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Contents

Editorial

Articles

Viewpoint

Clinical correspondence

Letters

Obituary

100 years ago in the *NZMJ*

Summaries

An assessment of burnout in New Zealand orthopaedic resident medical officers

Tanushk Luke Brito Martyn, Earle Savage, Simon Bruce Murdoch MacLean

Orthopaedic surgical training is a long and arduous commitment to both the trainee and their family that is ultimately necessary to create a competent surgeon that can fulfil the requirements necessary to treat the population of New Zealand to an acceptable standard of healthcare. Our study shows that approximately half of both trainee and non-trainee orthopaedic registrars are exhibiting signs of burnout. This is comparable to other developed nations with a similar healthcare system.

Presenting characteristics, length of stay and oxygen use among COVID-19 cases at a single tertiary hospital in Auckland, New Zealand, using retrospective medical recorded data

Nicole Hotchkiss, Georgia Van Zantvoort, Christin Coomarasamy, Eunicia Tan, Andrew Brainard

Our study looked at the first wave of COVID-19 patients in Auckland, New Zealand. We recorded information from medical charts including details about the patient's background, the symptoms that made them seek medical care, and their vital signs on arrival to hospital. We then assigned a clinical severity score, and looked at it in terms of oxygen use in the hospital and the patient's hospital course. We found that the assigned clinical severity score was associated with need for oxygen, whether the patient was discharged or admitted to hospital and the duration of the hospital stay. Additionally, we found that when patients were admitted to the hospital, they spent nearly half their stay not using any oxygen at all.

Community specialist palliative care services in New Zealand: a survey of Aotearoa hospices

Salina Iupati, Rod MacLeod, James Stanley, Cheryl Davies, Richard Egan

This paper is comprehensive survey of services provided by hospice across Aotearoa. All hospices responded to the survey. The survey found all hospices provided care at home with 94% also provided care in aged residential care facilities. There are areas of inconsistency in afterhours access and cultural support for Māori. This survey also questions capacity of the present system to address current and future shortages of palliative medicine specialist.

A survey of adult respiratory and sleep services in Aotearoa New Zealand: inequities in the provision of adult respiratory and sleep services

Roland Meyer, Paul Dawkins, James Fingleton, Brett Shand, Elaine Yap

Our health system is undergoing a major transformation with the stated aims of the reforms of addressing long-standing inequities, improving access to health services, correcting geographic variation and ensuring services are in accordance with the principles of the Te Tiriti O Waitangi. We believe that our survey underpins the evidence for the need of this work now. The need to end a "postcode lottery" in the patients and whanau's ability to receive key respiratory services is clearly demonstrated.

A health sector response to the commercial determinants of health

Sarah Sharpe, Karen McIlhone, Summer Hawke, Shanthi Ameratunga

This article describes the development and use of a framework for assessing a health organisation's response to the commercial determinants of health (CDoH). CDoH are the "strategies and approaches used by the private sector to promote products and services that are detrimental to health". The study was done at Counites Manukau Health in 2021. It involved reviews of published literature, review of policy documents at Counties Manukau Health, and interviews with 12 people about their thoughts and perspectives. The findings highlight: the power of companies that make harmful products (e.g., alcohol, tobacco, highly processed foods and beverages); the harmful impacts of these products on people, whānau/families, and communities; and the important role the health sector has in responding to the CDoH in order to protect and promote people's health and wellbeing.

Beyond muddy waters: Three Waters reforms required to future-proof water service delivery and protect public health in Aotearoa New Zealand

Tim Chambers, Nick Wilson, Simon Hales, Marnie Prickett, Edward Ellison, Michael G Baker

The current management of water services in Aotearoa is inadequate to protect public health and is economically inefficient. Three Waters reforms will facilitate better public health surveillance, water service provision and infrastructure upgrades. Concerns around co-governance, privatisation and loss of local control have varying degrees of legitimacy but do not provide a persuasive argument against the urgent need for reform.

Doctor owned investigation and treatment facilities: a conflict of interest or a pragmatic way forward?

Peter Robertson

The New Zealand health system is implementing a significant reform agenda amidst continued pressure related to the COVID-19 pandemic. A feature of the response, as the system continues to work through the reform agenda, has been the use of capacity and capability across both public and private components of the sector.

Within this context, the recent (September 2022) Medical Council of New Zealand consultation document on doctors and health related commercial organisations[1] has again highlighted the potential conflict between optimum patient care and the potential for this care to be influenced by financial factors. In relation to referral to a facility in which the doctor has a financial interest, the consultation document includes the statement that: *"You should only do so if you have explored other options with your patient, and there is no suitable alternative that meets your patient's needs."* This statement is a new addition to the existing guidelines (July 2012),[2] and has the potential to dramatically, and negatively, disrupt provision of healthcare across New Zealand.

Healthcare, globally, is characterised by a number of different funding models. Examples include fee for service models, tax-funded models, and insurance-based schemes.[3] In my view, New Zealand is fortunate to have a mixture of both fee for service and tax-funded (e.g., capitation) models, which operate alongside our world-class, no-fault universal accident compensation system. Our structures do, to a large degree, optimise healthcare delivery, in a world where many acknowledge that the tension between value, quality and timeliness is an insoluble problem for most jurisdictions.

In terms of elective intervention rates, tax-funded systems trend to lower levels of intervention, and fee for service systems trend to higher intervention levels—with the obvious inference that any financial interest, or the lack of it, contributes to both trends. As an example, for common orthopaedic interventions, we in New Zealand are in the "middle of the pack".[4] Whilst there will always be differing viewpoints it seems clear that prior to COVID-19, New Zealand healthcare serves its population, relative to GDP spent, at levels at or above most other countries. Of course, there is always room for improvement, and this is rightly the focus of the current health reforms.

Outside New Zealand's public hospitals, much of the care at primary and secondary levels is provided in doctor owned facilities, including primary care, radiology and pathology facilities, specialised procedural units, private specialist practices, and private day stay units and hospitals. The amount of work this component of the sector does is significant, again ranging from primary and urgent care to secondary care across multiple specialties.[5] Many of these specialist units have been developed by doctors in response to demand, and are characterised by innovation, and by the introduction of novel investigations and interventions. Reinvestment is a key for continuous improvement.

I believe that it is rare that such facilities have been detrimental to healthcare delivery. More commonly, these doctor-owned and -lead facilities advance healthcare, and lead developments that are adopted—over time—into the public sector. The introduction of magnetic resonance imaging (MRI) scanning to New Zealand is an excellent example of technology introduction through the private component of system. Three decades ago, this new technology was introduced by a private radiology facility in Auckland. Soon after, this the technology was adopted by several other doctor-owned private facilities and, with its obvious diagnostic advantages, was able to provide contracted services to the public hospitals. Several years later, public institutions acquired MRI scanners—although there is still considerable reliance on private contracting for public patients.

Whilst the private component of the sector does not hold a monopoly on innovation, it is often positioned to adapt faster. These investments in private health facilities are arguably more cost effective, and more efficient and innovative than the public sector can achieve. Endoscopy, cardiac and interventional radiology facilities in the private sector provide excellent examples. Whilst an exhaustive exploration of innovative practices and facilities is beyond the scope of this editorial, there are many examples where such private facilities lead developments in patient centric care—these include primary care, rehabilitation medicine and cancer care.

Limiting referral to facilities in which a doctor has a financial interest has the potential to impair patient care. In practice, that care would be directed away from units subject to referring doctors' involvement. It would lead to referral away from facilities characterised by doctor-lead innovation and development. Limiting referral to doctor-owned facilities would also likely dramatically reduce technological advancement and innovation across healthcare—a process that has evolved over generations in this country, and that is responsible for many of the models of quality care that currently exist.

It is difficult to imagine the degree of disruption of continuity of care, and system breakdown, that would occur at primary care level if the requirement for referral away from a doctor-owned practice for subsequent investigations and treatment were implemented. The resultant impact on patients is likely to be detrimental, and from a system perspective this approach is likely to add cost, cause delays and exacerbate capacity challenges.

Conflicts of interest must be acknowledged, and patients must be informed. In this regard, the Medical Council of New Zealand's 2012 guidance is sound, with a strong emphasis on disclosure and communication.[2] Where relevant, this discussion will, for most patients, acknowledge a greater overall understanding of the doctor's involvement with aspects of the patients care beyond the consultation role.

I have found that many patients express considerable satisfaction when they understand the role of the consulting doctor in further investigation and treatment. Much has been made of the patient's right to choose. This includes choice of provider and, when fully informed, the choice to consent to investigation and treatment. Within the New Zealand context, this approach has always been underpinned by a relationship based on trust and respect between the doctor and the patient.

At all times the medical profession must have patient care as its primary focus—as clearly enunciated in the discussion document—and at the heart of our profession. The Medical Council of New Zealand discussion document provides excellent guidelines relating to dealings with outside commercial organisations including drug, technology and implant companies. The drivers for these companies are often quite different from doctor-owned investigation and treatment facilities. These drug, technology and implant companies report primarily to shareholders and investors.

At the heart of this discussion, there is huge opportunity for ongoing benefit in patient care—when the risks of over-investigation and over-treatment are fully acknowledged. Careful monitoring, understanding of trends and changes in practice, observation of registry data, and outcome studies for procedural interventions, will ensure that quality care remains the priority. Disruption of the process of innovation, continuous improvement, and to continuity in patient care will be to the detriment of the profession—but most importantly, this will be to the detriment of our patients.

COMPETING INTERESTS

Peter Robertson is Past President New Zealand Orthopaedic Association and President Elect International Society for the Study of the Lumbar Spine.
Peter Robertson has financial interests in: TBI Health and MSK Radiology.
Peter Robertson is a Director of the Ascot Hospitals and Clinics Ltd and Auckland Orthopaedic Ltd.

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REFERENCES

1. Medical Council of New Zealand. Consultation – Statement on Doctors and health-related commercial organisations [Internet]. Wellington; 2022. Available from: https://www.mcnz.org.nz/about-us/consultations/consultation-statement-on-doctors-and-health-related-commercial-organisations/.
2. Medical Council of New Zealand. Statement on Doctors and health-related commercial organisations [Internet]. Wellington; 2012. Available from: https://www.mcnz.org.nz/assets/standards/e77cce6f24/Doctors-and-health-related-organisations.pdf.
3. Crigger NJ. A review of current healthcare funding models [published correction appears in JONAS Healthc Law Ethics Regul. 2005 Jan-Mar;7(1):1]. JONAS Healthc Law Ethics Regul. 2004;6(4):105-113. doi:10.1097/00128488-200410000-00008.
4. Ministry of Health. Services received acute and elective patient discharge volumes [Internet]. Wellington; 2019: Available from: https://www.health.govt.nz/publication/services-received-acute-and-elective-patient-discharge-volumes.
5. Health and Disability System Review. Health and Disability System Review – Final Report – Pūrongo Whakamutunga [Internet]. Wellington: HDSR; 2020 [cited 22 January 2022]. Available from: https://systemreview.health.govt.nz/assets/Uploads/hdsr/health-disability-system-review-final-report.pdf.

An assessment of burnout in New Zealand orthopaedic resident medical officers

Tanushk Luke Brito Martyn, Earle Savage, Simon Bruce Murdoch MacLean

ABSTRACT

AIMS: Burnout and fatigue are common in the medical profession. The primary aim was to assess rates of burnout in trainee and non-trainee orthopaedic registrars in New Zealand. A secondary aim was to establish which specific factors are associated with burnout.

METHODS: In 2021, a 53-question online survey was sent to New Zealand trainee and non-trainee orthopaedic registrars. The survey included questions addressing demographics, modifiable factors known to lead to burnout, information on respective orthopaedic departments, and how respondents had fared with COVID-19. Registrars also completed the Maslach Burnout Inventory—Human Services Survey for Medical Personnel (MBI-HSS MP), a 22-question validated survey that is designed to assess the frequency and intensity of perceived burnout among medical personnel.

RESULTS: Fifty of 62 (80.6%) trainees and 66 of 70 (estimated number) (94.3%) of non-trainees completed the survey. Trainees and non-trainees both exhibited moderate levels of burnout. The trainee mean score emotional exhaustion (EE) 22.5, depersonalisation (DP) 8.8, personal achievement (PA) 35.9; non-trainee mean score EE 22.4, DP 8.9, PA 35.9. Fifty-two point two percent of trainees and 50% of non-trainees scored in the severe range for at least one of EE or DP. Factors shown to reduce burnout are the presence of a senior colleague ($P<0.001$), participation in professional assistance ($P=0.049$), working in a department with a full complement of staff ($P=0.020$) and being able to attend health maintenance appointments ($P=0.050$).

CONCLUSION: Our study shows that approximately half of both trainee and non-trainee orthopaedic registrars are exhibiting signs of burnout. This is comparable to other developed nations with a similar healthcare system.

It is well documented that burnout and fatigue are common in the medical profession. Most of the available literature is based on assessment of the senior workforce, focussing primarily on consultants.[1–5] Recently, there has been a growing concern for the wellbeing of the junior workforce, due to a number of changes in the working environment.[6–12] These changes include an increased need for service provision, less teaching time, a diminished opportunity to progress through a chosen career pathway and a general increase in the number of patients (with increasing amounts of significant comorbidities), all potentially leading to a greater manifestation of occupational burnout.[6–12]

The consequences of burnout are far reaching, affecting all levels of healthcare. Adverse effects to doctors include increased rates of suicidal ideation and drug abuse, as well as health concerns such as hypertension, anxiety, depression, headaches and other cardiovascular disease.[1,7] Healthcare institutions are affected by doctor absenteeism and high turnover rate, as well as poor performance indicators while at work.[1] Patient care is often compromised, with an increased risk of medical errors and a decrease in the quality of medical care.[1,7,13] Burnout of medical staff has also been shown to decrease the empathy they have for patients. This ultimately affects the overall care of a patient.[14]

Occupational burnout is defined as a syndrome composed of three main facets: emotional exhaustion (EE), depersonalisation (DP) and a low sense of personal accomplishment (PA). These are often secondary to the chronic stresses of one's profession.[3,4,15] EE is defined as "*the perception of feeling drained or depleted due to excessive emotional or psychological demands*". DP is defined as "*the inclination to view another person in an overly detached and impersonal regard*".[1] Low PA is defined as "*a decline in feelings of competence" and "a tendency to evaluate oneself negatively, in particular, regarding their work with others*".[16]

Orthopaedic surgery is a highly skilled and demanding specialty. Surgeons are expected to maintain high standards of professionalism, medical expertise and technical competence.[5] The outcome of their work is directly linked to the overall function of their patients. Adverse outcomes have a serious impact on the patient, the surgeon and the healthcare system.[5]

Orthopaedic training is considered to be emotionally, physically and intellectually challenging, and can take a substantial toll on trainees and their families. The significant number of clinical hours, along with the time spent studying to reach the level of clinical excellence demanded, can often compromise the wellbeing of trainees. This is detrimental to their personal health and overall job satisfaction, and compromises patient care and safety.[6,7,9–12]

The phenomenon of burnout among orthopaedic scheme trainees has been extensively studied and documented in other first world countries that share a similar demand of excellence from their doctors.[6–8,10–12,17,18] To our knowledge, there is currently no published study analysing the rates of burnout among New Zealand orthopaedic registrars. The aim of this study was to assess the rates of New Zealand orthopaedic registrar burnout, both at a trainee and non-trainee level. A secondary aim was to establish if there were any specific factors leading to burnout. Our hypothesis was that the burnout rate would be comparable to other first world countries with a similar orthopaedic training programme.

Methods

In August 2021, an email containing a link to a 53-question survey was sent to all (n=62) of the orthopaedic registrars on the New Zealand Orthopaedic Association (NZOA) training programme. Ethics approval was retrospectively obtained from the Health and Disability Ethics Committee (Reference: #2022OOS12773). The survey was conducted anonymously online. A reminder email was sent in weeks two and three to all registrars on the list.

A similar email was sent to the non-trainee orthopaedic registrars. Two methods were employed to ensure the survey reached its intended group. Firstly, all non-trainee registrars who had identified orthopaedics as their current specialty with the Specialty Trainees of New Zealand (STONZ) union received an email. Secondly, a selected orthopaedic registrar was contacted at most of the district health boards (DHBs) and was asked to be a point of contact for the study. If they agreed, a link to the survey was sent to them via email or SMS. They were then asked to distribute the survey link to the rest of the applicable doctors in that department.

The surveys demographic questions addressed gender preference, ethnicity, age, year of the Surgical Education and Training (SET) Programme/number of years the registrar had worked in orthopaedics, current relationship status and, if applicable, work status of their partner and whether they were in the medical profession.

Factors associated with burnout were queried, including number of sleep hours and the exercise regimen of a registrar, as well as use of social media, alcohol and other substances. Registrars were asked whether they could routinely attend health maintenance appointments or if they had ever used professional services for their mental health. Questions about their orthopaedic department including hospital setting, whether the department had a full complement of staff, hours worked, time since their last holiday, manageability of the clinical workload and amount of senior support were also included.

