturation is ≤88%. Patients with oxygen saturation values between these levels might require specialist assessment.
- Those already on long-term oxygen therapy need an increase in flow rate of 1–2L per minute during the flight.
- Patients receiving oxygen therapy will need to contact the airline prior to flying.

Vaccination

- Yearly influenza vaccination reduces serious illness and death in patients with COPD and should be actively promoted to patients with COPD.

Box 3: Criteria for oxygen.

Criteria for supply of long-term oxygen therapy (LTOT):

- Assess when the patient's respiratory condition is stable—at least six weeks after hospital discharge or an acute respiratory illness.
- Arterial oxygen tension (PaO_2) (measured by arterial blood gas) less than 7.3kPa (55mmHg) indicates the need for long-term oxygen (oxygen saturation usually <88%).
- PaO_2<8.0kPa (60mmHg) (oxygen saturation up to 91%) may also be an indication for long-term oxygen if there is evidence of polycythaemia (haematocrit > 0.55) and/or cor pulmonale/right heart failure.

Criteria for oxygen in palliative care:

- Terminal illness with a life expectancy less than 3 months
- Oxygen saturation SpO_2 <90%
- Dyspnoea not adequately controlled by optimal treatment for dyspnoea and pain (physiotherapy, narcotics, anxiolytics)

There is a fire risk associated with oxygen use and smoking or other flammable sources such as gas appliances, open flames and vaping devices. Current smoking, use of heated tobacco, e-cigarettes, or vaping devices are absolute contra-indications to O_2 supply.

- Pneumococcal vaccination probably decreases the incidence of pneumonia and reduces the risk of exacerbations in patients with COPD, but the evidence for this is conflicting and pneumococcal vaccination is not currently funded for this indication in New Zealand.
- Two types of pneumococcal vaccine are approved for use. If the healthcare professional and patient consider this an appropriate treatment, a suggested schedule is one dose of 13-valent protein conjugate vaccine (PCV13, Prevenar 13®) given first, followed at least eight weeks later by the first dose of 23-valent polysaccharide vaccine (23PPV, Pneumovax 23®). A second dose of 23PPV is given a minimum of five years later and a third dose at age ≥65 years.

Acute exacerbations

COPD exacerbations are characterised by a change in the patient's baseline dyspnoea, cough, and/or sputum that is beyond normal day-to-day variations, is acute in onset, and may warrant a change in regular medication or hospital admission. Key symptoms of exacerbations include increased shortness of breath, increased sputum purulence and volume, increased cough, and wheeze.

Exacerbations of COPD are associated with an accelerated loss of lung function, particularly in patients with mild disease. Prolonged exacerbations are associated with worse health status and more frequent future exacerbations.

Early diagnosis and prompt management of exacerbations of COPD may prevent functional deterioration and reduce hospital admissions. Education of the patient, carers, other support people, and family may aid in the early detection of exacerbations.

Assessment (Figures 1 and 2)

- Most exacerbations can be managed at home. Indications for hospitalisation include, but are not limited to, a sudden worsening of symptoms, confusion or drowsiness, signs such as cyanosis and peripheral oedema, failure to respond to medical management, low oxygen saturation by pulse oximetry (SpO_2), the presence

of serious co-morbidities, including heart failure and newly occurring arrhythmias, and insufficient home support or lack of telephone or transport.

- A guide to acute severity assessment is shown in Table 4.
- Several prognostic scores have been proposed. The most validated one is DECAF, but this includes COPD with pneumonia and requires a blood gas, complete blood count (for eosinophils), and chest x-ray, which are unlikely to be available in primary care. An alternative is CURB-65, which was developed for pneumonia but has been found to be equally effective at predicting short term-mortality in COPD in New Zealand studies.[6] CRB-65 is a simpler version that does not require any laboratory measures (Table 5).
- A chest x-ray and electrocardiogram help to identify alternative diagnoses and complications, such as pulmonary oedema, pulmonary embolus, pneumothorax, pneumonia, pleural effusion, arrhythmias, myocardial ischaemia, and others. Biomarkers (troponins, B-natriuretic peptide, D-dimer) can help to identify comorbidities and abnormalities of these are associated with a worse prognosis.

Management (Box 4, Figures 1 and 2)

Use breathless management strategies (Appendix 4): sit, rest arms on a chair or table, use a fan, and practise breathing control techniques

Bronchodilators

- Short-acting inhaled beta$_2$ agonists with or without short-acting anti-muscarinics are the initial bronchodilator of choice to treat an acute exacerbation. These can be delivered via pressurised metered dose inhaler and spacer, dry powder inhalers, or nebuliser. We recommend salbutamol via a spacer. One actuation of the inhaler should be used each time and repeated as necessary.
- Spacer technique is important when using a pressurised metered dose inhaler. In an exacerbation, we recommend one actuation into the spacer followed by 4—6 tidal breaths. Observe and repeat if required.
- The bronchodilator effect of 8—10 puffs of 100mcg salbutamol via spacer is equivalent to a 5mg salbutamol nebuliser. We recommend that no more than five puffs are used at a time (given individually via spacer).
- If patients do not respond to multiple doses of inhaled short-acting beta$_2$ agonist, additional bronchodilator

Box 4: Key messages for exacerbation management in COPD.

Recommendations:

- Early diagnosis and prompt management of exacerbations of COPD may prevent functional deterioration and reduce hospital admissions.
- Most mild to moderate exacerbations can be managed at home.
- Short-acting inhaled beta$_2$ agonists with or without short-acting anti-muscarinics are the initial bronchodilators of choice to treat an acute exacerbation.
- Give short course oral corticosteroids (eg, prednisone 40mg once daily for five days).
- Give short-course antibiotics for purulent sputum and/or other evidence of infection.
- Titrate oxygen to target saturations of 88–92%
- Non-invasive ventilation (NIV) reduces mortality in patients with hypercapnic respiratory failure due to an acute exacerbation of COPD.
- Careful discharge planning and referral to pulmonary rehabilitation may reduce the risk of future exacerbations and admissions.

Table 4: Assessment of exacerbation severity. (Adapted from the National NZ Ambulance Guidelines 2019.[7] Not all patients will have all of these features.)

Mild to moderate	**Severe**	**Life-threatening / imminent respiratory arrest**
More short of breath than usual	Very short of breath	Extremely short of breath
Able to speak in sentences	Only a few words per breath	Unable to speak
Usually have wheeze		May not have a wheeze
Some chest/neck indrawing	Severe neck/chest indrawing	May be no chest/neck indrawing
	Tripod positioning	
SpO_2 near usual level	SpO_2 well below their usual level	SpO_2 rapidly falling
Normal level of consciousness	May be agitated	Severe agitation and/or falling level of consciousness

Table 5: Assessment of short-term (one-month) prognosis.

CURB65*	**CRB65***	**DECAF*#**
C – Confusion	C – Confusion	D – Dyspnoea: unable to leave house = 1 point; unable to wash/dress = 2 points
U – Urea >7mmol/L		E – Eosinophils<0.05x 109/L
R – Respiratory rate ≥30/min	R – Respiratory rate ≥30/min	C – Consolidation on CXR
B – Blood pressure: systolic<90, diastolic<60 mmHg	B – Blood pressure: systolic<90, diastolic<60 mmHg	A – Acidaemia: Blood pH <7.3
65 – age ≥65	65 – age ≥65	F – atrial Fibrillation
Low risk score ≤1: ~2% mortality	Low risk score ≤1: ~4% mortality	Low risk score ≤1: ~3% mortality
High risk score ≥3: ~20% mortality	High risk score ≥2: ~17% mortality	High risk score ≥4: ~20% mortality

*Score 1 point for the presence of each factor. #DECAF scores have been validated in patients with COPD *and* pneumonia, and CURB65 and CRB65 have not.

Figure 1: Pre-hospital management of acute exacerbation of COPD.