Maslach Burnout Inventory

The final part of the survey was the Maslach Burnout Inventory – Human Services Survey for Medical Personnel (MBI-HSS MP). This is a validated tool used to assess burnout.[15] It assesses the three main facets of the syndrome via a Likert-scale set of 22 questions: nine for EE, five for DP and eight for PA. The total score for each facet is then calculated, stratified and ranked into either a mild, moderate or severe form of burnout. This information is summarised in Table 1.[19] The level of EE and DP is proportional to burnout; PA is inversely proportional.[6] A registrar was considered “burnt out” if they scored in the severe range for either EE or DP. Levels of burnout were calculated in the trainee and non-trainee groups. Potential factors were then assessed to see if there were any statistically significant associations related to each facet of burnout.

Statistics

Parametric data between trainees and non-trainees was compared using unpaired T-testing. Ranked non-parametric data were compared using Mann–Whitney testing. Categorical data were compared using the Chi-squared and Fisher’s Exact test. A p-value <0.05 was considered statistically significant. A multivariate regression analysis was performed to establish associations between variables. Trainees and non-trainees were then grouped, dependent on whether they were exhibiting burnout.

Table 1: Maslach Burnout Index score summary.[17]

	Emotional exhaustion score (0–54)	**Depersonalisation score (0–30)**	**Personal accomplishment score (0–48)**
Low burnout	<19	<6	>39
Moderate burnout	19–26	6–9	34–39
High burnout	>26	>9	<34

Results

Trainees vs non-trainees

Fifty of the 62 (80.6%) trainees completed the survey. Sixty-six of 70 (estimated number) (94.3%) of non-trainees completed the survey. Overall, trainees exhibited moderate levels of burnout (mean score EE 22.5, DP 8.8, PA 35.9). Non-trainees also exhibited moderate levels of burnout (mean score EE 22.4, DP 8.9, PA 35.9). Fifty-two point two percent of trainees and 50% of non-trainees scored in the severe range for either (or both) EE or DP. This is summarised in Table 2.

Demographic data and relevant associated factors are summarised in Table 3. There were statistically significant differences between trainees and non-trainees with regards to age, relationship status, children, whether their partner was in the medical profession, and if COVID-19 had decreased the participant's mood. Ninety-five point seven percent of trainees and 87.9% of non-trainees either disagreed or were neutral when asked if they were able to routinely attend health maintenance appointments.

Associations within cohorts

Trainees

In the trainee group, the only significant association noted was an increased level in DP when trainees stated they had not had time away from work for greater than three months (P=0.042).

Non-trainees

The non-trainee group exhibited several associations between parameters. DP was found to be higher in males than females surveyed (P=0.028). It was also increased in departments without a full complement of staff (P=0.020). EE was higher in registrars who slept six hours or fewer (R=0.329, P=0.012) and worked greater than 80 hours per week (R=0.266, P=0.043). EE was lower in trainees with a lower mood due to COVID-19 (R=0.270, P=0.043). DP (P=0.009) and EE (P<0.001) were increased in non-trainees who indicated that they "strongly disagreed" that they were able to routinely attend health maintenance appointments.

Associations of respondents displaying signs of burnout

Respondents displaying signs of burnout exhibited several statistically significant associations. The presence of a senior colleague is highly significant at reducing burnout (P<0.001). A respondent who participates in professional assistance for work-related stress (such as attending professional supervision, or seeing a counsellor, psychologist or psychiatrist) is less likely to be burnt out (P=0.049). A respondent working in a department with a full complement of staff is less likely to be burnt out (P=0.020). A respondent who is able to attend health maintenance appointments is less likely to be burnt out (P=0.050). This is summarised in Table 4.

Discussion

Burnout is a syndrome that exists in all forms of the medical profession. It has been noted to adversely affect orthopaedic surgeons in other countries with similar healthcare systems, and it is particularly prevalent while doctors are advancing through their training.[3,6–8,10,11,13,17,18] Our study shows that New Zealand's orthopaedic registrars, both trainee and non-trainee, are not statistically different.

Orthopaedic surgery in New Zealand prides itself on its high standards, both in clinical practice and professional behaviour. These standards are developed by the quality of the surgeon's training and the examples set by their senior colleagues and consultants. It's accepted that

Table 2: Breakdown of burnout data.

Trainee Maslach Burnout Index summary									
	EE	Level	N (%)	DP	Level	N (%)	PA	Level	N (%)
		High	14 (30.4)		High	18 (40.9)		High	19 (43.2)
		Mod	14 (30.4)		Mod	9 (20.5)		Mod	6 (13.6)
		Low	18 (39.1)		Low	17 (38.6)		Low	43.2
	EE Total	Mean	22.5	DP Total	Mean	8.8	PA Total	Mean	35.9
		SD	9.8		SD	6.5		SD	8.5
Non-trainee Maslach Burnout Index summary									
	EE	Level	N (%)	DP	Level	N (%)	PA	Level	N (%)
		High	20 (34.5		High	21 (37.5)		High	20 (35.7)
		Mod	8 (13.8)		Mod	12 (21.4)		Mod	16 (28.6)
		Low	30 (51.7)		Low	23 (41.1)		Low	20 (35.7)
	EE Total	Mean	22.4	DP Total	Mean	8.9	PA Total	Mean	35.9
		SD	12.7		SD	7		SD	7.8
P-value **Trainee versus non-trainee**	0.877			0.372			0.933		

training will include stressful periods and, ultimately, is a necessary process to practice in a field that produces a high level of job satisfaction.[7,10,11] Regardless, there is now substantial evidence available that identifies orthopaedic trainees as being particularly vulnerable to burnout during this period. Consideration on how to mitigate these stresses needs to be further investigated and implemented.

New Zealand shares a comparable orthopaedic training scheme and healthcare system to Australia. Both orthopaedic associations follow guidelines set by the Royal Australasian College of Surgeons. A 2014 study by Arora et al. examined burnout in Australian orthopaedic trainees and demonstrated that 53% of respondents were burnt out.[6] This is a similar figure to our study, whereby 52.3% of trainees and 50% of non-trainees are burnt out. A 2016 study by Chambers et al. examined burnout in New Zealand's senior medical staff, finding 50.1% of respondents were burnt out.[20] It was also found that respondents aged 30–39 had the highest mean burnout scores. This is particularly alarming considering 89.1% of the trainee respondents are in this age category.

Burnout is difficult to address due to the complex and multifactorial nature of the syndrome. A 2009 study by Sargent et al. documented a number of factors associated with increased EE and DP.[9] EE was adversely affected by difficult relationships with senior colleagues, anxiety over clinical competence and high levels of conflict being present between work and personal life. A high level of DP was found with increased work hours and difficult relationships with nursing staff.[9]

Strategies to try and combat burnout have been identified. They can be divided into personal and institutional approaches. Personal strategies to combat burnout include spending time with partners, children and extended family and friends, as well as maintaining a social life outside work and maintaining physical fitness.[8,9,12,21] A strong

Table 3: Summary of demographics and relevant associated factors.

Demographic		**Trainee No (%)**	**Non-trainee No (%)**	**P-value comparing trainees to non-trainees**
Sex	Male	33 (71.7)	40 (69)	0.862
	Female	13 (28.3)	17 (29.3)	
Age	25–29 years	3 (6.5)	26 (44.8)	0.001
	30–34 years	31 (67.4)	24 (41.4)	
	35–39 years	10 (21.7)	7 (12.1)	
	40–55 years	2 (4.4)	1 (1.7)	
SET Year/Year of non-training orthopaedics	1	10 (22.2)	18 (31)	
	2	8 (17.8)	16 (27.6)	
	3	13 (28.9)	10 (17.2)	
	4	7 (15.6)	6 (10.3)	
	5 (or above)	7 (15.6)	8 (13.8)	
Current relationship status	Committed relationship	14 (30.4)	23 (39.7)	0.014
	Married	26 (56.5)	22 (37.9)	
	Separated/ divorced	1 (2.2)	0	
	Single	5 (10.9)	13 (22.4)	
Partner in the medical profession	Yes	15 (37.5)	27 (60)	0.038
	No	25 (62.5)	18 (40)	
Children	Yes	21 (46.7)	8 (14.3)	<0.001
	No	24 (53.3)	48 (85.7)	
Amount of sleep a night	<=6 hours	19 (41.3)	30 (53.6)	0.217
	>6 hours	27 (58.7)	26 (46.4)	
Amount of exercise a week	<=1 week	17 (37)	17 (30.4)	0.482
	>1 week	29 (63)	39 (69.6)	
Sought professional assistance for work-related stress	Yes	10 (21.7)	8 (13.8)	0.287
	No	36 (78.3)	50 (86.2)	

Table 3 (continued): Summary of demographics and relevant associated factors.

Demographic		**Trainee No (%)**	**Non-trainee No (%)**	**P-value comparing trainees to non-trainees**
Routinely able to attend health maintenance appointments	Agree	2 (4.3)	7 (12.1)	0.341
	Neutral	10 (21.7)	12 (20.7)	
	Disagree	34 (73.9)	39 (67.3)	
Department has a full complement of staff?	Yes	29 (63)	38 (66.7)	0.861
	No	17 (37)	19 (33.3)	
Average hours worked a week	50–59 hours	11 (23.9)	11 (19)	0.298
	60–69 hours	24 (52.2	28 (48.3)	
	70–79 hours	10 (21.7)	16 (27.6)	
	>=80 hours	1 (2.2)	3 (5.2)	
Time since last holiday	<3 months	14 (30.4)	16 (28.6)	0.837
	>=3 months	32 (69.6)	40 (71.4)	
Clinical volume manageable	Agree	30 (65.2)	31 (53.5)	0.951
	Neutral	10 (21.7)	14 (24.1)	
	Disagree	6 (13)	13 (22.4)	
Feel well supported by senior colleagues	Agree	34 (73.9)	46 (79.3)	0.638
	Neutral	8 (17.4)	5 (8.6)	
	Disagree	8 (17.4)	7 (12)	
COVID-19 increased my workload	Agree	3 (6.5)	6 (10.5)	0.606
	Neutral	21 (45.7)	20 (35.1)	
	Disagree	22 (47.8)	31 (54.4)	
COVID-19 has decreased my mood	Agree	17 (37)	13 (22.8)	0.046
	Neutral	11 (23.9)	13 (22.8)	
	Disagree	18 (39.1)	31 (54.4)	

Table 4: Protective factors for respondents identifying as burnt out.

Factor	P-value
Age of respondent	0.142
Sex of respondent	0.164
Respondent in a relationship	0.373
Partner in medical profession	0.253
Respondent having children	0.751
Sleep	0.727
Exercise	0.533
Ability to attend health maintenance appointment	0.050
Professional assistance	0.049
Complement of staff	0.011
Time since last holiday	0.910
Average hours worked	0.678
Clinical volume is manageable	0.389
Presence of a senior colleague	<0.001
COVID-19 has increased workload	0.374
COVID-19 has decreased respondent's mood	0.065

and positive maintenance of relationships with colleagues was deemed particularly important.[12] On an institutional level, limiting work hours to fewer than 80, providing senior support when required and providing mentorship programmes have been shown to decrease levels of burnout in registrar populations.[8,9,12,21,22]

A few important associations were found in our study. Trainees recorded a higher level of DP when they hadn't had time away from work for three months or more. In the non-trainee group, males had a higher level of DP compared to females. EE and DP were found to be increased in registrars who slept fewer than six hours, worked greater than 80 hours, or were in a department without a full complement of staff. To gain a place on the training programme is extremely competitive with limited places available. To attempt to gain an interview for potential selection, a points-based system is utilised to direct non-trainees in areas of orthopaedic development. This system awards points for specific courses, research published, presentations given, cultural involvement and orthopaedic work experience. The majority of non-trainees will have worked between three to five years as an orthopaedic registrar before being selected to the training programme. Our study noted that over 40% of non-trainee respondents were in their third year or more as orthopaedic registrars. While not directly assessed in this study, the lack of certainty about their future might be a direct contributor to burnout. Anecdotally, many non-trainees will often work long hours (often going above the hours stipulated on their salaried contract) to try and prove themselves. This is an unfortunate situation that may be improved with better personal and institutional strategies in place. When respondents displaying signs of burnout were grouped together, further important associations were noted. The presence of a senior colleague, participation in professional assistance programmes, being able to attend health maintenance appointments and working in a department with a full complement of staff were all found to be important factors in limiting burnout.

A positive change in our medical personnel's wellbeing necessitates looking for ways to change the current system. A particularly concerning area was the large proportion of respondents (95.7% trainees, 87.9% non-trainees) who were neutral or stated they were unable to routinely attend health appointments. As one of the strategies to prevent burnout is maintenance of physical fitness, we suggest a mandatory implementation of protected time for health-related consultations should be made at a DHB or governing body level. The presence of a senior colleague is highly significant at reducing burnout (P<0.001), leading us to emphasise the importance of implementation of mentoring programmes. Mentoring has been defined in many ways, but essentially equates to a "career friend" who can help a patron through the rigours of a particular activity.[23] Mentorship can be formal or informal; it is rewarding for both the mentor and the mentee. The NZOA offers mentorship to its trainees, with regular documented check-ins between surgeons and the registrars working for them. While there is no formal mentoring system set up for non-trainees, a Medical Council of New Zealand (MCNZ) requirement states all non-trainees must register in a recertification programme for their general scope of practice. Inpractice is an independent not-for-profit organisation whose role is to deliver education and continuing professional development programmes, including formulation of professional development plans, continued medical education, peer review sessions, participation in audits and quarterly meetings with a nominated consultant. This programme is important for future career planning and academic development. To help supplement this, we suggest either incorporating further sections that focus on burnout prevention or offer other mentorship programmes at a DHB level as an introductory step forward in this process.

We also endorse the use of professional supervision. This is an ongoing and formal process, whereby a participant is encouraged (in a professional capacity) to undergo critical self-reflection, discuss previous decisions, problems, or concerns in a safe environment.[24,25] Participants also practice wellbeing exercises at these sessions. The aim is for continued professional competence and development.[24,25] The majority of our respondents (78.3% trainees, 86.2% non-trainees) stated they had not sought professional assistance for work-related stress. These services are available to all medical practitioners in New Zealand. While the usefulness of the service is heavily dependent on the registrar's willingness and enthusiasm to participate, a potential institutional measure might be an increased promotion of the service, as well as advertising its positive attributes to orthopaedic registrars.

Trainees recorded higher levels of DP when they hadn't had time away from work for greater than three months. Evidence shows there is a reduction in burnout levels when people take vacations.[26–28] After a few weeks from returning to work, stress and burnout levels begin to rise. An institutional change to counteract this may be the implantation of a required stand-down period for trainees and non-trainees every few months to help limit their burnout levels.[26–28] A respondent working in a department with a full complement of staff was less likely to be burnt out (P=0.020). It was also found that DP was increased in non-trainees working in a department without a full complement of staff. While occasional understaffing is an accepted part of the job, institutional measures should be in place to facilitate recruitment and hiring in all departments to ensure registrars are not worn out by consistently having to do more than their fair share of duties.

A positive to be taken from the survey is that only a small proportion of registrars were working, on average, over 80 hours a week (2.2% trainee, 5.2% non-trainee). We found the majority fall between the range of 60 to 80 hours. In 2003 the United States restructured their programme so that a resident would not work more than 80 hours a week.[29] Follow-up studies from this proved that operating and clinical time were not affected by the change.[29,30] However, the overall MBI scores for the surveyed residents made no statistically significant change, with high levels of burnout still being recorded.[30] We are not advocating a rigorous limitation of hours but propose a potential future audit and deduction of potential superfluous jobs (such as extra administration to what is normally expected of a medical professional) might decrease this total.

Another positive is that the majority of respondents (73.9% trainee, 79.3% non-trainee) stated they felt well supported by senior colleagues. Again, as previously stated, the presence of a senior colleague is highly significant at reducing burnout (P<0.001), indicating its importance as an institutional strategy for limiting burnout. Additionally, 63% of trainees and 77.2% of non-trainees were neutral or disagreed with the statement that COVID-19 had decreased their mood. Only 6.5% of trainees and 10.5% of non-trainees felt their workload had increased due to COVID-19. This should be closely followed as the situation continues to develop.

Burnout prevention efforts should also be considered. Abelson et al. showed that a key way to reduce attrition in surgical residents was to begin career mentorship while in medical school.[22] Interest and technical ability in orthopaedics is not enough to make a surgeon—it takes consistent and focussed application over time to produce the finished product.[31] Preparing junior doctors and medical students about the potential rigours they may face prior to, and during, the training programme could prove to be a key component to limiting burnout in the future.

Limitations

There were a few limitations to the study. Firstly, the sample size was small. This meant we were unable to do multivariate analyses. However, we were only assessing burnout among orthopaedic trainees and non-trainees in New Zealand (a specific group with a finite number) and the high response rates of 80.6% and 94.3% makes these results representative of the New Zealand population. Another limitation was the inability to define the total number of non-trainee orthopaedic registrars in New Zealand. While the trainee population has a centralised body in the NZOA, there is no organisation in charge of the non-trainees. There is a chance that not every non-trainee registrar has had the opportunity to complete the survey. The survey was distributed to the population via STONZ or word of mouth. Some of the orthopaedic non-trainees may be associated with the Resident Doctors Association (RDA), another union representing a proportion of New Zealand's junior doctors. This organisation was not approached to help distribute the survey. The hope is that the survey found these non-trainees via their departmental colleagues passing the survey onto them. As mentioned in the discussion, another limitation is the lack of information regarding non-trainees in their third year or more as orthopaedic registrars. It is very likely that a proportion of this group have attempted (or had multiple attempts) to be selected to the training programme. This uncertainty about their future might be a direct contribution to burnout but wasn't fully assessed in this study. Recently, the decision has been made by the NZOA selection committee to only allow three attempts at selection. Future studies assessing burnout in this population should take this change, as well as its potential impacts, into account when designing their study. Finally, inherent survey-based biases might be apparent, with registrars submitting answers that potentially under-report how they are feeling, or answers which they feel they are expected to submit.

Conclusion

At least half of trainee and non-trainee orthopaedic registrars currently working in New Zealand are displaying signs of burnout. This is comparable to other first-world nations with similar training programmes. Burnout is a complex syndrome that is difficult to solve with singular changes. We believe burnout could be attenuated by advocacy for registrars attending health maintenance appointments; promotion and utilisation of mentorship/professional supervision services; and implementation/promotion of these programmes to junior doctors and medical students. As has been shown in other countries, if medical staff working within our healthcare system are burnt out, this ultimately leads to adverse health outcomes for the population of New Zealand.[6,7,9–12] By improving the lives of our medical personnel, we hope to ultimately make change on a greater level.

COMPETING INTERESTS

Nil.

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REFERENCES

1. Arora M, Diwan AD, Harris IA. Burnout in orthopaedic surgeons: a review: Burnout in orthopaedic surgeons. ANZ J Surg. 2013 Jul;83(7–8):512-5.
2. van Wulfften Palthe ODR, Neuhaus V, Janssen SJ, Guitton TG, Ring D. Among Musculoskeletal Surgeons, Job Dissatisfaction Is Associated With Burnout. Clin Orthop. 2016 Aug;474(8):1857-63.
3. Hui RWH, Leung KC, Ge S, Hwang AC, Lai GGW, Leung AN, et al. Burnout in orthopaedic surgeons: A systematic review. J Clin Orthop Trauma. 2019 Oct;10:S47-52.
4. Daniels AH, DePasse JM, Kamal RN. Orthopaedic Surgeon Burnout: Diagnosis, Treatment, and Prevention. J Am Acad Orthop Surg. 2016 Apr;24(4):213-9.
5. Ames SE, Cowan JB, Kenter K, Emery S, Halsey D. Burnout in Orthopaedic Surgeons: A Challenge for Leaders, Learners, and Colleagues: AOA Critical Issues. J Bone Jt Surg. 2017 Jul 19;99(14):e78.
6. Arora M, Diwan AD, Harris IA. Prevalence and Factors of Burnout among Australian Orthopaedic Trainees: A Cross-Sectional Study. J Orthop Surg. 2014 Dec;22(3):374-7.
7. Driesman AS, Strauss EJ, Konda SR, Egol KA. Factors Associated With Orthopaedic Resident Burnout: A Pilot Study. J Am Acad Orthop Surg. 2020 Nov 1;28(21):900-6.
8. Barrack RL, Miller LS, Sotile WM, Sotile MO, Rubash HE. Effect of Duty Hour Standards on Burnout among Orthopaedic Surgery Residents. Clin Orthop. 2006 Aug;449:134-7.
9. Sargent MC, Sotile W, Sotile MO, Rubash H, Barrack RL. Quality of Life During Orthopaedic Training and Academic Practice: Part 1: Orthopaedic Surgery Residents and Faculty. J Bone Jt Surg-Am Vol. 2009 Oct;91(10):2395-405.
10. Somerson JS, Patton A, Ahmed AA, Ramey S, Holliday EB. Burnout Among United States Orthopaedic Surgery Residents. J Surg Educ. 2020 Jul;77(4):961-8.
11. Strauss EJ, Markus DH, Kingery MT, Zuckerman J, Egol KA. Orthopaedic Resident Burnout Is Associated with Poor In-Training Examination Performance. J Bone Jt Surg. 2019 Oct 2;101(19):e102.
12. Kp W, Ak KP, Jyl O. Orthopaedic Resident Burnout: A Literature Review on Vulnerability, Risk Factors, Consequences and Management Strategies. Malays Orthop J. 2019 Jul 1;13(2):15-9.
13. Rodrigues H, Cobucci R, Oliveira A, Cabral JV, Medeiros L, Gurgel K, et al. Burnout syndrome among medical residents: A systematic review and meta-analysis. Junne FP, editor. PLOS ONE. 2018 Nov 12;13(11):e0206840.
14. Reynolds M, McCombie A, Jeffery M, Mulder R, Frizelle F. Impact of burnout on empathy. 2021;134(1530):9.
15. Maslach C, Jackson SE, Leiter MP. Maslach Burnout Inventory: Third edition. In: Evaluating stress: A book of resources. Lanham, MD, US: Scarecrow Education; 1997. p.191-218.
16. Schutte N, Toppinen S, Kalimo R, Schaufeli W. The factorial validity of the Maslach Burnout Inventory-General Survey (MBI-GS) across occupational groups and nations. J Occup Organ Psychol. 2000 Mar;73(1):53-66.
17. Faivre G, Kielwasser H, Bourgeois M, Panouilleres M, Loisel F, Obert L. Burnout syndrome in orthopaedic and trauma surgery residents in France: A nationwide survey. Orthop Traumatol Surg Res. 2018 Dec;104(8):1291-5.
18. Simons BS, Foltz PA, Chalupa RL, Hylden CM, Dowd TC, Johnson AE. Burnout in U.S. Military Orthopaedic Residents and Staff Physicians. Mil Med. 2016 Aug;181(8):835-9.
19. Wang J, Wang W, Laureys S, Di H. Burnout syndrome in healthcare professionals who care for patients with prolonged disorders of consciousness: a

cross-sectional survey. BMC Health Serv Res. 2020 Dec;20(1):841.
20. Chambers CNL, Frampton CMA, Barclay M, McKee M. Burnout prevalence in New Zealand's public hospital senior medical workforce: a cross-sectional mixed methods study. BMJ Open. 2016 Nov;6(11):e013947.
21. Balch CM, Shanafelt T. Combating Stress and Burnout in Surgical Practice: A Review. Adv Surg. 2010 Sep;44(1):29-47.
22. Abelson JS, Sosa JA, Symer MM, Mao J, Michelassi F, Bell R, et al. Association of Expectations of Training With Attrition in General Surgery Residents. JAMA Surg. 2018 Aug 1;153(8):712.
23. Patel VM, Warren O, Humphris P, Ahmed K, Ashrafian H, Rao C, et al. What does leadership in surgery entail?: Leadership in surgery. ANZ J Surg. 2010 Dec;80(12):876-83.
24. Wallbank S, Hatton S. Reducing burnout and stress: the effectiveness of clinical supervision. Community Pract. 2011 Jul;84(7):31-5.
25. Snowdon DA, Leggat SG, Taylor NF. Does clinical supervision of healthcare professionals improve effectiveness of care and patient experience? A systematic review. BMC Health Serv Res. 2017 Dec;17(1):786.
26. Westman M, Eden D. Effects of a Respite From Work on Burnout: Vacation Relief and Fade-Out. J Appl Psychol. 1997 Aug;82(4):516-27.
27. Fritz C, Sonnentag S. Recovery, well-being, and performance-related outcomes: The role of workload and vacation experiences. J Appl Psychol. 2006;91(4):936-45.
28. Etzion D. Annual vacation: Duration of relief from job stressors and burnout. Anxiety Stress Coping. 2003 Jun;16(2):213-26.
29. Froelich J, Milbrandt JC, Allan DG. Impact of the 80-hour Workweek on Surgical Exposure and National In-Training Examination Scores in an Orthopedic Residency Program. J Surg Educ. 2009 Mar;66(2):85-8.
30. Gelfand DV. Effect of the 80-Hour Workweek on Resident Burnout. Arch Surg. 2004 Sep 1;139(9):933.
31. Duckworth AL, Peterson C, Matthews MD, Kelly DR. Grit: Perseverance and passion for long-term goals. J Pers Soc Psychol. 2007;92(6):1087-101.

Presenting characteristics, length of stay and oxygen use among COVID-19 cases at a single tertiary hospital in Auckland, New Zealand, using retrospective medical recorded data

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ABSTRACT

AIMS: The purpose of our current study was to analyse demographic and presenting characteristics of COVID-19 patients, including assigning clinical severity scores, and analyse with respect to oxygen utilisation and hospital course.

METHODS: This was a retrospective observational study of COVID-positive patients presenting to the Emergency Department at Middlemore Hospital in Auckland, New Zealand. Data were collected between 1 August 2021 and 1 November 2021. They were followed through 20 December 2021. Data were obtained from both the EMR system and paper charts for all eligible patients during the study period.

RESULTS: There were 171 patients included, with 187 patient presentations. Oxygen data were collected on 123 admitted patients and showed that 47% of admission time was spent off oxygen. Of the total presentations, the median length of stay (LOS) was 4 days. The severity of presenting illness was associated with disposition and predictive of LOS.

CONCLUSIONS: Approximately half of the admitted patient's hospital time involved no oxygen use, which suggests that we may be able to further risk stratify in order to decrease the number and duration of hospital admissions going forward. As expected, clinical severity scores were associated with oxygen utilisation, disposition and LOS.

New Zealand has experienced coronavirus disease 2019 (COVID-19) differently than the rest of the world. Initially, a successful COVID-19 elimination strategy of managed isolation at the border, nationwide lockdowns and contact tracing resulted in very few cases.[1] In August 2021, a single community case of Delta COVID-19 was reported, and eventually led to endemic spread. Due to the earlier success of the elimination strategy early in the pandemic, there have been limited data specific to COVID-19 patients in New Zealand.

In the August 2021 Delta outbreak, the use of diagnostic and predictive models for COVID-19 for clinical and resource management were undeveloped. Efficient diagnosis and clinical predictors of disease severity were needed. In North America, a systematic review of 232 prediction models found two promising models.[2] The Risk Stratification in the Emergency Department in Acutely Ill Older Patients (RISE UP) score and 4C mortality score could be used to guide decision making.[3,4] Oxygen has been the mainstay of treatment for COVID-19, and being able to predict oxygen utilisation could enable more efficient allocation of resources. Noh et al. discovered risk factors for receiving oxygen therapy in early stage COVID-19.[5] Prediction models to help with resource utilisation may become increasingly important.

The purpose of our current study is to gather and analyse demographic and presenting characteristics of our unique population in New Zealand that occurred during the Delta outbreak, including clinical severity scores, oxygen utilisation and hospital course.

Methods

Design, setting and participants

We conducted a retrospective observational cohort study of COVID-19 patients aged ≥15 years presenting to the Emergency Department (ED) at Middlemore Hospital, Auckland, New Zealand. The Middlemore Hospital ED is one of the busiest EDs in Australasia, serving a population of approximately 525,000 people, with over 100,000 annual presentations. Patients were included into the cohort if they presented to the ED with a positive COVID-19 nasopharyngeal polymerase chain reaction (PCR) test from the community or during their hospital journey. Patients who presented multiple times were included as separate presentations. Positive COVID-19 cases that were detected in the community or managed isolation and quarantine (MIQ) but did not present to the ED, interhospital transfers, and paediatric patients (aged ≤14 years) were excluded.

Data collection

Data were obtained from the electronic medical record (EMR) system, paper charts and EpiSurve (disease surveillance database tracking New Zealand COVID-19 cases). Data on demographics, presenting characteristics, initial presenting complaints, disposition and patient journey timeline characteristics were collected. Oxygen use was collected from inpatient EMR (eVitals). Data were managed using REDCap.[6]

Clinical severity scores

Patients were assigned clinical severity scores using the National COVID-19 Clinical Evidence Taskforce Living Guidelines and Consensus Recommendations,[7] and the World Health Organization (WHO) severity score.[8] Two study investigators (NH and GVZ) scored after retrospectively reviewing the ED chart. (See supplementary material.)

Oxygen use

We collected oxygen use data on oxygen flow rate, fractional inspiration of oxygen (FiO_2) and oxygen device from the EMR. Due to inconsistencies in the data collection of oxygen flow rate and FiO_2, only the oxygen device was used for analysis. The oxygen device was treated as an ordinal variable and included nasal prongs, high flow nasal prongs, air blender, non-invasive ventilation (NIV) (including both continuous positive airway pressure (CPAP) and bilevel positive airway pressure (BIPAP)) and invasive mechanical ventilation. Total number of hours during which each inpatient was on an oxygen device was measured and then divided by the patient's total inpatient length of stay (LOS). Analysis was done on the proportion of the patient's stay that was spent on each oxygen device, including no oxygen device. ED and intensive care unit (ICU) data were not analysed due to inconsistent collection in the EMR, but for analysis purposes ICU time was considered equivalent to intensive oxygen use.

Data analysis

We summarised data as counts and proportions for categorical variables, and mean with standard deviation (SD) or median with interquartile range (IQR) for continuous variables as appropriate. Ethnicity was prioritised as per the New Zealand Ministry of Health ethnicity data protocols.[9] The oxygen usage was calculated as cumulative sum of total oxygen use divided by the total usage. This was reported as a percentage based on the total use. To determine differences in the discharge and admission rates across severity, Chi-squared or Fisher exact test were used. Analysis of variance (ANOVA) or Kruskal–Wallis test were used to determine if LOS varied across severity. Association between shift time, speciality and LOS will be looked at using ANOVA. A two-tailed $p<0.05$ was considered statistically significant. Data were analysed using R and SAS version 9.4.

Results

Cohort description

Between 1 August 2021 and 1 November 2021, there were a total of 171 COVID-19 patients (male n=84, 49% and female n=87, 51%) and 187 presentations. We followed patients through 20 December 2021. The mean age was 40.6 (SD 18.8) years. Most patients were Pasifika (n=89, 52%) or Māori (n=59, 35%). The majority (n=140, 82%) of patients were unvaccinated (Table 1).

Presenting characteristics

Most (n=116, 62%) were self-presentations, while 29% (n=55) were referred from the MIQ facility (Table 1). Most (n=146, 78%) had a moderate Australasian Triage Scale (ATS) category of 3, with only 17 (9.1%) in the critical (ATS=1) or severe (ATS=2) categories. Most (n=128, 69%) arrived by ambulance and presented with a commonly described COVID-19 viral symptom (e.g., cough, fever, shortness of breath) (n=129, 69%) (Table 1).

Clinical severity

In terms of clinical severity scores, the majority of patients presented with mild (n=43, 23%), moderate (n=68, 36%) or severe (n=39, 21%) disease. The WHO score showed the majority of patients had mild (n=72, 39%) or moderate (n=112, 60%) disease (Table 2).

Oxygen use

Oxygen use data were collected on admitted

Table 1: Demographic and presenting characteristics of patients with COVID-19.

Age: mean (Std)	**40.6 (18.8)**	
	n	%
Gender		
Female	87	51
Male	84	49
Ethnicity		
Pasifika	89	52
Māori	59	35
New Zealand European	13	7.6
Asian	9	5,3
Other	1	0.6
Referred to hospital by		
Self-presentation	116	62
MIQ referral	55	29
GP/Accident & Medical	11	5.9
Other	5	2.7
Australasian Triage Score		
1	1	0.5
2	16	8.6
3	146	78
4	21	11.2
5	3	1.6
Mode of arrival to hospital		
Ambulance	128	69
Other	3	1.6
Walk-in	56	30
Vaccination status at ED arrival		
Fully immunised (2 dose + 2 weeks)	4	2.3
Partially vaccinated (1 dose)	27	16
No vaccine	140	82

Table 1 (continued): Demographic and presenting characteristics of patients with COVID-19.

Age: mean (Std)	**40.6 (18.8)**	
	n	%
Initial speciality caring for patient		
Emergency medicine	126	67
General medicine	48	26
General surgery	7	3.7
Respiratory medicine	4	2.1
Other	2	1.1
Initial presenting complaint (SNOMED)	**n**	**%**
Likely COVID-19 presenting complaint	**129**	**69**
Shortness of breath	70	37
Cough	20	11
Fever symptoms	19	10
Chest pain	9	4.8
General weakness/fatigue/being unwell	4	2.1
Sore throat	4	2.1
Abnormal vital signs	1	0.5
Coughing up blood	1	0.5
Exposure to communicable disease	1	0.5
Possible COVID-19 presenting complaint	**31**	**17**
Abdominal pain	15	8.0
Collapse/syncope	6	3.2
Headache	5	2.7
Dizziness/vertigo	2	1.1
Nausea/vomiting	2	1.1
Seizure	1	0.5
Unlikely COVID-19 presenting complaint	**27**	**14**
Injury of back, or upper/lower limb	6	3.2
Back or lower limb pain (no injury)	5	2.7
Suicidal thoughts or self-harm	4	2.2

Table 1 (continued): Demographic and presenting characteristics of patients with COVID-19.

Initial presenting complaint (SNOMED)	**n**	**%**
Unlikely COVID-19 presenting complaint	**27**	**14**
Localised lump/redness/swelling of skin	2	1.1
Rectal bleeding	2	1.1
UTI symptoms	2	1.1
Mental health issue or situational crisis	2	1.0
Certificate or paperwork requested	1	0.5
Disorder of pregnancy	1	0.5
Vaginal bleeding (not pregnant)	1	0.5
Weakness of facial muscles	1	0.5

Abbreviations: COVID-19 = coronavirus disease 2019; GP = general practitioner; MIQ = managed isolation and quarantine

patients. Of these 123 admitted patients, 47% of their admitted hospital time was completely off oxygen. Percentage of admitted time on oxygen increased with severity of illness, except in those classified as critical (n=3, 2.4%), where 87% of their time was spent off oxygen. This prolonged "off oxygen" time for the critical patients was due to their long rehabilitation time. The severity of the presenting illness was associated with which oxygen device was used, with increased severity associated with increasingly invasive devices (Table 2).