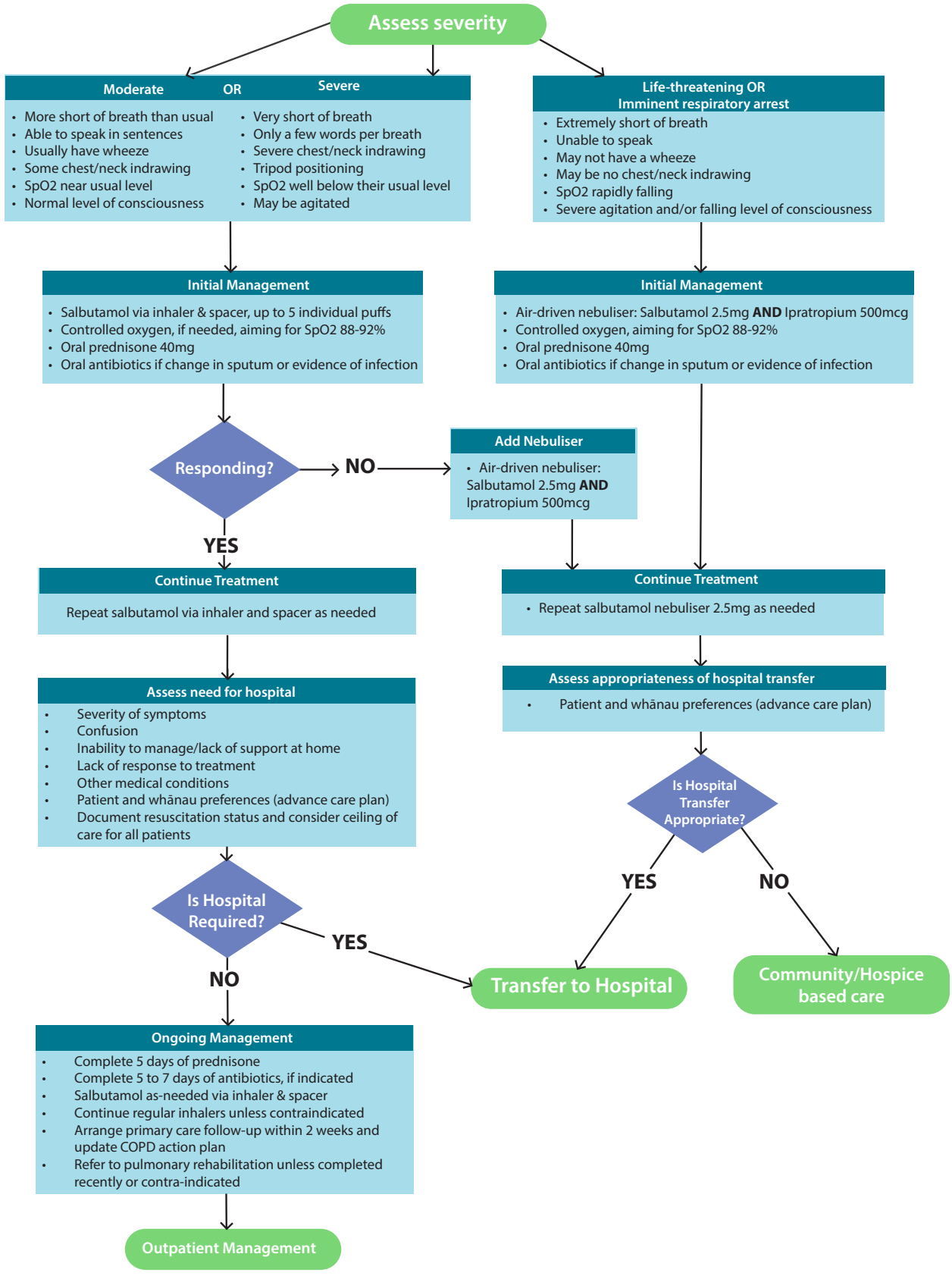

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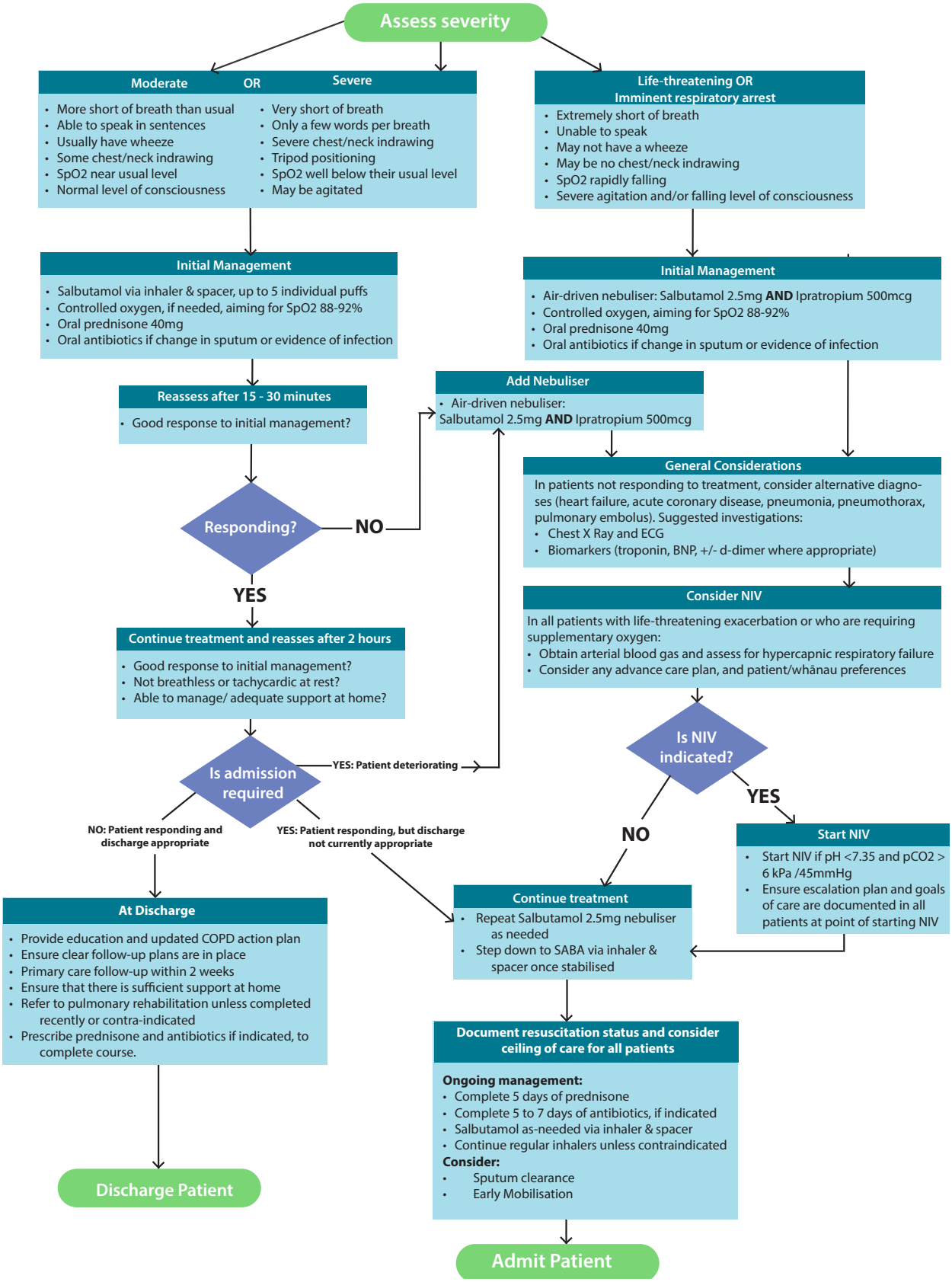
Figure 2: Hospital management of exacerbation of COPD.



treatment such as ipratropium is recommended.

- Nebulisers may increase the risk for aerosolisation of viruses such as SARS-CoV-2 (COVID-19). There is no evidence that nebulisers are more effective than inhalers via a spacer, and we recommend that nebulisers should be avoided in any patient who could be infected with respiratory viruses. If they are used, appropriate aerosolisation infection precautions should be implemented.
- If a salbutamol nebuliser is necessary, we recommend a maximum dose of 2.5mg at a time. Patients with COPD often have cardiac co-morbidities. Higher doses are associated with an increased risk of tremors, elevated heart rate, palpitations, and lower blood pressure, without evidence of any additional benefit.
- If nebulisers are given for acute COPD exacerbations, they should be air driven to reduce the risk of type 2 respiratory failure due to high flow oxygen.
- Maintenance LABA, LAMA, and ICS should be continued during an exacerbation.
- We do not recommend the routine use of intravenous (IV) magnesium for COPD exacerbations.
- We do not recommend adrenaline for COPD exacerbations in the absence of anaphylaxis.

Corticosteroids

- Systemic corticosteroids (eg, prednisone 40mg once daily) can improve lung function, improve oxygenation, and shorten recovery time. They should usually be given for five days. Longer courses should generally be avoided due to the risk of side effects.
- Intravenous steroids should be avoided. There is no evidence of benefit compared with oral corticosteroids for treatment failure, relapse, or mortality. Hyperglycaemia rates are higher with IV corticosteroids.

Antibiotics

- Respiratory tract infections are the most common precipitants of exacerbations of COPD. These may be viral, bacterial, or mixed. Common bacterial pathogens include *Haemophilus* influenzae, *Streptococcus* pneumonia, and *Moraxella* catarrhalis. *Mycoplasma pneumoniae* and *Chlamydia pneumoniae* have also been reported. *Pseudomonas aeruginosa* and *Staphylococcus aureus* are uncommon but occur more frequently in severe COPD.
- Antibiotics, when indicated by the presence of purulent sputum, fever and/or raised inflammatory markers (CRP >40), can shorten recovery time and reduce the risk of relapse and treatment failure, and should be prescribed for 5–7 days.
- Oral antibiotics such as amoxicillin or doxycycline are recommended. If treatment failure or resistant organisms are suspected, amoxycillin-clavulanate can be prescribed. If pneumonia, *Pseudomonas* or *Staphylococci* are suspected, appropriate antibiotics should be used.

Oxygen

- If indicated, oxygen should be prescribed and titrated via nasal prongs or a controlled flow device to target saturations of 88–92%.
- Oxygen delivery via a high-flow humidified nasal device can improve ventilation and airway clearance as well as reduce the physiological dead space and work of breathing.

Supported ventilation

- Non-invasive ventilation (NIV) reduces mortality by about 50%, reduces need for intubation, and shortens length of stay in patients with rising arterial carbon dioxide tension ($PaCO_2$) levels due to COPD. It should be considered in patients who present with hypercapnic respiratory failure (arterial pH <7.35, $PaCO_2$ >6kPa/45mmHg).
- An arterial blood gas should be considered in every patient with a severe exacerbation, an oxygen saturation less than 90%, or signs of cor pulmonale.
- A *venous* blood gas pH ≤7.34 has good sensitivity and specificity for acidaemia (pH ≤7.35) but *does not*

reliably predict arterial $PaCO_2$ and cannot diagnose hypercapnic respiratory failure. An arterial blood gas is necessary to assess the need for NIV.

- Ward-based NIV can reduce the requirement for HDU/ICU admission but should be conducted in an appropriately monitored setting with trained clinical staff.
- At the time of initiating NIV, the goals and limits of care should be considered and a clear written escalation plan established.

Airway clearance techniques

- Patients with excess sputum production benefit from airway clearance techniques during an exacerbation.
- Airway clearance techniques should be individualised to the patient.

Before discharge

- Ensure that adequate education is provided regarding COPD management, including smoking cessation, use of inhalers, and the development of an acute management/action plan.
- Ensure that clear follow-up plans are in place, as the risk for further exacerbations is greatest following an exacerbation.
- Ensure that there is sufficient support at home for the patient to manage during their recovery. This may require social work, physiotherapy, occupational therapy, and other allied health input.
- Recommend primary care follow-up within two weeks.
- Consider follow-up spirometry if this has not been done.
- Refer to a pulmonary rehabilitation programme unless recently completed or contra-indicated.

After an exacerbation

- Having an exacerbation is the greatest risk factor for a further exacerbation.
- Each exacerbation is associated with a faster decline in lung function and increased mortality.
- Exacerbations should be used as an opportunity to review the pharmacological and non-pharmacological strategies in place and to develop a personalised action plan.
- Review of inhaler technique and adherence should occur in every patient following an exacerbation (see section *Optimise knowledge of COPD and adherence to treatment*).
- All medications should be reviewed following an exacerbation of COPD and adjusted as appropriate.
- Refer to a pulmonary rehabilitation programme unless recently completed or contra-indicated.

Comorbidities and treatable traits

Identify and manage comorbidities

- People with COPD often have other conditions. Lung cancer, bronchiectasis, ischaemic heart disease, congestive heart failure, diabetes, anxiety, depression, gastro-oesophageal reflux, and osteoporosis are all more common among people with COPD than in the general population.
- These conditions can negatively impact on the management of COPD and, in turn, the presence of COPD can negatively impact on the treatment and prognosis of comorbid conditions.
- A systematic approach to the assessment and management of comorbidities has been proposed as part of the treatable traits concept. This approach recommends that management is personalised to the individual, with the use of biomarkers where available, and the systematic multidimensional identification and treatment of all comorbidities or disease characteristics, which may contribute to the patient's presentation and are potentially amenable to treatment ('treatable traits'). There is preliminary evidence to suggest that this approach improves quality of life.

Lung cancer

- There is a strong association between COPD and lung cancer, more so than is explained by the shared risk factor of smoking.

- Haemoptysis is not a symptom of COPD and should be investigated to rule out lung cancer. Unexplained weight loss and a new persistent cough may also be symptoms of lung cancer.
- Although patients with severe COPD may be unfit for surgery because of poor lung function, they may still be eligible for curative-intent cancer treatment. Newer radiotherapy techniques such as stereotactic ablative radiotherapy can deliver curative-intent treatment with little effect on lung function.
- A person with lung cancer who has a poor life expectancy due to advanced COPD or other comorbidities may not require any treatment for an early stage, slow-growing and asymptomatic lung cancer.

Cardiac disease

- People with COPD are at increased risk of ischaemic heart disease and cardiac failure because of the shared risk factors of age and smoking status. Severe COPD is associated with pulmonary hypertension and cor pulmonale. People with COPD should have a cardiovascular risk assessment done.
- Smoking cessation reduces cardiovascular risk as well as the rate of lung function decline in COPD.
- If beta-blockers are needed for cardiac disease, then cardioselective beta-blockers such as bisoprolol should be used. Inhaled SABA and LABA therapy can be used alongside cardioselective beta-blocker therapy.
- Bronchodilators may have pro-arrhythmic effects. There is an acceptable safety profile for long-acting beta agonist and anticholinergic bronchodilators at prescribed doses, but caution should be employed with high doses of short-acting beta$_2$-agonists during a COPD exacerbation or when using theophylline. There may be a risk of developing arrhythmias such as atrial fibrillation in these situations.

Mental health disorders

- Anxiety and depression are common in COPD. Breathlessness, activity limitation, and loss of social connections are risk factors for the development of anxiety and depression. In turn, anxiety and depression increase the perception of breathlessness and may increase symptom burden, leading to a reduction in social activity and exercise avoidance.
- Treatment of anxiety and depression should not change in the presence of COPD. Participation in a pulmonary rehabilitation programme reduces anxiety and depression scores.
- Smoking and therefore COPD are common among people with mental health disorders, and COPD may be underdiagnosed and undertreated in this group.

Other comorbidities

- The presence of gastro-oesophageal reflux is a risk factor for COPD exacerbations, possibly due to lung injury from aspiration. It is sensible to treat reflux symptoms with proton pump inhibitors, although it has not been proven that this reduces the risk of COPD exacerbations.
- Allergic rhinitis may increase COPD symptoms.
- Obstructive sleep apnoea syndrome and obesity-hypoventilation syndrome lead to worse night-time hypoxaemia in people with COPD. Appropriate treatment of these comorbidities with nocturnal continuous positive airways pressure (CPAP) or NIV can improve sleep quality, reduce pulmonary hypertension, and may reduce mortality.
- Identification of coexisting non-COPD lung disease such as bronchiectasis or interstitial lung disease is an opportunity to use disease-specific treatment to improve respiratory symptoms. (See also section *Asthma and COPD overlap (ACO)*).

Multiple comorbidities and frailty

- People with multiple comorbidities are more vulnerable to adverse

outcomes including mortality. COPD treatments may impact on control of comorbid conditions. For example, prednisone taken for a COPD exacerbation can adversely affect diabetic glycaemic control.

- COPD is a risk factor for falls. Hypoxemia, dyspnoea, and fatigue are associated with impaired balance.
- Cognitive impairment is common in COPD, particularly during exacerbations. This can affect COPD disease education and adherence to medication and self-management plans.
- Some COPD treatments such as pulmonary rehabilitation or lung transplantation may not be able to be delivered safely due to comorbidities.
- People with COPD and comorbidities may be taking many medications. COPD medication can add to the problem of polypharmacy and we recommend a regular medicines review.

Asthma and COPD overlap (ACO) (Box 5)

Patients with features of both asthma and COPD appear to have a worse prognosis than those with COPD alone according to many, but not all, studies. Treatment recommendations are based on expert opinion only because asthma and COPD overlap (ACO) patients have largely been excluded from controlled trials.

- Patients with ACO are broadly characterised by the following:
  - asthma diagnosed before aged 40 years old, and
  - a smoking history of >10 pack years or comparable aero-pollutant exposure, with
  - highly variable expiratory volumes (FEV_1 >400ml) and/or
- elevated eosinophils (>$0.3x10^6$).
- We recommend inhaled corticosteroids in low or moderate doses to target asthma-like inflammatory pathways in combination with single or dual long-acting bronchodilator.
- We recommend ICS/LABA as initial therapy followed by the addition of LAMA (ie, triple therapy) if there are persistent symptoms or exacerbations.
- We recommend using either an asthma or COPD action plan depending on the dominant clinical features.
- Although recent studies in asthma favour the use of combined budesonide/formoterol reliever inhalers, the role of these inhalers in ACO remains uncertain, as there are no data to support this approach at this time.

End-of-life care

Advance care planning

End-of-life care is important in advanced COPD. As the goals of care change, patients and their family/whānau require realistic advice and support to make informed decisions and plan for the future.

- Discussion about advance care plans and advance directives should

Box 5: Principles of management of asthma–COPD overlap.

- There are no data to support the use of ICS alone in asthma–COPD overlap.
- Data from asthma trials suggest that LABA monotherapy may be harmful.
- Observational evidence suggests that ICS combined with long-acting bronchodilators should be the mainstay of therapy in ACO.
- Non-pharmacological approaches to the management of COPD are also recommended in people with ACO (eg, smoking cessation, vaccinations, exercise, pulmonary rehabilitation and treatment of comorbidities).
- ICS withdrawal is not recommended in patients with ACO, due to possible increases in exacerbations and mortality.

be undertaken as part of usual management at a suitable time in the disease course.

- Advance care plans can be made at any stage of the disease and do not need to wait until the patient is approaching the end of life.
- Most patients with life-limiting conditions prefer to identify their goals of treatment and discuss preferences for end-of-life care early. Good communication with patients who have a terminal illness is associated with better end-of-life care and fewer medical interventions.
- A useful strategy when deciding whether end-of-life discussions are appropriate is to consider the question: "Would I be surprised if this patient died in the next 12 months?"
- The following features should also prompt health practitioners to consider initiating discussions about advance care plans, centred on the patient's preferences for end-of-life care:
    - Breathless at rest or on minimal exertion or housebound
    - Weight loss or cachexia
    - FEV_1<30% of predicted
    - Meets criteria for long-term oxygen therapy
    - Two or more hospitalisations in the previous year for exacerbations
- An admission with respiratory failure requiring non-invasive ventilation
- A structured advance care plan will reduce the burden of setting the ceiling of care by unfamiliar staff and family members during an acute admission and allow implementation of a patient's choice of health care when they are no longer capable of expressing their choice.
- In general, patients and their family/whānau want an honest conversation that is balanced between realistic information and appropriate hope.
- Consider involving local hospice and/or palliative care services.

More details and Advance Care Plans are available at: www.advancecareplanning.org.nz.

Palliation of dyspnoea

Morphine

- Morphine reduces respiratory effort and the sensation of breathlessness.
- Lower doses are usually required than used for pain (eg, 2.5mg to 5mg every four hours, or as required).
- Consider lower doses for older patients.
- Dose can be gradually titrated as for pain. But aim for comfort rather than resolution of dyspnoea.
- If greater than two doses per day of morphine liquid are regularly being used with effect, convert to low-dose, slow-release morphine capsules (eg, 10 mg twice a day). In this case, it would also be reasonable to make small amount of as-required morphine liquid (2.5mg to 5 mg as required) available to the patient.
- Oral morphine doses are generally <40 mg per day when used for dyspnoea alone.

Benzodiazepines

- Evidence for benzodiazepines for breathlessness in COPD is lacking. Benzodiazepines may be harmful and are not recommended as a first-line treatment of breathlessness.
- Benzodiazepines increase the risk of falls among patients with COPD and may also increase the risk of COPD exacerbations and pneumonia.
- Benzodiazepines should not be used in patients at risk of hypercapnic respiratory failure.

Appendix 1: The four-step COPD consultation

1. Assess COPD control and exacerbation risk	2. Consider other relevant clinical issues	3. Decide whether the treatment plan needs to be changed	4. Complete the COPD self-management (action) plan
Review history of COPD exacerbations in last 12 months (requiring oral corticosteroids or antibiotics) Complete CAT score Complete mMRC (breathlessness score) Review last spirometry result Assess current status: • Breathlessness • Exercise tolerance • Sputum volume • Sputum colour • Oxygen saturations • Flu vaccine • Weight	Assess the patient's knowledge of their personal signs and symptoms of an exacerbation Ask about adherence with maintenance treatment Check frequency of using reliever medication Check inhaler technique Review smoking status and cessation strategies Assess whether the patient is coping with activities of daily living Consider a nutritional assessment Consider whether patient requires further specialist review if symptoms and presentation don't correlate Review for any co-morbid conditions	Consider whether additional drug treatment is required if COPD is not adequately controlled such as increasing breathlessness or recent exacerbation Consider withdrawal of ICS if patient is stable and there is no evidence of benefit or recent pneumonia. If ICS is withdrawn review patient in 4–6 weeks Consider if a home supply of antibiotics and oral corticosteroid is required Discuss an exercise plan and/or refer to pulmonary rehabilitation and/or physiotherapy Recommend annual flu vaccine and consider pneumococcal vaccine Refer for assessment for domiciliary oxygen if resting oxygen saturations <88% on room air when well and smoke free Refer for support services/ specialist review if appropriate	Complete the details on the front page of the patient's plan Review the signs and symptoms of worsening COPD and of a chest infection with the patient (unwell, very unwell and extremely unwell) Remind the patient what to do when unwell: • breathing control techniques • correct inhaler technique • chest clearance (if required) • energy conservation techniques Enter the antibiotic type and length of course (usually 5–7 days). Enter the prednisone regimen. The usual regimen in an exacerbation is 40mg daily for 5 days. Advise the patient of a time for clinical review after starting home supply of prednisone and antibiotics (if applicable). Enter additional instructions in the steps to manage breathlessness section. Give the patient a copy of the plan and save on the patient record.

These steps are likely to need more than one consultation.

Appendix 2: COPD assessment test (CAT)

Name:

Date:

CAT™
COPD Assessment Test

How is your COPD? Take the COPD Assessment Test (CAT)

This questionnaire will help you and your healthcare professional measure the impact COPD (Chronic Obstructive Pulmonary Disease) is having on your wellbeing and daily life. Your answers and test score, can be used by you and your healthcare professional to help improve the management of your COPD and get the greatest benefit from treatment.

For each item below, place a mark (X) in the box that best describes you currently. Be sure to only select one response for each question.

Example: I am very happy 0 X 2 3 4 5 I am sad

			POINTS
I never cough	0 1 2 3 4 5	I cough all the time	
I have no phlegm (mucus) in my chest at all	0 1 2 3 4 5	My chest is full of phlegm (mucus)	
My chest does not feel tight at all	0 1 2 3 4 5	My chest feels very tight	
When I walk up a hill or one flight of stairs I am not breathless	0 1 2 3 4 5	When I walk up a hill or one flight of stairs I am very breathless	
I am not limited doing any activities at home	0 1 2 3 4 5	I am very limited doing activities at home	
I am confident leaving my home despite my lung condition	0 1 2 3 4 5	I am not at all confident leaving my home because of my lung condition	
I sleep soundly	0 1 2 3 4 5	I don't sleep soundly because of my lung condition	
I have lots of energy	0 1 2 3 4 5	I have no energy at all	
		TOTAL SCORE	

What does your COPD Assessment Test (CAT) result mean?

A score between 0 and 10 suggests a low impact.
This score should only be interpreted and acted on in partnership with your healthcare professional.

A score between 11 and 20 suggests a medium impact.
This score should only be interpreted and acted on in partnership with your healthcare professional.

A score between 21 and 30 suggests a high impact.
This score should only be interpreted and acted on in partnership with your healthcare professional.

A score between 31 and 40 suggests a very high impact.
This score should only be interpreted and acted on in partnership with your healthcare professional.

For further information about your COPD and what your test result might mean, make an appointment to see your health care professional.*

TAPS NA10197/18AU/CPD/002/16(1)

*Please note that normal doctor fees will apply.