Clinical outcomes and disposition

Out of the total 187 patient presentations, 123 were admitted. Most patient presentations were initially seen in the ED by emergency medicine (n=126, 67%) and were grouped into the moderate, severe or critical category of presenting illness (n=110, 59%). Those grouped into the minimal/no, mild category (n=77, 41%) were most often discharged (n=51, 66%). Across initial treating speciality, we found that patients were most likely admitted to the ward, but emergency medicine was the most likely to discharge patients (n=59, 47%) (Table 3).

Of all presentations, the median LOS stay was 3.98 days. The WHO score was predictive of LOS, with cases classified as severe having a median of 12.83 days. There was one in-hospital death, but no additional fatalities at 60-day follow-up. The WHO score was also associated with a decreased time spent in the ED, with those categorised as severe having a median ED LOS 2.17 hours. Those patients being discharged to MIQ spent the longest time in the ED (median 9.14 hours). (Table 4).

Discussion

This study is the first of its kind to present hospital oxygen utilisation, clinical outcome and demographic data from the beginning of New Zealand's COVID-19 Delta outbreak. The utility of analysing ED-based COVID-19 data is demonstrated by the COVID-19 Emergency Department (COVED 0–5) Quality Improvement Project based in Australia, which also showed information on demographics and clinical predictors of COVID-19 disease.[10–14]

One of the unique aspects of our study is the socio-economically disadvantaged South Auckland population consisting mainly of Pasifika and Māori patients. Other research shows that minority groups had higher rates of COVID-19 disease and severity than non-minorities, and that socio-economic disparity and clinical care quality were associated with COVID-19 outcomes

Table 2: Presenting severity of illness by intensity of oxygen use on ward for the 123 admitted patients with COVID-19.

		Proportion of inpatient time on oxygen device									
		No vs any oxygen device (%)		**No to minimal oxygen vs moderate to intensive oxygen (%)**		**Specific device (%)**					
	n (%)	**No O_2**	**Any O_2**	**None+nasal cannula**	**Mask+HFNO+NIV+ICU**	**Nasal cannula**	**Air blender**	**Mask**	**HFNO**	**NIV**	**ICU**
All	123 (100%)	47%	53%	66%	34%	20%	0.80%		14%	14%	4.10%
Presenting severity of illness (pts)											
Minimal/No	10 (8.1%)	75%	25%	100%		25%					
Mild	16 (13%)	96%	4%	97%	3.30%	0.80%			1.80%	1.50%	
Moderate	55 (45%)	51%	49%	72%	28%	21%			11%	17%	
Severe	39 (32%)	17%	83%	44%	56%	27%	2.10%	0.53%	24%	19%	10%
Critical	3 (2.4%)	87%	13%	87%	13%			5.20%	6.90%		0.70%
Grouped by presenting severity of illness categories											
Minimal/no, mild	77 (41)	94%	6%	97%	3%	3%			2%	1%	
Moderate, severe, critical	110 (59)	35%	65%	58%	42%	24%	1%		17%	18%	5%
Grouped by presenting WHO clinical severity scores											
Mild (1–3)	72 (39)	35%	65%	65%	35%	30%			2%	33%	
Moderate (4–5)	112 (60)	48%	52%	66%	34%	18%	1%		16%	11%	5%
Severe (6–9)	3 (2)	56%	44%	71%	29%	15%			11%	15%	3%

Abbreviations: Pts = patients; O2 = oxygen; HFNO = high flow nasal oxygen; non-invasive ventilation; ICU = intensive care unit.

Table 3: Disposition and representation number and rate grouped by presenting clinical severity and initial speciality for patients with COVID-19.

	Total patients (n/%)				**Discharged (n/%)**				**ED admit to hospital (n/%)**		
Disposition	**Total**	**Total ED discharge**	**Total admits**	**P-value**	**Discharge: to home**	**Discharge: to MIQ**	**Self-discharge**	**Represent to hospital after discharge**	**Admit: ward**	**Transfer**	**Admit: ICU/HDU**
All	187	64 (34)	123 (66)		30 (16)	30 (16)	4 (2)	34 (18)	120 (64)	1 (0.5)	2 (1)
Presenting severity of illness category											
Minimal/no	34 (18)	24 (71)	10 (29)	<0.0001	12 (35)	8 (24)	4 (12)	15 (44)	9 (26)	1 (3)	0
Mild	43 (23)	27 (63)	16 (37)		10 (23)	17 (40)	0	3 (7)	16 (37)	0	0
Moderate	68 (36)	13 (19)	55 (81)		8 (12)	5 (7)	0	13 (19)	55 (81)	0	0
Severe	39 (21)	0	39 (100)		0	0	0	3 (8)	38 (97)	0	1 (3)
Critical	3 (2)	0	3 (100)		0	0	0	0	2 (67)	0	1 (33)
Grouped by presenting severity of illness categories											
Minimal/no, mild	77 (41)	51 (66)	26 (34)	<0.0001	22 (29)	25 (32)	4 (5)	18 (23)	25 (32)	1 (1.3)	0
Moderate, severe, critical	110 (59)	13 (12)	97 (88)		8 (7)	5 (5)	0	16 (15)	95 (86)	0	2 (2)
Grouped by presenting WHO clinical severity scores											
Mild (1–3)	72 (39)	60 (83)	12 (17)	<0.0001*	28 (39)	28 (39)	4 (6)	18 (25)	12 (17)	0	0

Table 3 (continued): Disposition and representation number and rate grouped by presenting clinical severity and initial speciality for patients with COVID-19.

	Total patients (n/%)				**Discharged (n/%)**				**ED admit to hospital (n/%)**		
Disposition	**Total**	**Total ED discharge**	**Total admits**	**P-value**	**Discharge: to home**	**Discharge: to MIQ**	**Self-discharge**	**Represent to hospital after discharge**	**Admit: ward**	**Transfer**	**Admit: ICU/HDU**
Grouped by presenting WHO clinical severity scores											
Moderate (4–5)	72 (39)	4 (4)	108 (96)		2 (2)	2 (2)	0	16 (14)	107 (96)	1 (1)	0
Severe (6–9)	3 (2)	0	3 (100)		0	0	0	0 (0)	1 (33)	0	2 (67)
Initial speciality treating patient											
Emergency medicine	126 (67)	59 (47)	67 (53)	<0.0001*	28 (22)	28 (22)	3 (2)	21 (17)	64 (51)	1 (1)	2 (2)
General medicine	48 (26)	2 (4)	46 (96)		1 (2)	1 (2)	0	11 (23)	46 (96)	0	0
General surgery	7 (4)	1 (14)	6 (86)		0	1 (14)	0	2 (29)	6 (86)	0	0
Other	2 (1)	2 (100)	0		1 (50)	0	1 (50)	0 (0)	0	0	0
Respiratory medicine	4 (2)	0	4 (100)		0	0	0	0 (0)	4 (100)	0	0

Fisher exact test used; Abbreviatons: MIQ = managed isolation quarantine facility; ICU = intensive care unit, HDU = high dependency unit.

Table 4: ED and hospital length of stay (LOS) of patients with COVID-19.

	Total length of hospital stay in days Median (IQR)	**P-value**	**Total ED time in hours Median (IQR)**	**P-value**	**Total Ward+ICU time (non-ED hospital time) in days Median (IQR)**	**P-value**
All/total patients	3.98 (2.02–7.81)		5 (3.57–7.60)		3.73 (1.69–7.72)	
Presenting severity of illness category						
Minimal/no	1.10 (0.69–1.96)	<.0001	4.39 (3.13–7.95)	0.0025	0.92 (0.38–1.58)	<0.0001
Mild	3.35 (2.00–5.45)		6.80 (4.72–9.53)		3.03 (1.8–5.37)	
Moderate	3.54 (1.89–60)		5.44 (4.04–7.27)		3.34 (1.66–5.78)	
Severe	6.87 (4.05–15.01)		3.97 (3.03–5.67)		7.68 (4.07–14.87)	
Critical	9.39 (4.72–12.83)		4.13 (4.03–10.17)		9.22 (4.3–20.41)	
Grouped by presenting severity of illness category						
Minimal/no, mild	2.1 (1.12–3.95)	0.001	5.8 (3.57–9.18)	0.05	1.80 (0.94–3.38)	0.0003
Moderate, severe, critical	4.45 (2.52–8.06)		4.67 (3.57–6.68)		4.43 (2.33–8.74)	
Grouped by presenting severity of illness category (WHO Scores)						
Mild (1–3)	1.83 (0.69–3.15)	0.0005	5.69 (3.67–9.25)	0.0198	1.44 (0.52–2.90)	0.0001
Moderate (4–5)	4.05 (2.12–7.91)		4.83 (3.55–6.75)		3.99 (1.95–7.76)	
Severe (6–9)	12.8 (7.81–60.9)		2.17 (1.00–4.13)		20.41 (10.4–99.8)	
Initial speciality treating patient						
Emergency medicine	3.95 (2.07–6.79)	0.0915	5.59 (3.63–8.85)	0.014	3.7 (1.67–6.74)	0.071
General medicine	5.04 (2.12–9.06)		4.32 (3.48–5.75)		4.91 (1.98–9.29)	
Other	2.37 (1.39–4.65)		5.88 (4.03–6.97)		2.11 (1.12–4.14)	
Disposition						
Admitted to ward	3.97 (2.04–7.11)	0.0263	4.83 (3.51–6.75)	<.0001	3.72 (1.7–7.69)	0.020
Discharged home	0.29 (0.29–0.29)		4.77 (3.63–7.05)			
Discharged to MIQ	N/A		9.14 (4.92–14.17)			
Other	36.85 (12.8–60.9)		3.43 (0.95–4.13)		60.1 (20.4–99.8)	

in minority groups.15 Our research did not find any significant differences in admission versus discharge, oxygen utilisation or LOS by ethnicity. This is likely due to the small sample size for comparison.

Even though most patients had mild or moderate disease, they often arrived by ambulance. During New Zealand's first lockdown in early 2020, Dicker et al. also found that a large proportion of low-acuity patients requested ambulance services, but many were not unwell enough to require transport.[1]6 This ambulance utilisation may be due to the public being fearful of leaving home to seek medical treatment independently, or reduced access to primary care during lockdown. Although telemedicine was available during lockdown, virtual consultations may also have been a barrier to access for both patients and providers.

Clinicians also had a risk-averse practice pattern. There was a 71% admission rate, with 34% of the admitted patients having minimal/no or mild severity. This is higher than the 67% admission rate reported in the COVED-5 study.[14] Furthermore, 47% of the admitted patients' time was spent off oxygen. While this may be due to minimal clinical experience with a novel virus, it is likely also due to unclear admission and discharge criteria. Updated clinical management guidelines have likely decreased admission rates compared to early in the pandemic.[17] Sze et al. found there is large variability amongst discharge criteria for COVID-19 patients.[18] Development of evidence-based discharge guidance for hospitalised COVID-19 patients could be helpful as the pandemic continues.

In addition to unclear discharge criteria, another potential contributor to our admission rate was the arduous process involved in safely discharging patients into isolation facilities with an elimination strategy in place. Our study showed that the total ED time for patients requiring an MIQ facility for isolation was significantly longer than other dispositions. This may have led to a tendency for admitting patients, as it was less cumbersome with less delay in patient flow from an ED clinician standpoint. Now that New Zealand has moved away from an elimination strategy, the issues associated with the MIQ discharge no longer have the detrimental impact that occurred early in the pandemic.

During the first wave in 2020, Australian hospitals had a median ED stay of 4.7 hours and a hospital stay of 9.8 days.[19] Our findings were consistent in terms of ED LOS, however, our hospital LOS was shorter with a median of 4 days. This is likely due to admitting a large number of minimally and mildly severe cases. Development of a prediction tool, such as the DELTA risk score, can be considered to minimise unnecessary utilisation of healthcare resources.[20]

Limitations

The main limitation of our study is the retrospective design, with the potential for inaccurate or incomplete data. This was apparent with our oxygen data, where there were missing data and discrepancies between oxygen device, FiO_2 and flow rate. Additionally, we had a relatively small sample size, as all of our cases were from early in the Delta surge during an elimination strategy, before widespread vaccination and without the current treatment options.

Conclusion

For the first 187 ED presentations during the COVID-19 Delta outbreak, approximately half of the admitted patients' hospital time involved no oxygen use. The initial presenting clinical severity was associated with oxygen utilisation, disposition and length of stay.

COMPETING INTERESTS

Nil.

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REFERENCES

1. Baker MG, Wilson N, Anglemyer A. Successful Elimination of Covid-19 Transmission in New Zealand. N Engl J Med. 2020 Aug 20;383(8):e56. doi: 10.1056/NEJMc2025203. Epub 2020 Aug 7.
2. Wynants L, Van Calster B, Collins GS, et al. Prediction models for diagnosis and prognosis of covid-19: systematic review and critical appraisal. BMJ. 2020 Apr 7;369:m1328. doi: 10.1136/bmj.m1328. Update in: BMJ. 2021 Feb 3;372:n236. Erratum in: BMJ. 2020 Jun 3;369:m2204.
3. van Dam PMEL, Zelis N, Van Kuijk SMJ, et al. Performance of prediction models for short-term outcome in COVID-19 patients in the emergency department: a retrospective study. Ann Med. 2021 Dec;53(1):402-409. doi: 10.1080/07853890.2021.1891453.
4. van Dam PM, Zelis N, Stassen P, et al. Validating the RISE UP score for predicting prognosis in patients with COVID-19 in the emergency department: a retrospective study. BMJ Open. 2021 Feb 5;11(2):e045141. doi: 10.1136/bmjopen-2020-045141.
5. Noh CS, Kim WY, Baek MS. Risk factors associated with the need for oxygen therapy in patients with COVID-19. Medicine (Baltimore). 2021 May 7;100(18):e25819. doi: 10.1097/MD.0000000000025819.
6. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)-a metadata-driven methodology and workflow process for providing translational research informatics support. J Biomed Inform. 2009 Apr;42(2):377-81. doi: 10.1016/j.jbi.2008.08.010. Epub 2008 Sep 30.
7. National COVID-19 Clinical Evidence Taskforce. Australian guidelines for the clinical care of people with COVID-19. 2022 [version 57]. Available from: https://covid19evidence.net.au/
8. WHO Working Group on the Clinical Characterisation and Management of COVID-19 infection. A minimal common outcome measure set for COVID-19 clinical research. Lancet Infect Dis. 2020 Aug;20(8):e192-e197. doi: 10.1016/S1473-3099(20)30483-7. Epub 2020 Jun 12. Erratum in: Lancet Infect Dis. 2020 Oct;20(10):e250.
9. Ministry of Health. HISO 10001:2017 Ethnicity Data Protocols [Internet]. Wellington; 2017. Available from: https://www.health.govt.nz/publication/hiso-100012017-ethnicity-data-protocols.
10. O'Reilly GM, Mitchell RD, Noonan MP, et al. Informing emergency care for COVID-19 patients: The COVID-19 Emergency Department Quality Improvement Project protocol. Emerg Med Australas. 2020 Jun;32(3):511-514. doi: 10.1111/1742-6723.13513. Epub 2020 Apr 21.
11. O'Reilly GM, Mitchell RD, Rajiv P, et al. Epidemiology and clinical features of emergency department patients with suspected COVID-19: Initial results from the COVID-19 Emergency Department Quality Improvement Project (COVED-1). Emerg Med Australas. 2020 Aug; 32(4):638-645. doi: 10.1111/1742-6723.13540. Epub 2020 May 18.
12. O'Reilly GM, Mitchell RD, Mitra B, et al. Epidemiology and clinical features of emergency department patients with suspected and confirmed COVID-19: A multisite report from the COVID-19 Emergency Department Quality Improvement Project for July 2020 (COVED-3). Emerg Med Australas. 2021;33(1):114-124. doi:10.1111/1742-6723.13651.
13. O'Reilly GM, Mitchell RD, Mitra B, et al.

Epidemiology and clinical features of emergency department patients with suspected COVID-19: Insights from Australia's 'second wave' (COVED-4). Emerg Med Australas. 2021 Apr;33(2):331-342. doi: 10.1111/1742-6723.13706. Epub 2021 Jan 6.

14. O'Reilly GM, Mitchell RD, Mitra B, et al. Outcomes for emergency department patients with suspected and confirmed COVID-19: An analysis of the Australian experience in 2020 (COVED-5). Emerg Med Australas. 2021 Oct;33(5):911-921. doi: 10.1111/1742-6723.13837. Epub 2021 Aug 13.
15. Magesh S, John D, Li WT, et al. Disparities in COVID-19 Outcomes by Race, Ethnicity, and Socioeconomic Status: A Systematic-Review and Meta-analysis. JAMA Netw Open. 2021 Nov 1;4(11):e2134147. doi: 10.1001/jamanetworkopen.2021.34147. Erratum in: JAMA Netw Open. 2021 Dec 1;4(12):e2144237. Erratum in: JAMA Netw Open. 2022 Feb 1;5(2):e222170.
16. Dicker B, Swain A, Todd VF, et al. Changes in demand for emergency ambulances during a nationwide lockdown that resulted in elimination of COVID-19: an observational study from New Zealand. BMJ Open. 2020 Dec 23;10(12):e044726. doi: 10.1136/bmjopen-2020-044726.
17. Ministry of Health. Clinical Management of COVID-19 in Hospitalised Adults (including in pregnancy) [Internet]. 6 May 2022. Available from: https://www.health.govt.nz/covid-19-novel-coronavirus/covid-19-information-health-professionals/covid-19-advice-all-health-professionals.
18. Sze S, Pan D, Williams CML, et al. The need for improved discharge criteria for hospitalised patients with COVID-19-implications for patients in long-term care facilities. Age Ageing. 2021 Jan 8;50(1):16-20. doi: 10.1093/ageing/afaa206.
19. Boyle, J. and Sparks, R. Characteristics of patients with COVID-19 hospitalised in South Australia during the first wave of the pandemic. Emerg Med Australas. 34:122-126. https://doi.org/10.1111/1742-6723.13906.
20. Davis R, Bein K, Burrows J, et al. Clinical characteristics and predictors for hospitalisation during the initial phases of the Delta variant COVID-19 outbreak in Sydney, Australia. Emerg Med Australas. 2022 Jun 23:10.1111/1742-6723.14048. doi: 10.1111/1742-6723.14048. Epub ahead of print.

Appendices

Appendix 1: National COVID-19 Clinical Evidence Taskforce. Australian guidelines for the clinical care of people with COVID-19. 2022 [version 57]. Available from: https://covid19evidence.net.au/.

Presenting severity of illness definitions	
Minimal/no symptoms	**Adults without any symptoms in hospital for a non-COVID reason.***
Mild illness	Adults not presenting any clinical features suggestive of moderate or severe disease or a complicated course of illness. Characteristics: • No symptoms* • Or no mild upper respiratory tract symptoms • Or no cough, new myalgia or asthenia without new shortness of breath or a reduction in oxygen saturation
Moderate illness	Stable adult patient presenting with respiratory and/or systemic symptoms or signs. Able to maintain oxygen saturation above 92% (or above 90% for patients with chronic lung disease) with up to 4L/min oxygen via nasal prongs. Characteristics: • Prostration, severe asthenia, fever >38℃ or persistent cough • Clinical or radiological signs of lung involvement • No clinical or laboratory indicators of clinical severity or respiratory impairment
Severe illness	Characteristics (adult patients meeting any of the following criteria): • Respiratory rate ≥30 breaths/min • Oxygen saturation ≤92% at a rest state • Arterial partial pressure of oxygen (PaO2)/ inspired oxygen fraction (FiO2) ≤300
Critical illness	Characteristics (adult patient meeting any of the following criteria): • Respiratory failure • Occurrence of severe respiratory failure (PaO2/FiO2 <200), respiratory distress or acute respiratory distress syndrome (ARDS). • This includes patients deteriorating despite advanced forms of respiratory support (non-invasive ventilation (NIV), high-flow nasal oxygen • (HFNO)) OR patients requiring mechanical ventilation OR other signs of significant deterioration: • Hypotension or shock • Impairment of consciousness • Other organ failure.

*Patients without COVID-19 symptoms were classified as having minimal/no symptoms, which is altered from the National COVID-19 Taskforce Australian guidelines.

Appendix 2, Figure 1: WHO Working Group on the Clinical Characterisation and Management of COVID-19 infection. A minimal common outcome measure set for COVID-19 clinical research. Lancet Infect Dis. 2020 Aug;20(8):e192-e197.WHO clinical progression scale.

Patient state	Descriptor	Score
Uninfected	Uninfected; no viral RNA detected	0
Ambulatory mild disease	Asymptomatic; viral RNA detected	1
	Symptomatic; independent	2
	Symptomatic; assistance needed	3
Hospitalised moderate disease	Hospitalised; no oxygen therapy*	4
	Hospitalised; oxygen by mask or nasal prongs	5
Hospitalised severe disease	Hospitalised; oxygen by NIV or high flow	6
	Intubation and mechanical ventilation, pO$_2$/FIO$_2$ ≥150 or SpO$_2$/FIO$_2$ ≥200	7
	Mechanical ventilation pO$_2$/FIO$_2$<150 (SpO$_2$/FIO$_2$<200) or vasopressors	8
	Mechanical ventilation pO$_2$/FIO$_2$<150 and vasopressors, dialysis, or ECMO	9
Dead	Dead	10

Abbreviations: ECMO = extracorporeal membrance oxygenation; FIO$_2$ = fraction of inspired oxygen; NIV = non-invasive ventilation; pO$_2$ =partial pressure of oxygen; SpO$_2$ = oxygen saturation.
*If hospitalised for isolation only, record status as for ambulatory patient.

Community specialist palliative care services in New Zealand: a survey of Aotearoa hospices

Salina Iupati, Rod MacLeod, James Stanley, Cheryl Davies, Richard Egan

ABSTRACT

AIM: Community specialist palliative care (SPC) in Aotearoa New Zealand is provided by independent hospices. Substantial increase in demand for palliative care is projected in the next 20 years. We aimed to describe the current landscape of SPC services across Aotearoa whilst incorporating an equity lens.

METHODS: A descriptive cross-sectional survey was undertaken to describe aspects of hospice service and populations served. Survey links were emailed to clinical, or service leads of hospices identified via Hospice New Zealand Website.

RESULTS: All eligible hospices (n=32) completed the online survey. All hospices provided care at home, with 94% (n=30) also providing care for patients in aged residential care facilities. All 32 hospices provided symptom management, family and carer support and bereavement care. Six hospices (19%) did not provide afterhours cover. Fifteen (47%) hospices did not have Māori cultural position and median full time equivalent across all hospices for such position was one day per week. Only nine (28%) hospices provided palliative medicine specialist training.

CONCLUSION: Areas of inconsistency were highlighted including afterhours access and cultural support for Māori. The capacity of the present system to address current and future shortages of palliative medicine specialist is questioned.

With Aotearoa New Zealand's ageing population, demand for palliative care is projected to increase substantially in the next 20 years, whilst equitable access to palliative care services is emphasised in the Ministry of Health's Palliative Care Action Plan.[1,2] Like other well-resourced countries, community palliative care in New Zealand is delivered via a primary-specialist model.[3] The Ministry of Health has based their definitions of specialist and primary palliative care on providers' degree of training or experience and those who work exclusively in palliative care. Primary palliative care is provided by any health professional who is not part of a specialist palliative care team as an integral part of their standard practice, e.g., a general practice team.[4] Community specialist palliative care (SPC) services deliver or support home-based care for those who have life limiting condition and in New Zealand, is currently delivered by 33 hospices. Hospices in New Zealand are independent, charitable organisations that provide support to people with life-limiting conditions and their whānau at no cost to patients.[5] These hospices provide care both directly to patients with complex needs and indirectly by supporting primary palliative care teams to care for their patients with palliative care needs.[2]

Health disparities in New Zealand are well documented, and Māori experience both higher cancer incidence and higher mortality rates than non-Māori regardless of education level or occupation.[6,7] Moreover, palliative care services have not historically been developed to specifically meet the needs of Māori. Māori have not accessed palliative services at similar levels as non-Māori, possibly due to low levels of awareness or misconceptions of palliative care services.[8,9] Recent calls for more equitable healthcare delivery have included consideration of palliative care.[10] To develop a sustainable and equitable model for the future requires starting with a stocktake of the status quo, including areas of gaps and inequity.

Criteria for defining models of specialist palliative care remains a developing area of research; furthermore, the term "model of care" is used inconsistently in studies and policy documents.[11] Up until recent work by Firth et al., there has been no consensus on core components of a specialist care service model both internationally or in New Zealand, which poses challenges for making comparisons between models of care and development of evidence based health policy.[12] Research examining models of specialist community palliative care in New Zealand is very limited.[11] Service models differ across the country, and studies in New Zealand have generally been limited to individual services and certain aspects of the palliative care services.[13,14] Unlike other well-resourced countries, benchmarking or stocktake of SPC services has not yet been conducted in New Zealand.[15] Moreover, provision of quality SPC services in rural communities remains a challenge and under-resourcing of SPC services in remote areas in New Zealand is well recognised.[16]

The objective of this study is to describe the current landscape of specialist community palliative care services across New Zealand whilst incorporating an equity lens on these services.

Methods

Study design

This study used a descriptive cross-sectional survey to describe and summarise aspects of hospice services. The survey design was based on the Firth et al.'s conceptual framework that sets out core components of specialist palliative care service, with the addition of questions on equity and service provision for Māori populations.[12] An online survey was created using Qualtrics software (Version [July 2021] of Qualtrics, Qualtrics, Provo, UT. USA). Paper-based surveys were also available on request. There were 31 service-related questions with five additional demographic questions about the respondent who completed the survey. Examples of aspects of services of interest were related to care settings, staffing, number of referrals, demographics of serviced population, types of care provided, out-of-hours (See Appendix 1 for the full set of survey questions). The survey was peer reviewed by three senior clinicians before dissemination.

Study population and recruitment

A total of 33 hospices were identified via Hospice New Zealand website. One hospice does not provide direct clinical care and hence was excluded from the study. Clinical or service leads of each of the 32 remaining hospices were emailed individualised links to the online survey, participant information sheet and consent form. Hospice New Zealand assisted with recruitment by emailing out an introductory letter about the research project to all hospices in April 2021, which was followed by survey links two weeks later. Participants were asked to give consent electronically prior to undertaking the survey. The study was approved by the University of Otago Ethics Committee (D20/024).

Data analysis

Responses were recorded in Qualtrics and downloaded to an Excel spreadsheet and statistical analysis was conducted using statistical computing software R 4.1 (R Institute, Vienna, Austria). Questionnaire responses were reported using descriptive analysis, e.g., frequencies, means and standard deviation to determine the general patterns in the data. As the respondent frame covered the entire set of Hospices operating in New Zealand at the study date, no inferential statistics were calculated or reported.

Results

Clinical and psychosocial services

All 32 invited hospices completed the online survey. Most hospices provided direct hands-on care (n=31) and all hospices provided face to face care whilst just over half (n=16; 53%) also offered telehealth. All hospices provided care at home, with 94% (n=30) also providing care for patients in aged residential care facilities. All 32 hospices provided symptom management, family and carer support and bereavement care. Most hospices also provided psychological care (n=30; 94%) and spiritual care (n=30; 94%) with a smaller number providing respite care (n=17; 53%) and rehabilitation (n=8; 25%).

Fewer than half of all hospices (n=13) had inpatient units, with the majority of these having between six to ten beds (n=11). The most frequent number of referrals accepted were in the range of 200 to 499 per year, with only a minority of hospices (n=6; 19%) receiving more than 1,000 referrals per year. Almost all hospices reported having standardised acceptance criteria (n=31; 97%).

The most frequently employed professions were nursing (n=29; 91% of hospices), followed by medical professionals and social workers (both n=25; 78%), spiritual workers (n=21; 66%), complementary practitioners and counsellors (n=20; 63%) (see Figure 1). Within medical personnel, the most commonly employed roles were palliative medicine specialists (n=21; 66%), followed by medical officers (n=19; 59%) and general practitioners (n=11; 34%). Only nine hospices (28%) had positions for palliative medicine advance trainees.

Hospices offer a range of procedures with syringe drivers (91%) being the most common (see Figure 2).

Most hospices provide spiritual care (n=29; 91%) and care is delivered by a staff spiritual carer (n=20; 63%), visiting spiritual carer (n=11; 34%) and by "others" (n=9; 28%).

Figure 1: Professions employed by New Zealand Hospices (n=32 total).

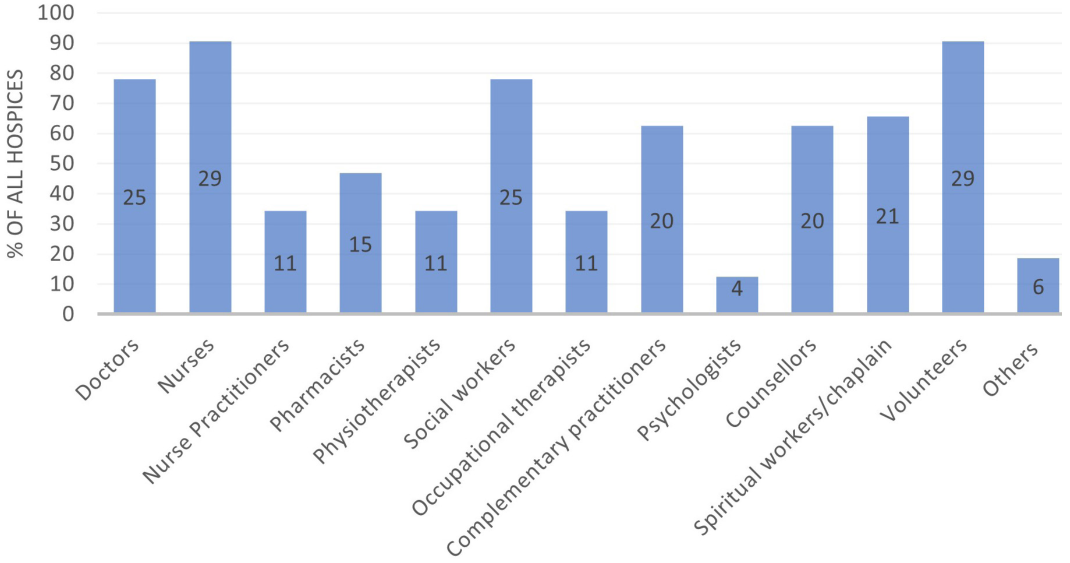


Figure 2: Procedures provided by New Zealand Hospices (n=32).

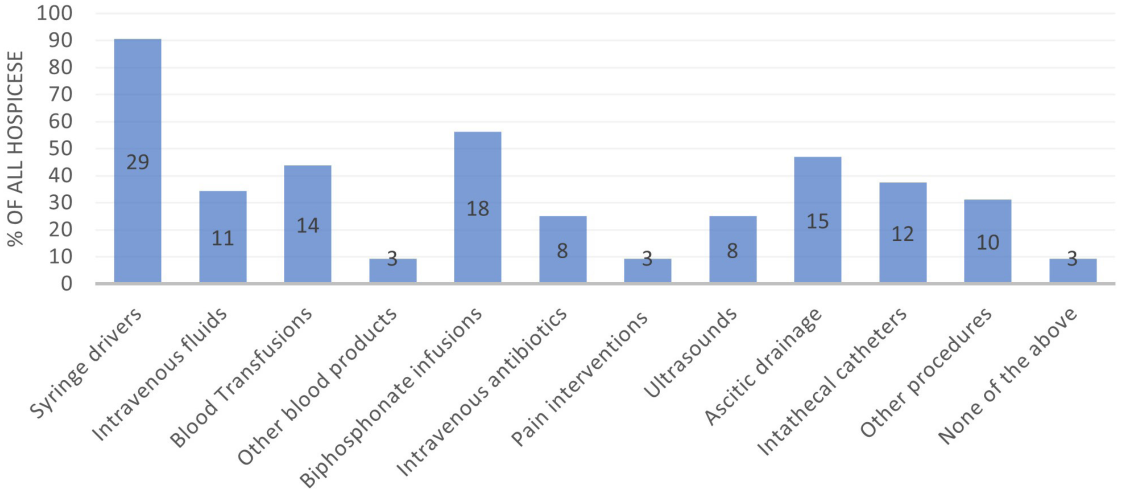


Figure 3: Types of interpreting services used in hospices.