About Me

(tick all that apply)

- ☐ I am a known CO_2 retainer
- ☐ I have an Advance Care Plan
- ☐ I am happy for this plan to be shared with other healthcare providers
- ☐ Long term home oxygen and flow rate ☐ L/min

Remember

- Keep your action plan up to date
- Make sure your inhalers aren't empty or expired
- Take your medications as prescribed
- Ensure you always carry your reliever
- Regularly check your inhaler technique with your healthcare professional

My Breathlessness Plan

1. Stop what you are doing

2. Find a resting position

3. Use your fan, or the breeze

4. Begin your preferred breathing technique for 2-3 minutes

If you are still feeling breathless, follow your Action Plan on the next page

Using a spacer

If you use a metered dose inhaler (MDI), a spacer will help get the correct dose of medication into your lungs.

Ask your healthcare professional about a spacer, they can provide them free of charge. If you don't already have one, you need one. Spacers increase your medications effectiveness.

1. Shake the inhaler well (holding it upright)

2. Fit the inhaler into the opening at the end of the spacer

3. Seal lips firmly around the mouth piece, press the inhaler once only

4. Take 4-6 slow breaths in and out through your mouth. Do not remove the spacer from your mouth between breaths

   OR take one slow deep breath in and hold this for 10 seconds

5. Repeat steps 1-4 for further doses

Washing your spacer

Wash your spacer once a week with warm water and dishwashing liquid.

Do not rinse, drip dry to ensure that your medicine gets into your lungs and doesn't stick to the sides of the spacer.

Produced by Asthma and Respiratory Foundation NZ
info@asthmaandrespiratory.org.nz
asthmaandrespiratory.org.nz

Asthma + Respiratory
FOUNDATION NZ

COPD
(Chronic Obstructive Pulmonary Disease)
Action Plan

This COPD Action Plan belongs to:

Better Breathing, Better Living

Asthma + Respiratory FOUNDATION NZ — YOUR COPD ACTION PLAN

Name: *Healthcare practice:*

Date of plan: *Healthcare practice phone:*

Know your COPD symptoms

Know when and how to take your medicine

Normal for me

When I am well my 'normal' is

- I have a usual amount of cough /phlegm.
- I can do my usual activities.
- Exercise / activity
- Oxygen Saturations % breathing room air

[name]	*puffs*	*every morning*
	puffs	*every night*
[name]	*puffs*	*every morning*
	puffs	*every night*
Reliever:	*puffs*	*when you need it to relieve your symptoms*

I'm unwell

These signs suggest my COPD is worse:

- I am more breathless
- I need my reliever medicine more often
- I am more tired / lethargic
- I am losing my appetite
- I may have signs of a fever (hot/cold flushes, temperature)

What should I do?

- Breathing control techniques
- Energy conservation techniques
- Chest clearance
- Take reliever inhaler regularly (for example every 4 hours)
- Make an appointment to see my Primary Health Care team within 3 days

Start prednisone:

Prednisone *mg* *for* *days*

If I have all of the following symptoms it is a sign of a chest infection:

- There is an increase in the amount of phlegm
- My phlegm has changed to a darker colour
- I am more breathless than usual

Start antibiotics for signs of a chest infection:

[name] *times per day* *for* *days*

I'm *very* unwell

I am becoming more unwell if:

- I am getting worse despite the extra medicines

OR

- I am no better 48 hours after taking prednisone

What should I do?

- Breathing control techniques
- Energy conservation techniques
- Chest clearance
- Phone my Primary Health Care team to make an urgent appointment today or go to After Hours Medical Centre

Important: You need to see a doctor today

Other instructions:

Emergency

I'm *extremely* unwell

- I am very breathless
- I am not getting any relief from my reliever medicine
- I am scared
- I maybe unusually confused or drowsy
- I may have chest pain

What should I do?

- **Dial 111** for an ambulance or press your medical alarm button
- Take extra reliever as needed until the ambulance arrives
- Breathing control techniques

Plan prepared by: _____

Next review date: _____

Signature: _____

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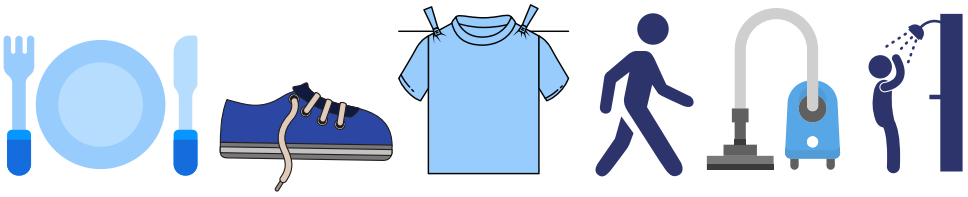
Appendix 4: Breathlessness strategies for COPD

BREATHLESSNESS
STRATEGIES FOR COPD

Asthma + Respiratory FOUNDATION NZ

Breathlessness is a major symptom in COPD. It can often seem to come on for no apparent reason or with very little exertion. This can cause people to feel frightened, out of control and anxious

COMMON ACTIVITIES THAT CAN CAUSE BREATHLESSNESS



Many activities can cause breathlessness such as, walking, bending down, showering, getting dressed, going to the toilet, vacuuming, hanging out washing, and lifting things.

Eating can be challenging as it can require effort to prepare food and then it is difficult to eat food due to breathlessness. Eating a large portion can also cause breathlessness.

MANAGING BREATHLESSNESS

These strategies can help manage chronic breathlessness in stable lung disease. If your breathlessness becomes out of control and unmanageable rapidly, please seek medical attention.

1 CONSERVE YOUR ENERGY & PACE YOURSELF

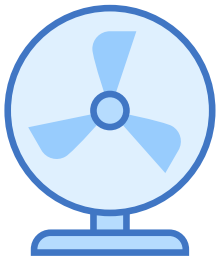
People who are breathless often rush to get tasks done. This is not a useful strategy. Learning to pace yourself helps keep control of your breathing so that you can manage independently for longer.

- ***Plan your day:*** *Don't try to fit too much in—allow plenty of time to carry out tasks. Cut bigger tasks down into smaller manageable parts and Allow for plenty of rest periods between each task.*
- ***Prioritise tasks:*** *Which tasks can wait until you feel less breathless?*
- ***Adapt tasks:*** *Can you sit down to complete the task? Is there a simpler way to complete the task?*
- ***Delegate:*** *Can someone help you with the task?*

2 USE A FAN

A fan can help control breathlessness. Hand-held fans are a great option because they are cheap, quiet and easily portable. A free-standing fan, a desktop fan or the breeze through an open door or window can also help.

To use the fan: Hold the fan about 15 centimetres from your face so you can feel the air on your top lip. Slowly move the fan from side to side so that the breeze covers the bottom half of your face



MANAGING BREATHLESSNESS

3 FIND A RESTING POSITION

Find your resting position – this is a position which helps you relax and breathe better. You may already unconsciously use these.

Lean forward with arms resting on your knees or the sides of a chair. Position knees slightly apart

Lean forward over a table or surface resting on your arms up on some pillows or similar

Lean forward with arms resting on a surface such as supermarket trolley, or back of a chair. Alternately, rest standing with your back against a wall.

4 BREATHING CONTROL TECHNIQUES

There are several different breathing techniques that can be used to manage breathlessness. Practice them to find what suits you.

BREATHING CONTROL

1) Place one hand on your tummy.
2) Relax upper chest & shoulders.
3) Breathe in gently through your nose (feel your tummy move out).
4) Breathe out through your nose and/or mouth and your tummy will move in.

PURSED LIPS

This can be used with all activities and at rest.
1) Breathe in gently through your nose.
2) Breathe out with your lips pursed as if you are whistling or blowing through a straw

BLOW AS YOU GO

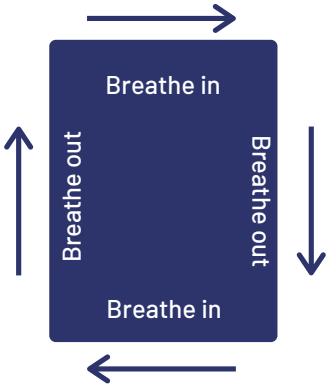
Use this when doing something that makes you breathless, such as hanging out washing.
1) Breathe in before you make the effort.
2) Breathe out while making the effort.

PACED BREATHING

Useful when you're active (climbing stairs or walking).
1) Pace your steps to your breathing.
2) Breathe in.
3) Breathe out as you go up a stair.

BREATHE AROUND THE RECTANGLE

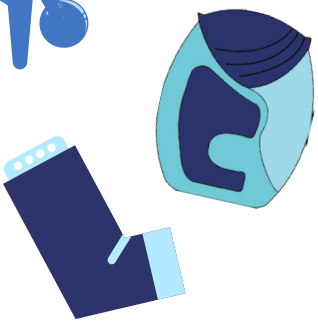
1) Focus on a rectangle shape eg door frame or window
2) Breathe in along the short side
3) Breathe out along the long side



MANAGING BREATHLESSNESS

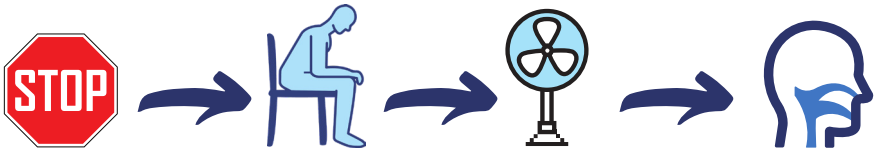
5 **DISTRACTION AND RELAXATION**
Focus on things that bring you pleasure or calmness. Mindfulness and meditation can be useful.

6 **EXEMPLE**
Regular activity is important to maintain fitness and strength, but should be done in moderation. Ask to be referred to your local pulmonary rehabilitation program.



7 **MEDICATION**
Use your prescribed medication as directed. If you have difficulty managing your breathlessness, talk to your doctor or nurse practitioner as there may be other medications that may help.

WHEN FEELING BREATHLESS...



Stop what you are doing → **Find a resting position** → **Use your fan or the breeze** → **Choose your preferred breathing technique, & continue for 2-3 minutes**

AFTER 2-3 MINUTES EVALUATE YOUR BREATHLESSNESS

Are you feeling less breathless and more in control?
Yes: Continue with your activity
OR
No: Take reliever medication through a spacer, then resume breathing technique for another 2-3 minutes

If you still feel no better, then assess whether you need to seek medical help

Appendix 5: Breathlessness strategies: quick reference guide

Appendix 6: Useful documents and resources

An updated list of resources will be maintained at Asthma and Respiratory Foundation of New Zealand: www.nzrespiratoryguidelines.co.nz (COPD Action Plan, Breathlessness Strategies, Breathlessness Quick Reference, Guide Summary, Inhaler Devices Identification Chart).

- The Lung Foundation (Australia) website has many resources for patients with COPD: https://lungfoundation.com.au/patients-carers/living-with-a-lung-disease/copd/treatment/.
- Airway clearance techniques: https://bronchiectasis.com.au/resources/videos/the-active-cycle-of-breathing-technique.
- Smoke free services: https://www.smokefree.org.nz/.
- Māori model of care: https://www.health.govt.nz/our-work/populations/maori-health/maori-health-models.
- Advance Care planning: www.advancecareplanning.org.nz.
- Supporting Breathlessness: https://supporting-breathlessness.org.uk/.
- Regional Pulmonary Rehabilitation Classes list: https://www.asthmafoundation.org.nz/about-us/support-groups.
- 'How-to use' inhaler videos, Health Navigator NZ: https://www.healthnavigator.org.nz/videos/i/inhaler-use/.