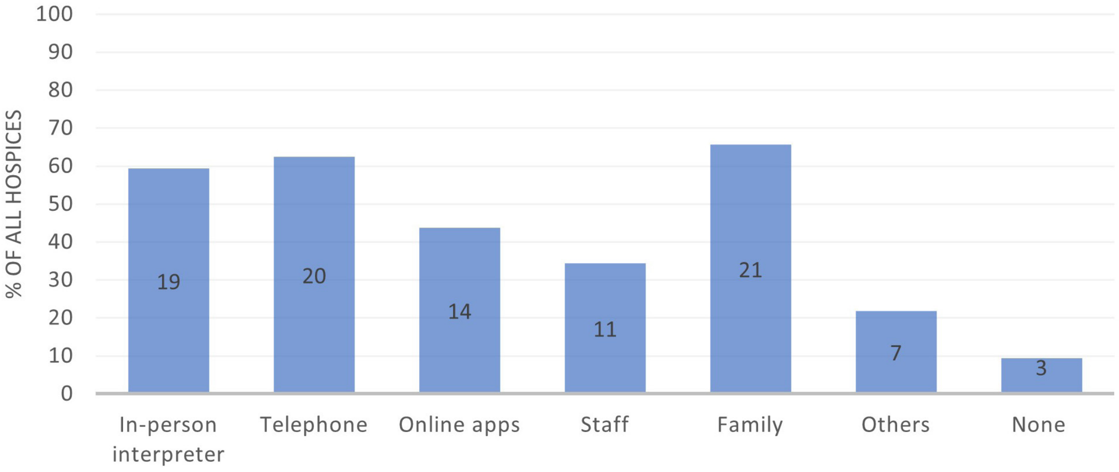
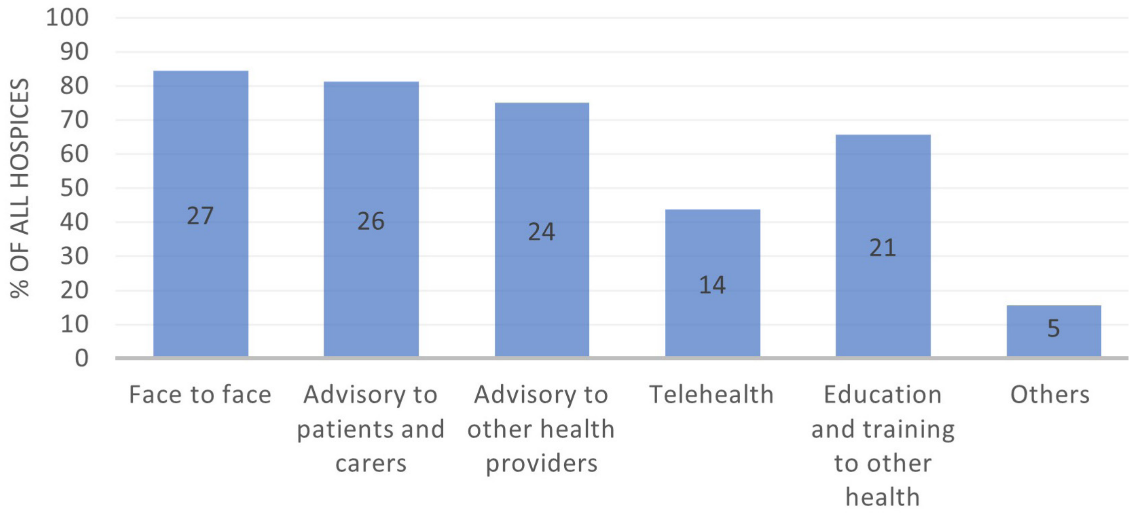


Figure 4: Types of care provided in rural areas by hospices.



About two-thirds of all hospices (n=22; 69%) had implemented patient reported outcome measures in their clinical services, with most (n=19) having adopted the Outcome Assessment and Complexity Collaborative's (OACC) suite of measures (either Palliative care Outcome Scales [POS]; or Integrated Palliative care Outcome Scales [IPOS]).[17] Another suite of measures used were Palliative Care Outcomes Collaboration (PCOC) (n=4) and four hospices reported use of other measures.[18]

Provision of afterhours nursing and medical service was reported for 22 and 20 hospices respectively, with four of these hospices offering "telephone advice only". Six hospices reported that no routine afterhours care, either directly or via telephone, was available for their patients. Only a minority of hospices provide afterhours psychological (n=3; 9%) and spiritual care (n=6; 19%).

The mean percentage of cancer and non-cancer patients across all hospices were 64% and 36%, respectively. Ten hospices only provided care to adults, and there was no paediatric-only hospice.

Education and integration with other health providers

Most hospices offered specific education sessions to outside professionals (n=28; 88%) with most of these same hospices also delivering onsite professional (n=26) and student training (n=25). Of note, only nine hospices (28%) were found to be specialist palliative medicine training sites. Most hospices offered liaison staff in other settings: hospital (n=14; 44%), primary care (n=10; 31%), aged residential care (n=20; 63%) and other settings (n=6; 19%). Seven hospices (22%) had no liaison staff in other settings.

Bereavement care

All hospices provided non-complex bereavement care for adults, and a majority (n=21; 66%) extended that care to bereaved children. Many hospices also provided complex bereavement care for adults (n=22; 69%) and just under half (n=14; 44%) offered complex paediatric bereavement care. Modes of routine contact following death were telephone (n=29; 91%), letter (n=20; 63%), face-to-face (n=24; 75%) and in a group (n=20; 75%).

Equity in care

About three-quarters of hospices reported keeping ethnicity data for their patients (n=23; 72%) and these hospices were asked to give the estimated percentage of patients seen by their service. The median percentages of NZ European, Māori and Pasifika peoples were 70%, 17% and 1%, respectively. Percentage of Māori seen ranged between 3 to17% across the 23 hospices.

Māori population

Māori cultural competency staff training was reported by most hospices, covering topics of Te Tiriti o Waitangi (n=25; 78%), Māori customs (n=18; 56%), Te Wairuatanga (n=14; 44%) and other topics (n=10, 31%). Three hospices reported no staff training in Māori cultural competency (9%). All hospices reported having knowledge of local Iwi and/or Māori providers, with 10 hospices (31%) having partnership agreements and 19 (59%) engaged regularly with Māori providers. Types of regular engagement reported were hui (n=10; 31%), written correspondence (n=9; 28%), social media (n=1; 3%) and others (n=9; 28%). Fifteen (47%) hospices do not have a cultural, or liaison position designated for Māori and median full time equivalent (FTE) across all hospices for such position was 0.2 FTE (i.e., one day per week equivalent).

Other cultural groups

Four hospices (12.5%) reported of having cultural liaison staff specific for other cultural groups with two of these hospices having support staff for more than one ethnic groups. Ethnic groups catered for by support staff were Pasifika (n=2; 6%), East Asian (n=3; 9%) and South Asian (n=1; 3%). About two-thirds (n=22; 69%) hospices reported having a budget for interpreter services. Common types of interpreting services used were reported to be via family, telephone and in person professionals (see Figure 3). Only seven (22%) hospices reported having a specific policy for patients with a disability.

Rural communities

Most hospices (n=28; 88%) reported providing care in rural areas, defined in the survey as more than 30 minutes travel time from the nearest base hospital.[19] Figure 4 displays the types of care offered.

Discussion

This study surveyed all hospices in New Zealand regarding the populations they serve and services they provided and is the quantitative part of a mixed method study for determining a future model for community specialist palliative care in New Zealand. This study found areas of similarity and variability in services provided by hospices. Areas of similarity include a holistic approach to care, a cornerstone of palliative care; and hands-on care including end-of-life care delivered at home by multi-disciplinary teams.[20] Such a finding is noteworthy as home base palliative care programmes have been shown to improve quality of life, increase home deaths, reduce hospital service utilisation and to be cost-effective.[21–23] Another commonality was that hospices commonly engage in education for people in primary palliative care roles. Education and training are known to facilitate collaboration between primary and specialist palliative care; however, previous studies found effective education models may vary between professionals.[24] A previous study in New Zealand evaluating a palliative education programme in the form of workshops, that aligns with clinical practice, resulted in sustained improvement in knowledge, skills and confidence in general practitioners.[25] Similar research should extend to other professional groups to identify elements of effective education model. The last Ministry of Health Workforce Stocktake, published in 2009, identified palliative care medical specialists as one of the biggest workforce issues for both hospices and hospitals. One could argue whether the small number of advanced training hospices found in the present study is adequate to remedy the workforce shortage issue and meet future demand.[4]

As a contrast, the study identified many areas of variability between hospices, some of which may lead to inconsistent care across settings and population groups, a concern previously voiced by the New Zealand palliative care sector.[1] A key element of providing end of life care at home is to have round-the-clock access to palliative care including SPC; the fact that 19% of hospices were unable to provide any afterhours care (direct or via telephone) is potentially concerning, although it is unclear from this survey whether alternative arrangements with other out-of-region SPC providers exist to fill that gap. This finding suggests hospices are more limited to provide afterhours care to their patients than previously reported.[4] Conversely, comparing with the Ministry of Health's report in 2009, the number of hospices with an inpatient unit has increased by one, although it is not known whether this led to changes in the total number of hospice beds in New Zealand.[4]

The New Zealand Palliative Care Strategy highlighted Māori as a group requiring specific policies, community linkages and care coordinators to ensure "culturally appropriate" and "coordinated" service implementation.[26] Although the majority of hospices were found to offer Māori cultural competence training, the varying availability of Māori liaisons or their equivalent suggests inconsistent access to appropriate cultural support. Similarly, this study also found varying levels of support for other cultural groups including Pasifika peoples. Health equity is a priority in New Zealand and the relatively small number of hospices engaging actively with local Māori providers indicates that further work in this area is needed. Future efforts can be guided by Hospice New Zealand's recently published Mauri Mate that sets out a Māori Palliative Care Framework for hospices, including one recommendation for the need for hospices to develop good engagement and relationships with local Māori communities. These relationships could help to dispel myths about hospices (as only a place for people to die) and reveal insights into traditional Māori values, customs and local resources.[27]

This survey also highlights a potential gap for hospices in meeting the palliative care needs of people with disabilities as only a minority of hospices have policy specific for this frequently overlooked group. The rising number of people with disability living into old age will see increasing age related illnesses requiring palliative care, ideally delivered by a workforce that are equipped and confident to meet their unique needs.[28]

Historically, hospices in New Zealand and overseas have had a strong focus in caring for cancer patients.[8] Although there is an increasing recognition of the value of palliative care for people with non-malignant diagnoses,[1] this study found the profile of patients continues to weigh heavily towards cancer. One explanation could be that the unpredictable trajectory of non-malignant diseases makes appropriate timing of referral to palliative care difficult.[29] As the burden of non-malignant disease increases with the ageing population, changes in the model of care may be required. For instance, this might include SPC services providing episodic instead of the usual round-the-clock care for chronic conditions to support primary care teams via shared patient electronic records and, in the event of patients' sudden deterioration, enhanced responsiveness to enable home deaths.

Community SPC access for children continues to be challenging due to the small number of paediatric patients seen in general. The current model of Starship Hospital, Auckland being the national resource service to collaborate with patient's primary paediatric team and local adult specialist palliative care services is likely to continue in the foreseeable future.[4]

There were several strengths to this study. To the authors' knowledge, this is the first comprehensive study to describe community SPC services in New Zealand. All eligible hospices responded which provides an excellent snapshot of populations served and current service provision. The survey utilised an existing robust framework specifically designed for describing specialist palliative care services.[12] The survey covered a range of areas of relevance for future planning in Aotearoa New Zealand, including a focus on Māori population and equity.

There were several limitations to this study. Qualitative responses were limited to free-text boxes with a lack of details to clarify responses especially when respondents chose the "others" option. Although most hospices reported providing services to rural communities, due to the service provider framework utilised in this study, comparison between rural and urban services was not feasible and a future study from a service population perspective that specifically examines inequity in access to SPC in rural areas is warranted. There is considerable overlap in the catchment areas covered by hospices which precludes subgroup analysis according to geographical areas and population size. Financial data collection was outside the scope of this study and the extent to which variations found between hospice services attributable to funding levels was not examined.

Conclusion

The present study demonstrated hospices in New Zealand provide holistic care at home by multi-disciplinary teams. Areas of inconsistency were highlighted, particularly in afterhours access to SPC and cultural support for Māori and other ethnic groups. The number of advanced training hospices remains small and the capacity of the current system to address shortages in the previously identified palliative medicine specialists is questioned. Future studies comparing SPC services between rural and urban communities in New Zealand is warranted to identify other areas of inequity.

COMPETING INTERESTS

Nil.

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REFERENCES

1. Palliative Care Action Plan. Wellington, New Zealand: Ministry of Health; 2017.
2. Review of Adult Palliative Care Services in New Zealand. Wellington, New Zealand: Ministry of Health; 2017.
3. Robinson J, Frey R, Raphael D, et al. Difficulties in navigating the intersection of generalist and specialist palliative care services: A cross-sectional study of bereaved family's experiences of care at home in New Zealand. Health Soc Care Community. 2022;30:133-141.
4. Gap Analysis of Specialist Palliative Care in New Zealand, Providing a national overview of hospice and hospital-based services. Wellington, New Zealand: Ministry of Health; 2009.
5. Hospice Care: Hospice New Zealand; [cited 2022 6 April 2022]. Available from: https://www.hospice.org.nz/what-is-hospice/.
6. Ajwani S, Blakely T, Robson B. Decades of disparity: ethnic mortality trends in New Zealand 1980 - 1999. Ministry of Health; 2003.
7. Robson B, Ellison-Loschmann L. Māori and cancer care in Aotearoa/New Zealand--responses to disparities. Eur J Cancer Care (Engl). 2016;25:214-8.
8. Taylor EJ, Ensor B, Stanley J. Place of death related to demographic factors for hospice patients in Wellington, Aotearoa New Zealand. Palliat Med. 2012;26:342-9.
9. Slater T, Matheson A, Ellison-Loschmann L, et al. Exploring Māori cancer patients', their families', community and hospice views of hospice care. Int J Palliat Nurs. 2015;21:439-45.
10. Mason K, Moeke-Maxwell T. Māori and Palliative Care: Literature review report for Te Ohu Rata Aotearoa. Te Ohu Rata Aotearoa; 2018.
11. Luckett T, Phillips J, Agar M, Virdun C, et al. Elements of effective palliative care models: a rapid review. BMC Health Serv Res. 2014;14:136.
12. Firth AM, O'Brien SM, Guo P, et al. Establishing key criteria to define and compare models of specialist palliative care: A mixed-methods study using qualitative interviews and Delphi survey. Palliat Med. 2019;33:1114-1124.
13. McKinlay E, McBain L. Evaluation of the Palliative Care Partnership: a New Zealand solution to the provision of integrated palliative care. N Z Med J. 2007;120(1263):U2745.
14. Stewart B, Allan S, Keane B, et al. Palliative Care Partnership: a successful model of primary/secondary integration. N Z Med J. 2006;119(1242):U2235.
15. Gómez-Batiste X, Caja C, Espinosa J, et al; Working Group of Standing Advisory Committee for Palliative Care. Quality improvement in palliative care services and networks: preliminary results of a benchmarking process in Catalonia, Spain. J Palliat Med. 2010;13:1237-44.
16. Landers A, Dawson D, Doolan-Noble F. Evaluating a model of delivering specialist palliative care services in rural New Zealand. J Prim Health Care. 2018;10(2):125-31.
17. Witt J, Murtagh F, de Wolf-Linder S, et al. Introducing the Outcome Assessment and Complexity Collaborative Suite of Measures. A Brief Introduction London, United Kingdom: King's College, University of London. [cited 2022 6 April 2022]. Available from: https://www.kcl.ac.uk/cicelysaunders/attachments/studies-oacc-brief-

introduction-booklet.pdf.
18. Palliative Care Outcomes Collaboration. Australia: University of Wollongong; [cited 2022 May 17]. Available from: https://www.uow.edu.au/ahsri/pcoc/.
19. Rural-urban classification for NZ health research and policy. Geographic Classification for Health (GCH): University of Otago; [cited 2021 March 2]. Available from: https://blogs.otago.ac.nz/rural-urbannz/.
20. Palliative care: World Health Organisation; [cited 2022 May 17]. Available from: https://www.who.int/health-topics/palliative-care.
21. Gomes B, Calanzani N, Curiale V, et al. Effectiveness and cost-effectiveness of home palliative care services for adults with advanced illness and their caregivers. Cochrane Database Syst Rev. 2013;(6):CD007760.
22. Team-Based Models for End-of-Life Care: An Evidence Based Analaysis. Toronto, Canada: Health Quality Ontario; 2014. p.1-49.
23. Mathew C, Hsu AT, Prentice M, et al. Economic evaluations of palliative care models: A systematic review. Palliat Med. 2020;34:69-82.
24. Gardiner C, Gott M, Ingleton C. Factors supporting good partnership working between generalist and specialist palliative care services: a systematic review. Br J Gen Pract. 2012;62:e353-62.
25. Landers A, Jenkins R, Honkoop PJ. Palliative medicine Master Classes for primary care: an evaluation. J Prim Health Care. 2022.
26. The New Zealand Palliative Care Strategy. Wellington, New Zealand: Ministry of Health 2001 [cited 2022 May 19]. Available from: https://www.health.govt.nz/system/files/documents/publications/palliativecarestrategy.pdf.
27. Mauri Mate A Māori Palliative Care Framework for Hospices: Te Kahu Pairuri o Aotearoa (Hospice New Zealand); 2020 [cited 2022 May 20]. Available from: https://www.hospice.org.nz/wp-content/uploads/2019/04/Mauri-Mate-full-framework-for-hospices-FINAL-2020pdf.pdf.
28. Bailey M, Doody O, Lyons R. Surveying community nursing support for persons with an intellectual disability and palliative care needs. Br J Learn Disabil. 2016;44(1):24-34.
29. Carduff E, Johnston S, Winstanley C, et al. What does 'complex' mean in palliative care? Triangulating qualitative findings from 3 settings. BMC Palliat Care. 2018;17:12.

Appendix 1

A1. What is the purpose of the care provided in your service? (please tick as many as apply)

- Symptom management
- Family and carer support
- Psychological care
- Bereavement care
- Care of the dying (last few days of life)
- Respite care
- Spiritual care
- Rehabilitation
- Others (please specify in textbox below)

A2. Does your service accept patient or family self-referrals directly (i.e., not via another service providers, e.g., primary care team)?

- Yes
- No

A3, Within which setting is your service delivered? (please tick as many as apply)

- Inpatient hospital
- Inpatient hospice
- Home based care at patient's own home
- Aged residential care home
- Outpatient
- Day care
- Prison
- Others (please specify in textbox below)

A4. What type of care does your service provide? (please tick as many as apply)

- Direct "hands on, face-to-face" care
- Advice and support to patients and family e.g., phone advice or providing prescription to patients and families
- Consult advice and support to other professionals caring for individual patients e.g., primary care or other specialties
- Education and training to professionals (not in relation to specific individual patients)
- ⊗Other (please specify in textbox below)

B1. How many new referrals are accepted and seen annually by your service?

- <200
- 200–499
- 500–999
- 1000–3499
- 3500–5000
- >5000

B2. How many inpatient beds does your service have?

- No inpatient bed
- 1–5
- 6–10
- 11–15
- 16–20
- >20

B3. Which DHB(s) does your service catchment area come under? (please tick as many as apply)

- Auckland DHB
- Bay of Plenty DHB
- Canterbury DHB
- Capital and Coast DHB
- Counties Manukau DHB
- Hawkes Bay DHB
- Hutt Valley DHB
- Lakes District DHB
- MidCentral DHB
- Nelson–Marlborough DHB
- Northland DHB
- South Canterbury DHB
- Southern DHB
- Tairāwhiti DHB
- Taranaki DHB
- Waikato DHB
- Wairarapa DHB
- Waitematā DHB
- West Coast DHB
- Whanganui DHB

C1. Which of the following professionals does your service employ? (please tick as many as apply)

- Doctors
- Registered nurses
- Nurse practitioners
- Healthcare assistants
- Social workers
- Pharmacists
- Complementary practitioners e.g. music/art/lymphoedema (please specify in textbox below)
  Physiotherapists
- Occupational therapists
- Psychologists
- Counsellors

- Spiritual workers/Chaplains
- Volunteers
- Other (please specify in textbox below)

Display This Question:
If C1 = Doctors

C2. Which of the following types of doctors does your service employ (excluding relieving or locum staff)? (please tick as many as apply)

- Palliative medicine specialist
- Medical officers
- General practitioners
- Palliative medicine advance trainees
- Registrars
- House surgeons
- Others types of doctors (please specify in textbox below)

C3. How is care provided by your service? (please tick as many as apply)

- Face-to-face
- Telephone advice or support
- Telehealth other than telephone advice or support
- Others (please specify in textbox below)

C4. Which of the following procedures does your service provide to your patients? (please tick as many as apply)

- Syringe driver
- Ultrasound
- Ascites drainage
- Pain intervention procedures e.g., nerve block
- Intravenous fluids
- Other procedures (please specify in textbox below)
- Blood transfusions
- Biphosphonate infusions
- Other blood products
- Intravenous antibiotics
- Domiciliary management of intrathecal catheters
- ⊗None of the above

D1. Does your service accept afterhours referral?

- Yes
- No
- Yes, but only in exceptional circumstances (please comment in textbox below)

D2. Does your service provide any afterhours care by **medical staff** for patients already known to this service?

- Yes – direct hands-on care, face-to-face care
- Yes –telephone advice and support only
- Yes – both hands on and telephone advice/support
- No afterhours medical service
- Yes, only in exceptional circumstances (please comment in textbox below)

D3. Does your service provide any afterhours care by **nursing staff** for patients already known to this service?

- Yes –- direct hands-on care, face-to-face care
- Yes – telephone advice and support only
- Yes – both hands on and telephone advice/support
- No afterhours nursing service
- Yes – only in exceptional circumstances (please comment in textbox below)

Display This Question:
If D2 = Yes – direct hands-on care, face-to-face care
Or D2 = Yes –telephone advice and support only
Or D2 = Yes – both hands on and telephone advice/support
Or D3 = Yes – direct hands-on care, face-to-face care
Or D3 = Yes – telephone advice and support only
Or D3 = Yes – both hands on and telephone advice/support

D4. When is afterhours care service available? (please tick as many as apply)

- Weekdays evenings
- Weekdays overnight
- Weekends daytime
- Weekends evenings
- Weekends overnight

D5 Does your service provide any afterhours spiritual care?

- Yes
- No

D6. Does you service provide any afterhours psychological care e.g., counselling?

- Yes
- No

E1. Does your service offer education and/or training to professionals outside your organization?

- Yes
- No

Display This Question:
If E1 = Yes

E2. What kind of training or education does your service provide? (please tick as many as apply)

- Specific education sessions
- On-site training
- On-site student training
- Other (please specify in textbox below)

E3. Does your service have liaison staff designated in any of the following settings? (please tick as many as apply)

- Hospital
- Primary care
- Aged residential care
- Others (please specify in textbox below)
- No liaison staff in other settings

E4. Does your service routinely have joint clinics/home visits with other specialties? (please take as many as apply)

- Primary care
- Respiratory
- Cardiology
- Geriatrics
- Renal
- Oncology
- Psychiatry
- Others (please specify in textbox below)
- ⊗No routine joint clinics/visits with other specialties

F1. Is there a standardized palliative care pathway in your region to advise other clinicians on patient care?

- Yes
- No
- Not sure

F2. Does this service use any patient reported outcome measures (PROMs) e.g., Palliative Care Outcome Scales (POS), Integrated Palliative Care Outcome Scale (IPOS) or Palliative Care Care Outcomes Collaboration symptom assessment scale (PCOC)?

- Yes
- No

Display This Question:
If F2 = Yes

F3. Which patient reported outcome measures (PROMs) does your service use? (please tick as many as apply)

- POS/IPOS
- PCOC
- Others (please specify in textbox below)

F4. Does your service have standardized referral criteria for acceptance of patients?

- Yes
- No

F5. Does your service have standard criteria for discharging patients from the service?

- Yes
- No

G1. What is the standard follow-up routinely offered to families after death? (please tick as many as apply)

- Letter
- Telephone
- Face to face visit/meeting
- Group support
- Others (please specify in textbox below)
- ⊗No routine follow up after death

G2. Does your service offer bereavement care?

- Yes
- No

Display This Question:
If G2 = Yes

G3. Does your service offer specialist bereavement care to bereaved adults at risk of complex grief?

- Yes
- Only standard (non-specialist) bereavement care is available

Display This Question:
If G2 = Yes

G4. Does your service offer bereavement care to children?

- Yes
- No

Display This Question:
If G4 = Yes

G5. Does your service offer specialist bereavement care to bereaved children at risk of complex grief?

- Yes
- No

G6. Does your service offer spiritual care?

- Yes
- No

Display This Question:
If G6 = Yes

G7. Which of the following provides spiritual care at your service? (please tick as many as apply)

- Staff spiritual carer/Chaplain
- Visiting spiritual carer/Chaplain
- Others (please specify in textbox below)

H1. What Māori Cultural Competence staff training does your service provide or facilitate, including training by external providers e.g., DHB? (please tick as many as apply)

- Te Tiriti o Waitangi (Treaty of Waitangi) with a focus on health
- Traditional Māori customs e.g., te reo Māori, rongoā (traditional healing), protocols of tapu (sacred) and noa (ordinary)
- Te Wairuatanga - Māori spirtuality
- Others (please specify in textbox below)
- ⊗Content of training is not known
- ⊗No training is provided

H2. Does your service have knowledge of local Iwi and/or Māori providers?

- Yes
- No

Display This Question:
If H2 = Yes
H3. Does your service have partnership agreements with local Iwi and/or Māori providers?

- Yes
- No

Display This Question:
If H2 = Yes

H4. Does your service have regular engagement with local Iwi and/or Māori providers?

- Yes
- No

Display This Question:
If H4 = Yes

H5. What regular engagement does your service have with local Iwi and/or Māori providers? (please tick as many as apply)

- Regular hui (meetings)
- Written correspondence e.g. emails, newsletters
- Social media
- Others (please specify in textbox below)

H6. What is the total Full Time Equivalent (FTE) of Liaison or Cultural position designated for Māori? (please enter as a number e.g., 0.8 and write “0” if no FTE)

I1. What percentage (%) of patients (estimated: should add up to 100%) known to your service fall under the following primary diagnoses
Cancer :
Non-cancer :
Total :

I2. Does your service offer care to:

- Adult patients only

- Paediatric patients only
- Both adult and paediatric patients

I3. Do you know the ethnic profile of patients seen by your service? (e.g., what percentage are Māori)

- Yes
- No

Display This Question:
If I3 = Yes

I4 What is the ethnic composition of patients known to your service? (estimated percentages, should add up to 100%)

- NZ European/European
- Māori
- Pacific Islander
- Asian
- Others

I5. Does your service have cultural liaison staff other than Māori cultural support?
Yes
No

Display This Question:
If I5 = Yes

I6. If yes to above, please tick as many as apply:

- Pacific Island
- East Asian
- South Asian
- Muslim community
- Others (please specify in textbox below)

I7. What interpreting services do you use for patients with limited English? (please tick as many as apply)

- In person
- Telephone
- Online apps e.g., Google Translate
- Staff
- Family members
- Others (please specify in textbox below)
- ⊗None of the above

I8. How well do you think your service caters for patients with limited English?

- Very well
- Well
- Satisfactory
- Below satisfactory
- Poorly

I9. Does your service have a budget for interpreters?

- Yes
- No

I10. Does your service have policy specific for patients with disability?
Yes
No

I11. Does your service provide care to patients in rural area – i.e. more than 30-minutes travel time from the nearest base hospital? *(definition according to Rural-urban Classification for NZ Health and Research policy: University of Otago)*

- Yes
- No

Display This Question:
If I11 = Yes

I12. What type of care does your service provide in rural area – i.e., more than 30-minute travel time from the nearest base hospital? (Please tick as many as apply)

- Direct “hands-on, face-to-face” care
- Advisory (may include telephone advice, support and prescribing) to patients and families
- Advisory to other health care providers
- Telehealth to patients (other than telephone advice and support)
- Education and training to professionals (not in relation to specific individual patients)
- Others (please specify in textbox below)

A survey of adult respiratory and sleep services in Aotearoa New Zealand: inequities in the provision of adult respiratory and sleep services

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ABSTRACT

AIMS: The New Zealand “Standards for Adult Respiratory and Sleep Services” were published by the Ministry of Health in 2004. A 2006 survey demonstrated major gaps in the staffing and service provision and significant variation between district health boards (DHBs). We repeated this survey in 2019/20 in order to highlight issues which should be addressed as part of health service reforms.

METHODS: Survey of all adult DHB respiratory services assessing staffing and service provision.

RESULTS: There is marked regional variation in staffing levels for all specialist clinicians. There are 1.18 FTE/100,000 population respiratory physicians, which is well below Australian and United Kingdom levels. Two hundred thousand people in New Zealand do not have access to a local respiratory physician. For provided services we found a four-fold variation between DHBs for CPAP treatments, six-fold for oxygen services, and eight-fold for pulmonary rehabilitation.

CONCLUSION: The place of residence of New Zealanders determines access to respiratory services. There are inequities in access, with little progress made since 2006. Data on health outcomes are required. The restructure of the health service must rectify this situation. The need to end a “postcode lottery” is demonstrated when reviewing current respiratory services in New Zealand.

Standards for respiratory and sleep services in New Zealand were recognised and published on the Ministry of Health (MoH) website in 2004, where they have remained unchanged.[1]

A survey of adult respiratory services completed in 2006[2] reported that over 400,000 New Zealanders had no access to a respiratory physician, and that only four of the six large district health boards (DHBs), four of the nine medium sized DHBs, and two of the six small DHBs complied with the Standards. A significant regional variation in the staffing levels of all respiratory clinicians was noted. Inequity of service provision was also apparent, such as a seven-fold variation between DHBs for prescriptions of oxygen therapy, and a five-fold variation for investigation and treatment of patients with sleep-related breathing disorders. The absence of national health targets for respiratory services was noted to be a significant deficiency and that the apparent lack of planning for respiratory services was of major concern.

We repeated this survey for the now 20 DHBs to assess changes since 2006 and to highlight issues which should be addressed as part of a health service reform in New Zealand.[3] This reassessment provides a stocktake of adult respiratory services prior to the disestablishment of the DHBs and the creation of Te Whatu Ora – Health New Zealand. Planning of future respiratory and sleep services should be facilitated by the findings of this survey.

Methods

An updated version of the 2004 questionnaire was developed and approved by the New Zealand executive of the Thoracic Society of Australia and New Zealand (TSANZ). In late 2019, all DHBs with adult respiratory services were approached. The respiratory clinical directors of those DHBs were invited to complete the questionnaire (see Appendix 1). For those DHBs with no local respiratory services, the local general medical services lead, or neighbouring DHB responsible for the delivery of respiratory services there, were invited to complete the questionnaire.

The questionnaire sought information on:

- staffing levels;
- service provision— first specialist

assessments (FSA) and follow-up reviews and the DHB's ability to comply with the MOH's elective services performance indicator (ESPI 2);[4]
- diagnostic testing, and volumes of planned and acute services;
- community-based initiatives and specific strategies for chronic respiratory conditions;
- strategies for the Māori and Pasifika populations;
- collaboration between larger and smaller centres for management of respiratory conditions such as lung cancer and interstitial lung disease, conditions where multidisciplinary meeting (MDMs) are recommended as standard-of-care by international guidelines;
- oxygen, sleep, and pulmonary rehabilitation services;
- credentialling of respiratory physicians and respiratory departments;[5]
- accreditation of lung function and sleep laboratories.[6]

Statistical analysis

As the intention was a simple descriptive analysis, no formal hypothesis testing was performed. Results are reported as counts, proportions, or per 100,000 population as appropriate. DHBs were stratified by population size served: large sized DHB (population >300,000), medium sized DHB (100,000–300,000), and small sized DHB (<100,000).

Results

Of the 20 respiratory departments which received the survey, 16 responded with complete questionnaires. Two DHBs did not respond (Northland and Nelson-Marlborough), whilst two DHBs without on-site specialty respiratory services (Whanganui and West Coast) had some of their information provided by the MidCentral and Canterbury DHBs, respectively. The final analysis was therefore based on 18 DHBs consisting of seven large, six medium, and five small sized DHBs.

Staffing and workforce (Table 1)

Staffing levels across all professional groups have increased significantly since 2006, in terms of total full-time equivalents (FTEs) and FTEs per population but important differences remain between DHBs across all staff.

Specialist respiratory physicians

There remain no local specialist respiratory physicians in Whanganui, South Canterbury, Wairarapa, and West Coast DHBs, which serve a combined population of >200,000 people. Patients from these DHBs are managed by general medical services or they travel to attend specialist respiratory services in neighbouring DHBs. In those 14 DHBs with local respiratory physicians, the number of FTE varied three-fold: 0.73 to 2.26 per 100,000 population. Nine of the 13 designated DHBs' respiratory services had undergone external credentialling for the on-site physicians and the overall service.[5]

Respiratory nurses

Respiratory nurses included in this survey are respiratory nurse practitioners, nurse specialists providing inpatient and outpatient services, and respiratory ward nurses where a dedicated respiratory ward exists. There was large variation between DHBs in the combined number of respiratory clinical nurse specialists and nurse practitioners (0.44–2.38/100,000) and respiratory registered nurses (0–5.7/100,000). All but two DHBs reported to have some nurse-led services and some also provide community-based respiratory nurse clinics.

Respiratory physiotherapists

Respiratory physiotherapists provide a range of inpatient and outpatient services including pulmonary rehabilitation, treatment for airways diseases and disordered breathing patterns.[8] Of the 18 DHBs, 10 employ respiratory physiotherapists, the others including three large DHBs rely on "generalist" physiotherapists.

Sleep physiologists/dedicated sleep nurses

The provision of sleep services varies across the country: only six DHBs have a sleep laboratory for overnight testing and treatment, others only offer portable (home) sleep testing and outpatient-based treatment. Several DHBs work in partnership with their neighbouring DHB or private sleep laboratories. Dedicated sleep service nursing staff may be involved in the provision of positive airway pressure (PAP) treatment. Different service models influence staffing levels (shown in Table 3). Amongst DHBs which provide "in-house" services there was a six-fold difference in the number of sleep practitioners (range, 0.6–2.65/100,000) and higher numbers for those with a sleep laboratory.

Respiratory physiologists

For DHBs with respiratory physiology laboratories there is a three-fold variation among specialist staff which is reflected in the range or complexity of tests provided.

Service provision (Tables 2 and 3)

Outpatient/planned services

All DHBs provide outpatient services at urban hospital facilities, while at least nine DHBs also provide outpatient clinics at peripheral hospitals and health facilities (Table 3). Three DHBs provide some visiting specialist clinics in a neighbouring DHB. In the smaller DHBs most respiratory patients are seen by the general medical physicians whilst more complex patients are reviewed by visiting specialists or at neighbouring DHBs.

According to the MoH elective services performance indicator (ESPI 2) all patients referred and accepted for a FSA should be seen within four months.[4] Two DHBs reported "always" meeting the ESPI2, seven reported this to be "usually", four "sometimes", and two "rarely". For follow-up appointments, in five DHBs this is "usually" possible, in seven only "sometimes" and three "rarely".

Seven services have dedicated services for Māori patients/whanau and three for Pasifika patients. Six are involved in a partnership with community or primary care providers including kaupapa Māori health services, marae-based clinics, or community-based respiratory assessments.

Acute services

In general, there are no models of care for patients needing admission with respiratory conditions. Their care is either provided by inpatient respiratory teams or general medical (GM) teams. Of the 18 DHBs, six provide acute inpatient respiratory services (five large DHB and one medium DHB), whereas the remaining 12 provide acute respiratory care together with general medical teams. Some DHBs have mixed models where respiratory physicians partake in their GM acute roster.

All services provide non-invasive ventilation (NIV) for the management of acute type 2 respiratory failure. This treatment is provided in a variety of clinical settings. A respiratory physician leads this service in 7 of 16 DHBs.