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Telehealth as a tool for equity: pros, cons and recommendations

Jason Gurney, Lily Fraser, Amio Ikihele,
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The COVID-19 crisis has forced an abrupt change to the way our society functions. Two of our most critical sectors—education and health—have had to rapidly embrace digital technology in order to continue to provide key services to the public. Before the start of the second school term, and within a few weeks of our move to Alert Level 4, the New Zealand Government began distributing more than 17,000 digital devices to school students around the country.[1] In addition, thousands of modems were circulated to households without current internet access—all in an effort to bridge the digital divide and enable online learning amid the COVID-19 shutdown.[2]

In the context of health, clinical consultations that do not require in-person contact have moved to phone calls and video-conferences. For example, the Royal New Zealand College of General Practitioners (RNZCGP) made an urgent request for their members to use phone, email or video to reduce in-person consultations by 70%.[3] Minimising contact between ill patients, their doctors and the public is a necessary component of our COVID-19 elimination strategy,[4] and these (and other) telehealth tools help us to achieve this goal. They also allow at least part of our clinical pathway to continue to provide patients with access to care throughout a national shutdown.

Māori and Pacific people shoulder a disproportionate burden of morbidity. We are more likely to have cardiovascular disease, cerebrovascular disease, cancer, respiratory disease, infectious disease and psychological distress than non-Māori non-Pacific people.[5,6] On top of this increased burden, there is evidence that Māori have poorer access to healthcare, including primary care[5] as well as secondary care for services such as cancer diagnosis and treatment.[7] Pacific people similarly report higher rates of unmet need for primary healthcare and secondary care services.[8] In short: these persisting health inequities highlight the fact that Māori and Pacific people have a greater need for healthcare, but poorer access to it.

The factors that drive poor healthcare access for Māori and Pacific peoples are multifactorial, but ultimately these factors reflect a disproportionate exposure to the multiple determinants of poor health (including health systems and social determinants such as socioeconomic deprivation and institutionalised racism).[8,9] These are the social determinants that manifest as barriers to healthcare access for Māori and Pacific people: transportation barriers that prevent access to in-person appointments; financial barriers that prevent paying for general practitioner (GP) visits or medication; and cultural barriers that prevent access to a service that was not necessarily designed to align with Māori and Pacific worldviews of health—with the understanding that access is not solely premised by availability and affordability, but also acceptability of services for Maori and Pacific people.

In this viewpoint, we consider whether telehealth is an equity-positive tool that might help to overcome some important barriers to health care access for Māori and Pacific people. We consider the equity ramifications of a shift toward models of care that maximise the use of telehealth solutions, and our recommendations regard how we might best achieve the equity-positive potential of telehealth for Māori and Pacific people.

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Opportunities

Telehealth can reduce barriers to care. Since telehealth reduces or removes the requirement for patients to travel to receive care, it follows that telehealth can improve access to care among those who have transport barriers.[10–12] By removing the necessity to travel for care, telehealth also reduces the time commitment required by patients and their whānau, further improving access to care. In addition, since remote telehealth consultations can conceivably be conducted from anywhere in the country, the pool of clinical expertise available to a given individual can feasibly expand—a key consideration for Māori [13] and Pacific (as well as non-Māori non-Pacific) people living in rural or small urban centres. Telehealth consultations may also improve accessibility of the consultation to wider whānau (who may either be with the patient or in another part of the country), improving support for the patient and enabling informed collective decision-making. Similarly, telehealth can also reduce the indirect costs of healthcare; if patients or their whānau need to take paid or unpaid leave, or cover the costs of travel or childcare, then the option of telehealth could be health-enhancing simply by protecting the patient's and whānau's social and economic resources.

Telehealth can enhance the quality of holistic care. During the COVID-19 pandemic, telehealth has enabled a holistic and whānau-inclusive approach to healthcare delivery. Multiple call centres have been organised and run by iwi, hauora Māori providers and community groups. These organisations assess needs and offer a range of solutions, from delivering food and personal care items through to financial, housing and medical support (personal communication, Nina Scott).

Telehealth can reduce exposure to infectious diseases. Reducing patient contact with healthcare services reduces the risk of healthcare-associated infection (also known as nosocomial infection). Although this is a key consideration amid the current COVID-19 pandemic, we also note that Māori and Pacific people are at higher risk of multiple other infectious diseases—including influenza,[14,15] tuberculosis,[16] meningococcal disease,[17] measles[18] and the sequelae of streptococcal infection including rheumatic fever.[19,20] While these disparities in risk of infectious disease are likely driven by disparities in exposure to poor housing and overcrowding,[21,22] they indicate that community transmission of infectious disease disproportionately impacts Māori and Pacific—and reducing or eliminating one source (healthcare-associated infection) of possible exposure may have significant ramifications in terms of the wider burden of infectious disease for Māori and Pacific people.

Telehealth may enable the redirection of health resources toward areas of need. As noted below, due to issues of digital inclusion, Māori and Pacific communities may not stand to benefit from telehealth consultations as readily as other New Zealanders. The efficiencies gained through widespread implementation of telehealth may free-up resources that can be used to provide more support for those who are currently digitally excluded (and who may have less access to health information and care overall). If this resource is re-directed based on unmet need and longstanding health inequity, such a re-direction may benefit Māori and Pacific health.

Barriers

Widespread implementation of telehealth may increase health disparities. Telehealth care can only be provided to a patient if they have the resources required to access it. Some telehealth can be delivered via phone, and some requires digital technologies such as video and data. Without an equity-first approach to telehealth in New Zealand, it is likely that uptake will be difficult for individuals and communities with insufficient access to mobile phones and the internet (and/or the digital literacy to use these tools), compared to those who have these resources.[23] It is clear that Māori and Pacific have less access to digital technology than other population groups,[24–26] and this gap will need to be bridged to ensure that telehealth does not exacerbate the existing health inequities experienced by Māori and Pacific communities.[5,6]

Only some health care can be provided remotely. Although we have noted above that telehealth may be a solution to transport barriers to healthcare, not all

care can be delivered via telehealth—and as such, telehealth does not solve all transport barriers to care. In addition, it is conceivable that our system could start to over-rely on telehealth once its efficiencies are recognised, which could potential result in attempts to provide telehealth care in cases where in-person care would result in a better outcome for the patient (see below).

Loss of in-person care. Many Māori value kanohi ki te kanohi interaction, as in-person communication may result in better outcomes from the conversation.[27] Pacific people also place great emphasis on relationships and nurturing the space (va) that connects people, things and elements,[8] which can be lost with telehealth consultations. As such, the replacement of in-person interaction with telehealth solutions requires rapid research regarding its acceptability for Māori and Pacific people, as well as assessments of the impact of this replacement on health outcomes. Another factor that requires careful consideration is whether telehealth may preclude the detection and treatment of conditions other than the primary reason for the consultation.

Technical barriers. Technical barriers to the equitable provision of telehealth for Māori and Pacific people include (but are not limited to): the availability of telephone or internet connection; device availability (including telephones and other communication devices); digital literacy/education regarding device usage; infrastructure, education and resourcing within Māori and Pacific health providers to provide telehealth to their communities; and attitudinal barriers to telehealth uptake among some health professionals. Each of these (and others) will need to be overcome to ensure equitable provision of telehealth care.

Recommendations

- *We need to collect high-quality data on telehealth connectivity.* Addressing digital inclusion for Māori and Pacific people to facilitate telehealth care provision requires good data on digital connectivity. We believe that connectivity should be considered a health-related exposure, and data on connectivity should be collected just like ethnicity or age data. The rapid adoption and submission of telephone data in the Ministry of Health National Collections shows district health boards (DHBs) should also be able to improve the quality of telehealth data to more accurately show how outpatient care is delivered.
- *We need to address digital inclusion for Māori and Pacific people.* Linked to the above point, we need to better understand the extent of digital poverty in New Zealand, with a focus on digital poverty among Māori and Pacific people. Māori and Pacific must be viewed as priority populations in the allocation of digital devices and data packs.
- *We need resourced champions*. In order to facilitate equitable telehealth provision to Māori and Pacific communities, we need to resource organisations and individuals who can communicate and enact telehealth into their communities. Some enablers of these champions already exist, such as the Marae Digital Connectivity initiative[28] and the Pacific Senior Connect[29] and Digifale[30] programmes provided through churches.
- *We need more research.* Our understanding of the impact of telehealth on Māori and Pacific experiences of healthcare in New Zealand is extremely limited. We need research led by Māori for Māori, and by Pacific for Pacific, to understand their approach to telehealth and their experience of it, with a view to informing an equity-first telehealth strategy (see below).
- *We need a strategy.* We recommend the rapid development and implementation of a robust telehealth strategy (such as that developed for New South Wales in Australia)[31] that has te Tiriti o Waitangi and equity as core guiding principles. The development of this strategy must occur in partnership with Māori (as Crown partners in Te Tiriti, and as a population with substantial unmet healthcare need) and Pacific health leaders, organisations and individuals. Part of this strategy must include ongoing monitoring and evaluation of telehealth provision in New Zealand and the impact of telehealth on the equitable provision of healthcare to Māori and Pacific New Zealanders.

The move to telehealth consultations during the COVID-19 shutdown in early 2020 was made out of necessity. Data recently extracted by the Ministry of Health's Telehealth Leadership Group suggests that, over the month of April 2020, the health sector moved to providing nearly half of all first specialist appointment (FSA) and follow-up appointments via telephone (personal communication, John Manderson)—an example of swift action in the face of immediate need. As alert levels drop and contact restrictions ease, we must ensure that the aspects of telehealth that help to address health inequities for Māori and Pacific people—such as reducing barriers to care—are maximised, and that the aspects of telehealth that could exacerbate inequities—including digital poverty—are addressed and eliminated.

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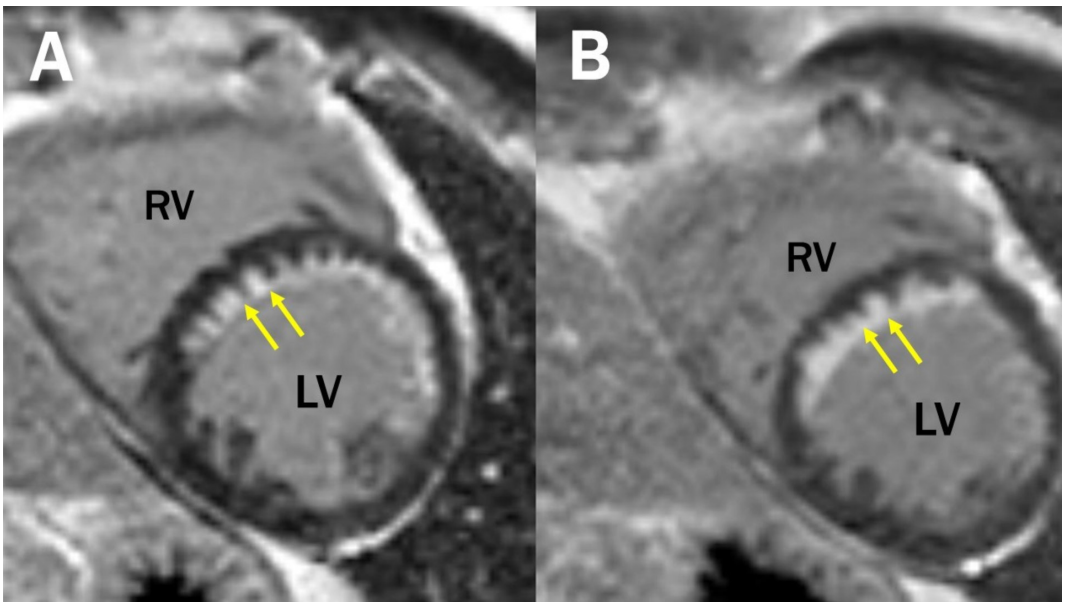
Ischaemia-induced syncope: the role of cardiac magnetic resonance imaging

Danting Wei, Wil Harrison, Jen-Li Looi

A 57-year-old man presented with his first episode of syncope after skiing 10 days earlier. There was no chest pain and serial troponins were normal. Electrocardiogram showed Q-waves anteriorly and T-wave inversions laterally. Transthoracic echocardiogram showed basal-mid septum hypokinesis. Cardiac magnetic resonance imaging (CMR) was performed to exclude an infiltrative process as the cause of his syncope. The CMR demonstrated myocardial fibrosis involving the left anterior descending (LAD) territory (Figure 1), which is in keeping with a myocardial infarction. Coronary angiogram revealed a severe proximal LAD stenosis (Figure 2), which was successfully treated with a single drug eluting stent (DES). He remained well with no further event after his coronary intervention.

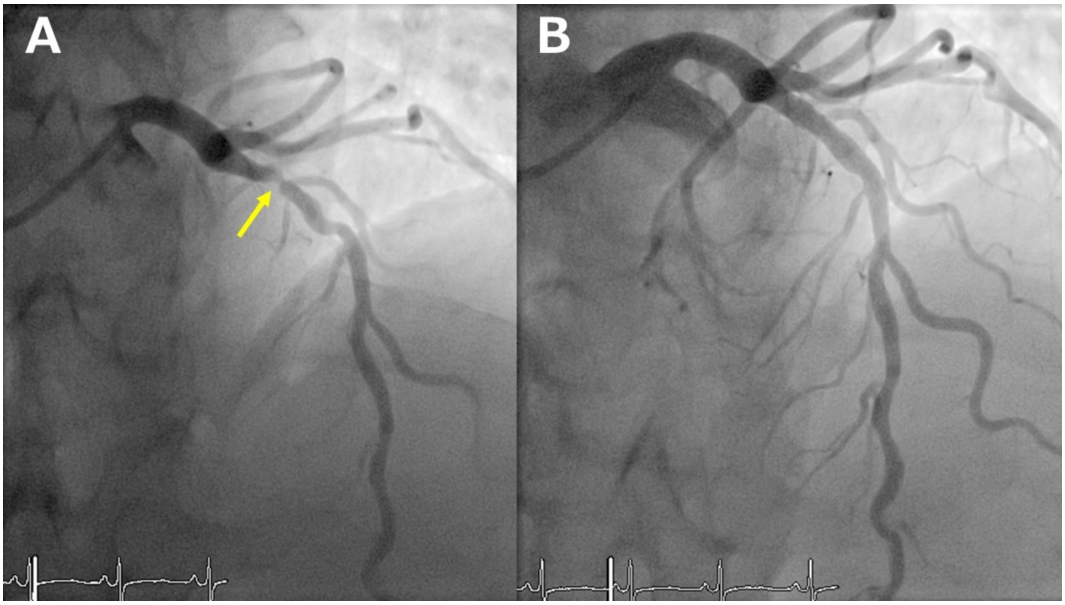
Syncope is an uncommon presentation of acute coronary syndrome in the absence of chest pain.[1,2] CMR is not only accurate in the assessment of cardiac anatomy and function, but it is also superior in non-invasive myocardial tissue characterisation, outweighing other imaging modalities such as echocardiography. Late gadolinium enhancement (LGE) imaging is useful in making the differential diagnosis between

Figure 1: (A) LGE imaging showed subendocardial myocardial fibrosis (yellow arrows) involving the mid to apical anterior wall, apical septum and LV apex. (B) There was also near transmural myocardial fibrosis (yellow arrows) involving the mid anteroseptum and mid inferoseptum regions.



ischaemic (ICM) and non-ischaemic (NICM) aetiology of cardiomyopathies; the site is essential: subendocardial or transmural in ICM, with vascular distribution and varied pattern, without vascular distribution in NICM.[4] This case illustrates the role of CMR in the assessment of an atypical presentation of LAD ischaemia resulting in syncope. Given our patient's transapical LAD supplies the anteroseptum and inferoseptum, it is likely the LAD ischaemia caused transient heart block resulting in syncope.

Figure 2: (A and B) Coronary angiography revealed a transapical LAD vessel with severe proximal LAD stenosis (yellow arrow) was successfully treated with 3.5x2.8 Xience Apline DES.



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Ineffective, meaningless, inequitable: analysis of complaints to a voluntary alcohol advertising code

Nicki Jackson, Nathan Cowie, Amy Robinson

Aotearoa New Zealand has a vision of being the best place in the world for children and young people: a place where children live in healthy, sustainable environments.[1] Compromising this vision is the harmful ubiquity of alcohol advertising across children's everyday settings.

Exposure to alcohol advertising is shown to increase the likelihood of children and young people initiating drinking earlier and consuming larger amounts of alcohol.[2–4] A recent analysis suggests this relationship is causal.[4] Exposure is also highly inequitable, with tamariki Māori being five times, and Pacific children three times, more likely to be exposed than other New Zealand children.[5] One key source of this exposure is alcohol sports sponsorship.[5] Protection from harm during the adolescent period is of critical importance, given the heightened vulnerability of adolescents to the development of alcohol use disorders (AUD), which has been demonstrated in one New Zealand population-based study showing that almost 50% of cases of AUD had developed by the age of 20 years.[6]

Others particularly vulnerable to the effects of marketing include individuals with AUD. Alcohol advertisements, especially the portrayal of drinking, may induce physiological cue reactivity, increasing cravings and motivation to drink among alcohol-dependent persons.[7] Advertising therefore hinders the social permission of many New Zealanders to successfully cut down their drinking or remain sober.

Although tobacco advertising and sponsorship has been prohibited in New Zealand for decades, alcohol advertising controls remain weak despite a series of recommendations and strong public support for increasing restrictions.[8] The main mechanism is a voluntary code of practice, known as the Advertising Standards Authority (ASA) Code for Advertising and Promotion of Alcohol (the 'Code'). The ASA is a self-regulatory body comprising advertisers, agencies and the media.[9] Advertising complaints are received from the public and determined to be 'settled' if the advertiser does not contest the complaint and voluntarily removes the advertisement without proceeding to a Complaints Board meeting, or 'upheld' or 'not upheld' against the relevant Code principle and/or guideline following an ASA Complaints Board meeting (comprising four industry and five public members). A user-pays Liquor Advertising and Promotion Pre-vetting System (LAPPS) is available to advertisers to check compliance with the Code, but approval is only a prerequisite for broadcasting televised alcohol commercials as part of the Commercial Approvals Bureau process.

The Code centres on advertising content and does little to limit the amount of marketing that New Zealanders are exposed to. It does not attempt to address the inequities in exposure to advertising or harms from alcohol. At the time of writing, controls on exposure include a television watershed and a limit on the number of alcohol advertisements per commercial break. Also, broadcasters are to avoid the impression that alcohol advertisements are dominating the viewing or listening period. There are limited controls on placement; advertising must be directed at adults, not minors. However, the Code permits exposing minors to alcohol marketing where minors make up

less than 25% of the audience. An updated Alcohol Advertising and Promotion Code will come into effect from 1 April 2021. The following analysis highlights results published in a larger report.[10]

Methods

ASA complaints were obtained from the ASA's public facing website (https://www.asa.co.nz/decisions/search-browse-decisions/). All complaints made to the ASA in relation to the Code from 1 January 2017 through 30 June 2020 (42 months) were identified and assessed. Complaints determined as having 'no grounds to proceed' and 'no jurisdiction' were excluded from analysis, as were appeals to complaints.

Data from each complaint were extracted on alcoholic beverage type, advertising medium, Code principle(s) and complaint outcome. Where possible, the duration from complaint submission to issue of the decision was calculated.

Results

In total, 73 complaints were identified, of which the ASA deemed 17 had no grounds to proceed and one had no jurisdiction. There were two appeals to complaint decisions.

The remaining 55 complaints represented more than 60 individual advertisements, as some complaints featured multiple advertisements. One in eight advertisements featured across more than one media channel. More than one-half (58%) of complaints related to social and digital/electronic media and 30% related to traditional media (eg, TV, radio, print, billboards). Around one-third (38%) of complaints related to beer, 27% to spirits, 13% to pre-mixed spirits and 11% to wine.

More than one-half (56%) of complaints were assessed against more than one principle of the Code. Principle 1 (high standard of social responsibility) comprised more than one-half (60%) of assessments, followed by Principle 3 (appeal to minors, 22% of complaint assessments) and Principle 2 (consistency with moderation in drinking, 15% of complaint assessments). Although a number of complaints were made against Principle 4 (sponsorship), only one complaint was assessed under this principle, and this complaint was deemed settled. Other sponsorship-related complaints during this period did not get recorded against this principle, as the Code requires that advertisements found to breach Guidelines 4(a) to 4(e) of Principle 4 are then assessed by the Complaints Board under Principles 1 to 3, and not Principle 4.

A range of issues were described in the complaints, including the promotion of health and lifestyle benefits of alcohol, promoting alcohol as a coping mechanism, sexualisation of women, location on billboards very close to school grounds, promotion of drinking games and use of persons or groups that have strong appeal to minors (known as 'heroes of the young' in the Code).

In total, 196 assessments were made against the Code's principles and guidelines, of which 40% of assessments were settled, 36% were not upheld and 24% were upheld. The duration of time from complaint submission to decision was known for 40% of complaints—these were complaints submitted by the authors or by community members and organisations known to the authors. Among these, the mean duration was 39 days (SD 18). Settled complaints had a shorter average duration (M=29 days; SD 16) than complaints that proceeded to the Complaints Board (M=47 days; SD 15).

Discussion

Firstly, the relatively low number of complaints must be viewed with extreme caution. The ASA runs a complaints-based process that relies on the public's knowledge of the Code as well as their time to submit a complaint. There remains no active or systematic monitoring of alcohol advertisements by the ASA or any other agency, even for advertisers who frequently breach the Code. Secondly, personalised and uniquely targeted advertising now dominates the digital world of alcohol marketing,[11] making it impossible for harm reduction agencies to systematically identify and track advertisements and monitor compliance with the Code. This leaves the onus on vulnerable persons uniquely targeted by digital marketing to make a complaint, which risks widening the inequities in harm.

It is unsurprising that digital marketing was the dominant media form in complaints against alcohol advertisements, given their proliferation on digital media in recent times. Digital advertising gives marketers a low-cost and far-reaching means of targeting unique audiences and engaging them through to the point of sale. Studies show an association between engagement with digital alcohol marketing and increased alcohol consumption and hazardous drinking behaviour, particularly in young people.[12] It is suggested that responses to this threat to children's well-being is lagging far behind, with voluntary codes being inflexible in response to the fast-changing nature of digital marketing.[11,13] Efforts are needed that focus on regulating the online environment at the platform level through a coordinated global response.

Although the majority (64%) of complaint assessments resulted in the advertisement being removed or amended, the length of time to decision often meant that the standard advertising cycle had finished. As an example, the Complaints Board took six weeks to reach a decision on a complaint against an advertisement that featured a sportsperson who had strong appeal to minors, and other decisions took over 60 days. This represents a substantial length of time that vulnerable groups are exposed to marketing violations.

Non-compliant advertisements can also remain permanently in the digital media space. One non-compliant beer advertisement video (a global beer brand's Facebook page featuring user-generated content of a local secondary school student in uniform) continues to be accessible in the social media accounts of private individuals. The complaint (ASA 19/461) notes that the advertisement had been viewed over 110,000 times before the complaint was submitted.

Among advertisers responding to complaints, there was a heavy reliance on using age-verification/age-gating mechanisms on websites and social media to effectively restrict their advertising to adult audiences. Website age-verification processes used by alcohol companies are deemed ineffective because they are easily circumvented.[14] One study of age-limits on social media advertising found a large number of Facebook and Instagram alcohol advertisements were not equipped with age limit restrictions.[15] In relation to print advertising, an ASA decision considered that newspapers were a restricted medium (for adults) and so permitted the use of, or reference to, identifiable heroes of the young in alcohol advertisements.

It was deeply concerning that some advertisements promoted alcohol as a coping mechanism, using words such as "therapy," "feeling bit under the weather" and "Need a pick-me-up?" Alcohol is well-known as a maladaptive coping mechanism, as it increases the risk of problem drinking and places at risk both dependent drinkers and those that are in emotionally vulnerable situations, due to their heightened susceptibility to alcohol advertising.[16] Of concern was the weak sanction for one wine company, which was found to have displayed a non-compliant label but was able to sell their remaining stock as long as they did not actively promote the product.

One alcohol producer had five complaints over the time period examined. In response to the complaints, the producer stated that they "would strongly encourage" the complainant "to click 'UNLIKE' and stop viewing the page" (ASA 20/056). In response to media attention on another complaint, a spirits producer told the media that "any publicity is good publicity."[17] There are no incentives for advertisers to voluntarily comply with the Code, as the ASA is unable to apply sanctions or penalties to advertisers who are found to breach the Code, even if they are repeat offenders.

The use of pre-vetting by advertisers was rarely noted in ASA decisions, likely reflecting the confidential nature of the pre-vetting process. In Australia, signatories to the self-regulatory alcohol advertising code are required to pre-vet all television, radio, cinema and outdoor advertising.[18] Mandatory pre-vetting is recommended given the potential to reduce non-compliance[19] (as found following the introduction of mandatory pre-vetting for prescription drug advertising in New Zealand)[20], but it could never be a solution to reducing harm in the presence of a weak, voluntary advertising code.

Evidence shows self-regulatory approaches are ineffective at addressing the harmful content of, and widespread exposure to, alcohol advertisements.[21] Protecting communities from the advertising and promotion of alcohol should never be left to an ineffective voluntary code of compliance. Nor should the onus be on the public to submit complaints to a process with ineffective sanctions. Stricter controls on alcohol advertising have been recommended by the Law Commission in 2010,[22] the Ministerial Forum on Alcohol Advertising and Sponsorship in 2014[23] and the Government Inquiry into Mental Health and Addiction in 2018.[24] The World Health Organization considers restricting alcohol advertising and sponsorship as one of the most cost-effective measures to reduce alcohol harm.[25]

Reducing the inequities in exposure to alcohol advertising can only be achieved via equity-promoting marketing restrictions that protect our most vulnerable. Priority should be given to funding the replacement of alcohol sports sponsorship, restricting alcohol marketing on social/digital media platforms and developing an independent statutory system of alcohol marketing surveillance and regulation. Leaving the fox to guard the henhouse is ineffective and only serves to maintain long-standing inequities in harm.

Competing interests:
Nil.

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Improving efficiency of current diagnostic pathways for investigation of colorectal cancer in symptomatic patients

Cameron Schauer, Uddaka Wijesinghe, Michael Wang, Sriharan Selvaratnam, Dinesh Lal

We read with interest the commentary from Bagshaw and Cox regarding the adequacy, or lack thereof, of publicly funded colonoscopy services in New Zealand.[1] Their article summarises concerns about provision of colonoscopy, underscoring again what was first noted in *The New Zealand Medical Journal* in 2007 regarding the already significant gap between colonoscopy demand and provision.[2] They highlight in particular the pressing concern that introduction of screening will have on symptomatic patients, currently the main avenue of colorectal cancer (CRC) diagnosis, let alone other important gastrointestinal conditions.

The challenge of diagnosis of these numerous symptomatic patients is that they may present with a heterogenous and diverse spectrum of symptoms, often mimicking more benign gastrointestinal pathology. There have been attempts to encapsulate these difficulties within grading criteria, with prioritisation of risk factors, symptoms and signs based on the UK National Institute of Clinical Excellence (NICE) Guidelines for Suspected Colorectal Cancer.[3] However, a local retrospective review of these criteria demonstrated that they may miss a quarter of the patients with CRC in the referral population.[4]

To review and understand the presenting features of patients in our locality and ascertain the suitability of our diagnostic pathways, we completed a prospective, case-controlled study comparing risk factors, symptoms and signs of all CRC diagnosed at Middlemore Hospital, Auckland, in 2018, recorded from referrals and patient consultation documents. Conditional logistic regression analysis was performed on patients diagnosed with CRC, stratified 1:2 matched by age, gender and ethnicity to compare to patients referred and accepted for diagnostic colonoscopy who were not diagnosed with CRC. In this year, 177 symptomatic patients were diagnosed with CRC and 354 matched controls were recruited: 54% were male; 57% New Zealand European, 15% Asian, 11% Polynesian and 7% Māori. The mean age was 68. Other than excess alcohol intake (4% vs 1% OR 4.17, 95% CI [1.04,17.16], p=0.04), no traditional risk factors were predictive of CRC. This included analysis of obesity status, smoking,[5] family history of CRC and personal history of inflammatory bowel disease. The only significant discriminatory symptom for CRC patients was haematochezia (40% vs 26%, OR 1.84, 95% CI [1.28,2.89], p=0.007). Independent predictors for CRC included a palpable mass (OR=6.71, 95% CI [2.31,19.54], p<0.001) and iron deficiency anaemia (OR=1.94, 95% CI [1.22,3.08], p=0.005). Twenty-seven percent of CRCs were already metastatic at presentation. Thirty percent of those diagnosed were less than 60 years old, our current age of screening commencement. Of these patients, 22% were of Pasifika ethnicity, compared with 6.5% of Pasifika patients who were diagnosed over 60 (p=0.02). Of the controls, 155 patients had normal findings (43.7%) and 172 (48.6%) were diagnosed with diverticulosis and/or haemorrhoids.

These results, coupled with the current limitations in resources for our symptomatic patients, suggest that alternative methods should be considered as an adjunct to clinical assessment and acumen to improve objective determination of risk of CRC. Biomarkers used in screening programmes, such as faecal occult blood testing (FOB), have emerged as an option for prioritising symptomatic patients internationally. A primary care case-control study in the UK noted that a positive FOB was nearly three times higher (PPV 7.1%) than their most predictive symptom of rectal bleeding (PPV 2.4%).[6] Faecal immunochemical tests (FITs) have also been established to be cost effective for evaluation of lower abdominal symptoms to determine need for colonoscopy and rule out CRC.[7–10] It has been suggested that this approach may reduce the burden of outpatient colonoscopic evaluation by as much as 80%.[11]

In 2015, the National Institute for Health and Care Excellence (NICE) guidelines included a recommendation for testing of FOB in patients without rectal bleeding who are:

- aged 50 years and over and have unexplained abdominal pain or weight loss
- under 60 years of age and have changes in their bowel habit or iron deficiency anaemia
- aged 60 years and over and have anaemia in the absence of iron deficiency.[12]

These guidelines have been proven to be effective in a single-centre UK study in primary care.[13]

As a profession, we have an obligation to advocate for the appropriate levels and access to colonoscopy. This investigation is a basic and vital tool for diagnosis, treatment and surveillance of patients with a number of serious colorectal diseases. While many of these may be FIT negative and still require colonoscopy to diagnose (ie, microscopic colitis), improved risk stratification may assist with prioritisation and management of waiting times.

In conclusion, these local data are consistent with international literature that shows that prioritisation by clinical features alone is inefficient. There is increasing research on the use of FIT for symptomatic patients. Introduction of this strategy may help to reduce colonoscopy workload.

Competing interests:
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The Surgical Treatment of Congenital Hypertrophic Stenosis of the Pylorus

1921

Outside War medicine and surgery, no one subject has received more notice of recent years in medical literature, and especially in American surgical journals, than the pyloric stenosis of infants. Scores of papers have appeared. Much speculation as to etiology and pathology has been indulged in, and a cloud of controversial dust has been raised in discussions upon the treatment.

It was an Englishman named Armstrong who, over 140 years ago, first described a peculiar condition of the pylorus in an infant. He concluded, after a post-mortem examination, that his patient died of a spasm of the pylorus. Ten years later, Beardsley, in America, reported a case of scirrhus of the pylorus, which Osler, in 1903, baptised into the name of Congenital Hypertrophic Stenosis of the Pylorus.

Out of the welter of discussion certain facts are at last emerging, and a definite line of treatment bids fair to become accepted by the profession generally. Just as the adoption of appendectomy, twenty years ago, helped to sheet home the blame for various forms of typhlitis, so surgical intervention is rapidly elucidating the real nature of this form of pyloric obstruction. Some years ago confusion of thought was largely the result of efforts at classification, and especially the attempt to draw a hard and fast line between hyperplasia and spasm. The fact appears to be that all these cases have hyperplasia in varying degree, and that spasm is frequently the factor which determines the obstruction. Where hyperplasia is slight and spasm can be controlled by medical treatment, the patient may be tided over a critical period of weeks of months till the growing stomach provides a large enough channel of exit for nourishment to reach the mucous membrane of the intestine. But the one safe therapeutic guide is to view the condition as one of obstruction, varying in degree but always dangerous. Anyone who has seen and handled these pylori needs no argument to convince him of that fact. Where the obstruction is severe, the mortality is enormous.

I need not linger over the symptoms and signs of this condition, as they are now familiar. The diagnosis is usually easy, and fewer deaths from stenosis are now certified as marasmus or inanition. The picture is that of obstruction, and all cases of intestinal obstruction bear strong family resemblance. “The undiscovered tidings in his breast suffer him not to rest.” Suffice to say that every infant, a few weeks old, who develops projectile vomiting should be carefully watched and treated. Medical treatment by lavage and atropine may possibly tide the patient, “mewling and puking in his nurse’s arms,” over the critical period. But is a mother describes starvation stools, almost dry napkins, and increasing emaciation, it is time to expect the characteristic bulging epigastrium, where visible peristalsis is always seen and a tumour is often felt.

In short, if explosive vomiting is intractable in spite of stomach washing and regulated feeding, then the degree of obstruction is highly dangerous, and unless surgery can successfully intervene, the child’s “doom is writ.” Even Robert Hutchison, who cannot be regarded as partial to surgery, records that four out of every five cases at Great Ormonde Street Hospital died under medical treatment.

The pertinent question now is, does surgery offer a reasonable chance of recovery for such cases? The answer is that the chances of success are increasingly good, and chiefly on account of the more general adoption of that simple form of pyloroplasty

which has been gradually evolved by quite a number of operators, and has lately been named "Rammstedt's operation."

Now that some thousands of cases of infantile stenosis have been operated upon, and as many as 100 cases have been recorded by one surgeon, some consensus of opinion might tbe expected on the subject. Gastro-enterostomy has afforded quite a large number of successful results; various modifications of pyloroplasty have been tried out; even pylorectomy has been ventured upon; Nicoll's Y-shaped plastic operation was once popular, and Strauss has more recently devised an attractive pyloroplasty. It is highly probable that the final word has not yet been spoken as to detail, but it may safely be said that at the present moment one operation, that named "Rammstedt's," is to be preferred to all others for its safety and efficacy.

What is more to our immediate purpose, the opinion of surgeons of large experience can now be endorsed by those of small experience, and we can assure the parents of these children that a large majority of severe cases which would otherwise die can be saved by a timely operation.

Up to last year six cases have been operated upon in Oamaru, in two of which my colleague, Dr. Hargreaves, was the operator, and I have his permission to include them in this list. All were successful, though some were desperate cases, and all the children are now alive and well. In each case pyloroplasty was the operation performed, though the simple "Rammstedt" procedure was only adopted in the last two.

A few practical points may be of value, as we have learned them from experience.

The most important points in technique are, first, to render the operation safe by avoiding the opening of the mucous membrane at the duodenal end of the incision; and, second, to make the operation effectual by seeing that the muscle is entirely divided, especially at the stomach end. One must remember that the stomach projects into the duodenum much as the cervix uteri projects into the vagina, and that the muscle and mucous membrane are most intimately adherent at the duodenal end. The tumour is held between the fingers and thumb of the left hand, and a line chosen on the serous membrane of the anterior wall of the tumour as free from obvious minute vessels as possible. A shallow longitudinal incision is then made along this line with a sharp knife. The incision is now deepened by a blunt instrument. We find that the blunt end of the scalpel suits well. Thus the circular muscular fibres, cheese-like in consistency, are divided down to the mucous membrane without penetrating that structure. Any evident bleeding point is pinched with fine artery forceps, and no ligatures may be required. This completes the operation expect for the closing of the abdominal wall.

No operations in surgery yield such satisfactory results as those which relieve mechanical obstruction, but here, as in prostatectomy and other similar conditions, the final results is largely influenced by the after treatment. Personal supervision and intelligent nursing are of prime importance. Retention of warmth is essential. In all our cases we have seen that liquid is absorbed per rectum at the average rate of one ounce per hour. These children are dehydrated and their tissues are wilted for want of water. Liquid per rectum before operation is often advantageous. After operation we aim at one ounce of normal saline and one ounce of sugar of milk solution (two drachms to the pint) alternately every hour for the first 24 hours, and then continue at longer intervals according to the state of the child and its ability to retain nourishment by the stomach. By the second day the child can usually retain diluted breast-milk given with pipette in gradually increasing quantities, beginning with one drachm. In a weaned child we begin with sugar of milk solution, followed by dilute humanised milk.

It is hard to withstand the allurements of speculation as to the etiology and pathology of this extraordinarily interesting condition. A fair amount of experimental investigation is now forthcoming, and many illuminating facts are on record. For example, the typical hyperplastic condition has been found in a fœtus of seven months. Again, in children who have died of intercurrent affections, many months after gastro-enterostomy had been successfully performed for the stenosis, the thickening of the pylorus was as great as at the time of operation, and the canal was impervious to the passage of water, or admitted only a fine probe.

There is a considerable class of young adults who have suffered all their lives from gastric symptoms, indicative of a narrow pylorus, without signs of ulceration, syphilitic fibrosis, or other adequate cause of stenosis. They may have died of phthisis later on, and it is often assumed that a tubercular diathesis had been the cause of their chronically ill-nourished condition. Is it possible that a persistent infantile stenosis is sometimes the basal cause, and that the inroads of tuberculosis follow upon inadequacy of nourishment? Many years ago I did a gastro-enterostomy and stitching-up of the lesser omentum upon a young woman of 30 whose weight varied from 4st. 12lb. to 5st. 2lb., and whose stomach was much dilated and proptosed. She improved after the operation, but died several years later from phthisis. I obtained the stomach post-mortem, and it shows a patent but narrow pylorus without any sign of a lesion to account for it, and a good functioning anastomotic opening.

The most attractive theory relating to the etiology and pathology of infantile stenosis is contained in articles by Pirie and Tyrrell Gray in the "Lancet" of September, 1919. It is there suggested that spasm inducing the hyperplasia is primarily due to anti-natal hyperadrenalism, and that other subsidiary post-natal causes determine the persistence and recurrence of the spasms. Want of balance between the hormones of the various endocrinic organs is a fascinating field for speculation upon the problems of Medicine. There are several reasons for thinking that pancreatic insufficiency may be a factor in inducing spasm, once the hyperplasia is established.

Case1.—July, 1914. Male Child; first; premature; weight at birth 5lb. 7oz. Characteristic symptoms of pyloric obstruction appeared somewhat suddenly. Medical treatment, continued for a week, proved unavailing. There was visible peristalsis with palpable tumour. Bowel movements ceased, and there was almost complete anuria. The child presented a shrivelled appearance and sometimes became leaden-coloured, so that the nurse more than once thought he was dead.

The condition appearing desperate, operation was performed at 8.20 p.m. under ether, after thorough stomach lavage with sterile water. The pyloric tumour was the size of a small walnut. It was incised longitudinally on the anterior surface down to the mucous membrane, two small bleeding points being creshed with fine forceps. A small separate opening was made on the anterior surface of the stomach, and by means of this opening fine dressing forceps were pushed through the pylorus. Following this a No. 12 soft rubber catheter was similarly passed through the pylorus well into the duodenum, and five ounces of sugar of milk solution (two drachms to the pint) was injected into the intestine.

The mucous membrane at the pylorus remained intact. A partially successful attempt was then made to transform the longitudinal incision in the pyloric muscle into a transverse one by means of mattress and simple interrupted sutures of linen thread. The small separate opening in the stomach was closed with Lambert stitches of catgut and thread. The abdominal wall was closed with No. 1 catgut and silkworm gut.

Strict care was taken throughout to retain warmth, the child being wrapped in cotton-wool. One ounce of rectal saline per hour was given for 24 hours. Twelve hours after the operation diluted breast-milk administered by pipette was rejected. Urine, however, was now passed and there was a bowel motion. After the first 24 hours the child began to retain sugar of milk solution by the mouth, and salines were given at gradually increased intervals. After 48 hours diluted breast-milk was retained, and from that time, by dint of cautious strengthening of nourishment, convalescence was uninterrupted. In a week's time normal breast-feeding was established, and the child gained weight steadily. This boy at six years is a sturdy, normal specimen of humanity.

Case 2.—1915, Male; first child; ten weeks; breast-fed. Nutrition poor from birth. Supplementary feeding by means of humanised milk. Inclination to vomit after a few weeks. Gradually failure of nutrition appeared and retention of food in the stomach. Treatment by lavage was begun and persevered with, but signs of obstruction slowly increased with visible peristalsis. Finally food was found to be retained in the stomach for ten hours.

At operation a large hard, nut-like pylorus was found. Simple pyloroplasty was performed, the pyloric tube being opened by a longitudinal incision. Some attempt was made to shell out the tube of mucous

membrane, and the opening therein was stitched transversely with a fine catgut. The muscle was then drawn together transversely by fine thread with difficulty, owing to the thread cutting through the cheese-like muscle. The infant made a slow recovery, but finally satisfactory nutrition was established, and the child has since gone through the gamut of children's diseases, ending up with diphtheria, which all but proved fatal. Tracheotomy, however, cheated pathological science of an opportunity of viewing, post-mortem, a cured case of pyloric stenosis, and the boy is now healthy and well.

Case 3.—1916. Male; eight weeks; second child; breast-fed. Weight at birth 8lb. 4oz. At end of first month 10lb. Then symptoms of obstruction. First, constipation and occasional vomiting. Finally, at the eight week, in spite of treatment, there was progressive loss of weight, projectile vomiting, visible peristalsis, diminished urine, and cold extremities.

Upon opening the abdomen a tumour like an acorn was found. A longitudinal incision was made down to mucous membrane, but at the duodenal end, where the muscle seemed to vanish suddenly contrasted with its hypertrophied state at the stomach end, I unintentionally opened the mucous membrane. In order to close the opening satisfactorily, a small incision was made in the anterior wall of the stomach some distance away, and by means of that opening a No. 7 rubber catheter was passed through the pylorus into the duodenum. Incidentally, use was made of this means to run three ounces of sugar of milk solution into the intestine, and the pyloric mucous membrane was accurately stitched with fine catgut over the catheter. The small hole in the stomach was then closed, and again, as in other cases, an attempt was made to draw together the pyloric muscle in a transverse direction. This closure, as previously, was unsatisfying owing to the pouting of the muscular incision. Therefore, finally, omentum was stitched over it. The child's convalescence was satisfactory. One ounce of saline and one ounce of sugar of milk solution was given alternatively per rectum every hour, and in the evening of the first day the pink appearance and occasional strong cry added hope to the prognosis. Breast-feeding was established in less than a week, and the child gained weight steadily and rapidly, week by week, till at the end of three months he was 16lb., and at 12 months of age 25lb. He is now a well-developed, healthy boy.

Case 4.—1917. Female; three months; first child; weight at birth 9lb. Breast-fed for a fortnight; afterwards humanised milk. Inclined to constipation and occasional vomiting from birth. In spite of constant case, no steady progress made. Later, symptoms and signs of obstruction were apparent. Weight at operation 7lb. 14oz. At operation a prick was again unintentionally made in the mucous membrane at the duodenal end of the pyloric incision. Therefore, after drawing together the hypertrophied muscle transversely, a piece of omentum was stitched over the incision. Convalescence was good. The infant did not vomit once after operation. Gain in weight has been steady, and the girl is now healthy.

Case V.—1917. Female; first child; five weeks. Patient normal at birth, became extremely emaciated, with obvious signs of pyloric obstruction. Milk was retained in the stomach of 12 hours before being syphoned out. At operation the mucous membrane was not opened. Convalescence was rapid, and the patient developed into a healthy child.

Case 6.—1919. Female; first child; three weeks; breast-fed. Symptoms of obstruction began at a fortnight. Explosive type of vomiting. Visible peristalsis. Palpable tumour. Napkins show only a damp, brick-dust-strained spot. No bowel motion for 48 hours. At operation the mucous membrane was not opened; no attempt was made to stitch the muscle, and no catgut whatever was left in the abdominal cavity. The child retained salines well. There was occasional vomiting during the re-establishment of breast-feeding, but gain in weight continued steadily, and the child became quite healthy.

Only two other cases of well-marked pyloric stenosis in infants were seen during the above period. In both cases medical treatment was persevered with, operation was declined, and a fatal result ensued.

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