Sleep services

There is significant variation in the sleep service provision between DHBs (Table 3). Six have a dedicated sleep laboratory with overnight testing. Nine access sleep services from a neighbouring DHB or in partnership with a private provider. Three offer community-based sleep assessments. One DHB-based sleep service and one private organisation providing DHB services have undergone Australasian Sleep Association accreditation. There is almost four-fold variation in the total number of sleep studies completed (192–724/100,000 population). Polysomnography studies make up between 5% and 55% of all studies with different types of partial or portable studies making up the rest. The provision of CPAP treatment for obstructive sleep apnoea varies four point eight-fold between DHBs (92–441/100,000 population).

Diagnostic and interventional bronchoscopy services

Fifteen DHBs provide on-site bronchoscopy, while three DHBs rely on neighbouring DHBs. Endoscopic bronchial ultrasound (EBUS) and biopsy is only available in six DHBs. There is only one EBUS provider for the entire South Island.

Two North Island DHBs provide interventional bronchoscopy for large airway pathology including: rigid bronchoscopy, laser, argon plasma coagulation, cryotherapy and airway stenting, and also endobronchial valve for bronchopleural fistulae management. One DHB is developing a national service for bronchoscopic lung volume reduction using endobronchial valves.

Broncho alveolar lavage (BAL) and transbronchial lung cryobiopsy (TBLC) have emerged as new diagnostic techniques for investigation of interstitial lung diseases.[10]

BAL for interstitial lung disease (ILD) is utilised by five DHBs and TBLC by only one DHB.

Pleural ultrasound

All DHBs use bedside pleural ultrasound to investigate and manage pleural effusions in accordance with the 2017 TSANZ position statement.[11] In six of 16 responding services none of the clinicians had undergone the process to achieve TSANZ competency for this procedure.

Respiratory physiology testing and respiratory laboratories

All DHBs provide on-site spirometry, and all but one provide lung volume testing and measurement of diffusion capacity (DLCO). Exhaled nitric oxide testing is undertaken by 10 DHBs, while 12 DHBs provide respiratory provocation testing. Both modalities are key investigations for patients

Table 1: Comparison of respiratory staffing levels per 100,000 population in New Zealand DHBs between the 2006 and 2019 surveys.

DHB	DHB population	Specialist respiratory physicians	Nurse practitioners + clinical nurse specialists/ registered nurses	Respiratory physiotherapists	Sleep physiologists/ dedicated sleep nurses	Respiratory scientists & physiologists
Large sized DHB >300,000 population						
Waitematā	629 [480]	0.85 [0.65]	0.51/0 [0]	0	*	0.57 [0]
Canterbury	568 [530]	1.63 [1.25]	1.53/5.83 [1.6]	0.53	1.61 [0.4]	1.32 [1.0]
Counties Manukau	563 [430]	1.54 [1.15]	1.74/0 [1.1]	0.89	0.4	0.53 [0.3]
Auckland	546 [425]	1.57 [1.4]	1.13/5.68 [0.9]	0.37	1.67 [0.95]	1.0 [0.75]
Waikato	420 [390]	2.26 [0.66]	2.38/0.48 [0.75]	0.24	1.43 [0.6]	0.95 [0.55]
Southern	330 [276]	1.09 [0.9]	0.73/0.97 [1.2]	0	1.48 [0.7]	0.97 [0.65]
Capital Coast	318 [250]	1.41 [0.95]	0.44/0.34 [0.8]	0	*	1.82 [1.8]
Medium sized DHB 100,000–300,000 population						
Bay of Plenty	238 [190]	1.68 [1.0]	1.55/1.13 [1.0]	0.21	0.84 [1.0]	0.76 [0.5]
MidCentral	179 [170]	1.45 [0.75]	1.95/ 0.73 [1.8]	0.73	1.67	1.4 [1.3]
Hawkes Bay	166 [150]	1.26 [1.3]	1.81/0.72 [0.66]	0.24	0.6 [1.8]	1.08 [1.3]
Hutt Valley	150 [130]	0.73 [0.55]	0.93/0 [1.7]	0.6	*	1.27 [0.55]
Taranaki	120 [100]	0.83 [0.5]	0.83/0 [2.2]	0.83	*	0.83 [0]
Lakes	110 [103]	1.90 [0.4]	1.91/0 [1.1]	0	1.45 [0]	ND [0]
Small sized DHB <100,000 population						
Whanganui	65 [64]	0 [0]	ND [1.5]	0	*	0 [0]
South Canterbury	60 [54]	0 [0]	1.25/0 [2.5]	0	0.83 [0]	0 [0.5]
Tairāwhiti	49 [44]	1.0 [2.0]	1.22/0 [1.0]	0.4	2.60 [0]	1.0 [0]
Wairarapa	45 [39]	0 [0]	2.22/0 [2.0]	0	*	0 [0]
West Coast	32 [31]	0 [0]	ND [3.0]	0	*	0 [0]

All data represent the number of staff per 100,000 population.
No data for Northland and Nelson Marlborough.
ND = No data provided.
*Sleep services provided by other DHB or private organisation.
The 2006 data are shown in square brackets [ ]. In 2006, Southern DHB included the separate Otago and Southland DHBs.

Table 2: Respiratory and related services provided by the different DHBs, grouped by population.

DHB	**Dedicated respiratory service**			**Sleep lab (PSG)**	**Referral specialities within DHB**						**Allergy/ immunology**
	Adult	**Adult acute**	**Paediatric**		**CF clinic**	**ILD clinic**	**Lung cancer MDM**	**ILD MDM**	**Radiology oncology**	**Thoracic surgery**	
Waitematā	Y					Y	Y	Y	N		Y
Canterbury	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Counties	Y	Y		Y	Y	Y	Y	Y	N		
Auckland	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Waikato	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y
Southern	Y	Y		Y	Y	Y	Y		Y	Y	
Capital Coast	Y	Y		Y*	Y	Y	Y	Y	Y	Y	Y
Bay of Plenty	Y			Y	Y	Y	Y		Y		
Mid Central	Y			Y	Y	Y	Y		Y		
Northland	Y										
Hawkes Bay	Y	Y									
Nelson-Marlborough	Y										
Hutt	Y										
Taranaki	Y										
Lakes	Y										
Whanganui											

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South Canterbury											
Tairāwhiti	Y										
Wairarapa											
West Coast											

Abbreviations: Y = yes; PSG = polysomnography; CF = cystic fibrosis; ILD = interstitial lung disease; MDM = multi-disciplinary meeting.
*Outsourced through University of Otago.

Table 3: Inpatient and outpatient services provided by DHBs per population.

DHB	DHB population (000)	Acute respiratory admissions	FSA	Follow-up	Sleep studies all types (%PSG)	CPAP new patients	NIV #	Pulmonary rehabilitation	Home oxygen
Large sized DHB >300,000 population									
Waitematā	629	GM	424	418	0*	0*	12	19	22
Canterbury	568	221	753	1367	433+284C (11.5%)	161	52	53	40
Counties Manukau	563	249	458	919	311* (17.1%)	92*	26	41	40
Auckland	546	380	432	1,282	293* (54.5%)	179*	28	16	18
Waikato	420	460	355	641	649 (18.3%)	190	56	14	29
Southern	330	225	347	648	194 (4.7%)	136	33	15	48
Capital Coast	318	GM	394*	698*	236* (36.0%)	125*	40	36	25

Table 3 (column): Inpatient and outpatient services provided by DHBs per population.

DHB	DHB population (000)	Acute respiratory admissions	FSA	Follow-up	Sleep studies all types (%PSG)	CPAP new patients	NIV #	Pulmonary rehabilitation	Home oxygen
Medium sized DHB 100,000–300,000 population									
Bay of Plenty	238	GM	365	344	331 (4.8%)	181	24	61	72
Mid Central	179	208	217	323	158+352C (7.1%)	357	33	33	28
Hawkes Bay	166	GM	401	639	724 (0)	210	43	151	51
Hutt Valley	150	GM	582	888	0*	0*	60	20	93
Taranaki	120	GM	327	617			5	37	57
Lakes	110	GM	598	1,868	269 (0)	441	55	23	108
Small sized DHB <100,000 population									
Whanganui	65	GM					33		
South Canterbury	60	GM	*	*	192C		48		
Tairāwhiti	49	GM	*	*		306	87	71	73
Wairarapa	45	GM	*	*	*	*		73	89
West Coast	32	GM			350C		56		

All data represents the annual number per 100,000 population. Empty fields are due to lack of data.
Pulmonary rehabilitation patient numbers are total referrals and patients completing a programme (75% attendance) per 100,000 population.
Home oxygen patient numbers are totals on oxygen concentrator treatment and patients also on cylinder oxygen (for ambulatory or emergency use).
The survey did not establish wait times, patient volumes including inter-district flows.
Admissions numbers shown are under care of a dedicated Respiratory service. GM = Generalist admission model i.e., acute admission under General Medical services.
Outpatient activity includes senior medical officers/ registered medical officers/ nurse practitioners/ clinical nurse specialists where these are available.
[C] Community sleep assessments including a level 4 study (only for Canterbury, Mid Central, South Canterbury, West Coast DHBs).
*Auckland DHB provides sleep services for Waitemata. WellSleep/ Capital Coast DHB provides sleep services for Hutt Valley and Wairarapa DHBs, and Eden Sleep provides sleep services for Taranaki.
Data from Neill et al.[23]
Further Abbreviations: FSA = first specialist assessment; CPAP = continuous positive airway pressure; NIV = non-invasive ventilation; PSG = polysomnography.

with possible airways disease. Six DHBs provide simulated altitude assessments for patients with hypoxaemia, while eight offer cardiopulmonary exercise testing (CPET).

Only four of the respiratory physiology laboratories had achieved TSANZ accreditation when completing this survey in 2019, compared with 2006 when it was six. The number of trained respiratory physiology staff, standardised for the population, shows a more than three-fold variation between DHBs.

Pulmonary rehabilitation

All 16 DHB services included in the survey provide pulmonary rehabilitation although the rates of referral and completion vary considerably between DHBs, with a 10-fold difference in referrals (23–271/ 100,000 population) and in completion rates (15–151/ 100,000) (Table 3). Several DHBs are involved in community-based programmes in different locations. All services but one accept direct referrals from GPs.

Oxygen services

All DHBs provide an oxygen service[12] (Table 3). The provision of long-term oxygen therapy (LTOT) ranged six-fold from 18 to 108 patients per 100,000 population, and the rate of prescriptions for cylinders or portable oxygen differed 16-fold (3–49/100,000). Between 4% and 67% of all oxygen patients were provided with portable oxygen in addition to concentrators, but the reasons for this difference were not studied specifically. In three services there was no routine annual review of oxygen patients.

Services for specific respiratory diseases

Cancer services

In line with the New Zealand Lung cancer standards,[13] the set-up of cancer services has changed considerably since the 2006 review. The major development is the availability of regional multi-disciplinary cancer panel meetings (MDM) where all suspected or confirmed cancer cases are reviewed weekly. Regional meetings are facilitated by vast improvements in internet technology that allow video-conferencing and easy exchange of medical imaging. Most DHBs have appointed cancer coordinator nurses in recent years.[14] Cases from smaller DHBs are discussed at a larger centre weekly MDM. The extra impact on resources in these larger centres hosting these MDMs has not been studied specifically. National Quality Performance Indicators (QPIs) and Faster Cancer Treatment (FCT) indicators are used. This predated the creation of Te Aho O Te Kahu—the New Zealand Cancer Control Agency in 2019.[15]

Five DHBs provide thoracic surgical services and seven centres provide on-site radiotherapy for patients with a thoracic malignancy. Medical oncology services are provided in all locations with some chemotherapy provided in peripheral and even rural hospitals.

Interstitial lung disease

Similar to lung cancer, patients with ILD benefit from a MDM approach, whereby cases are discussed following initial diagnostics such as computed tomography (CT) and pulmonary physiology testing.[10] Antifibrotic therapy for idiopathic pulmonary fibrosis (IPF) should be prescribed only after an MDM review. Six of the larger DHBs hold regular ILD MDMs and accept cases from neighbouring DHBs for discussion. Five of the smaller DHBs without "usually" and three "sometimes" refer patients to neighbouring ILD MDMs.

Tuberculosis

Of the 16 DHBs, six did not provide induced sputum testing for patients with suspected tuberculosis, presumably relying instead on bronchoscopic sampling which is not in line with the 2019 New Zealand tuberculosis guidelines.[16]

Cystic fibrosis

Of the 16 DHBs, seven provide on-site cystic fibrosis clinics, with all accepting patients from neighbouring DHBs. Half of the DHBs without on-site CF clinics "usually" refer their cystic fibrosis patients while the other half "always" refer these patients.

Pulmonary artery hypertension

Six of the 16 DHBs provide on-site pulmonary artery hypertension clinics and most accept patients from other centres. Patients from centres without these services have variable rates of referral, with the responses ranging from "rarely" to "always".

Lung transplantation

There is only one national lung transplantation service. This serves patients from throughout New Zealand and is based at Auckland City Hospital.

Discussion

This survey focused on staffing levels and the provision of adult respiratory services in the different New Zealand DHBs and assessed changes since a previous survey completed in 2006. The authors of the 2006 survey concluded that there was marked variation, a lack of monitoring of the DHBs' performance and of health outcomes. There was no consistent planning of services and there seemed to be no accountability to implement the Respiratory Standards published in 2004. Suggested measures were not taken up and data on health outcomes and regional variation remain very limited now, more than one decade later.

Since 2006 there has been an increase in all respiratory clinicians providing an expanded range of respiratory and sleep services to the New Zealand population, but the size of the workforce lags behind international standards. We found a marked variation in respiratory specialists, nurses, physiotherapists, and physiologists between DHBs standardised per 100,000 population. The increase in full-time equivalent (FTE) respiratory physicians from 0.67/100,000 in 2006 to now, 1.18/100,000, still represents only 56% of that in the United Kingdom (2.1/100,000 range 1.3–3.3),17 and 62% of that in Australia (1.9/100,000).[18] Only DHB appointments are included here but not university FTE. Four of the smaller DHBs (two in each North and South Island) serving a combined population of 202,000 in 2019/20 remained without dedicated respiratory specialists and have limited nurse specialists. Respiratory Nurse Specialist and Nurse Practitioner rates varied more than five-fold between DHBs. Differences in the local care models may be part of the reason but different levels of commitment and investment into staff development and career progression are also likely to be important factors. Within New Zealand, there are different service models for the provision of acute respiratory services: generalist or respiratory speciality, or "mixed" services. This is reflected in the different numbers of acute specialist service admissions and will be a factor in the different staffing levels.

Patient outcomes for certain acute respiratory conditions are superior when care is provided by a dedicated specialist team,[19] but only six of the 18 DHBs have those teams. Outpatient and community outreach services are similarly affected. Patient care may be compromised by the existing model-of-care where patients of a small DHB are reliant on the specialist service provided by a neighbouring DHB. Even within larger DHBs with a significant rural population (e.g., 45% in the Southern region[20] and 41% in Waikato[21]) the distance to the nearest hospital facility will be a barrier when accessing specialist services.

This survey provides evidence of marked variations in terms of the provision of specific respiratory and sleep services. Long-term oxygen therapy (LTOT) increases survival and improves the quality-of-life of hypoxemic patients with chronic obstructive pulmonary disease (COPD) but per population there is a six-fold difference in the provision of home oxygen, more or less unchanged since 2006. Pulmonary rehabilitation improves symptom control and quality-of-life and decreases hospitalisations in patients with long-term respiratory disease, but there is a 10-fold difference in the referral and completion rates. There is a four-fold variation in the numbers of sleep studies and in the CPAP provision for patients with obstructive sleep apnoea (OSA). Even DHBs with the highest rates of CPAP trials are likely to underserve their population.[22] Our data confirm previous reports of an inequitable service provision of sleep services in New Zealand: Neill et al.[23] showed an almost 16-fold variation in the provision of home NIV for patients with ventilatory insufficiency. Kelly et al.[24] showed inconsistencies in the provision of equipment and consumables, and in patient follow-up. Acknowledging that a four-month wait time for referrals triaged to be "non-urgent" is deemed to be acceptable, four several DHBs reported difficulties booking first specialist assessments and follow-up reviews with patients facing significant delays.

From a diagnostics perspective, EBUS, a key diagnostic and staging tool in lung cancer,[13] is only available in a single centre in the South Island. At least seven DHBs have no availability of bronchial provocation or exhaled nitric oxide testing, both key investigations for diagnosing airways disease. Lung cancer and airways disease represent the "bread and butter" of respiratory medicine, therefore the lack of adequate diagnostics compromises the care of many respiratory patients.

In cancer services, Quality Performance Indicators (QPI) provide some information about possible delays in the management and also about actual outcomes for patients referred for services.[15] Without such indicators it is very difficult to develop and assess improvement strategies. The authors of the 2006 study called for similar indicators for respiratory services and conditions but this never eventuated. As a consequence, little has changed now 14 years later.

The creation of MDMs for lung cancer and ILD where most cases are discussed are first steps towards ensuring greater equity of respiratory care across the nation, using a "hub and spoke" model. However, the impact on the resources of those services "hosting" MDMs has not been evaluated.

Respiratory disease affects one in six people, is responsible for one in eight hospital admissions, and it is the third leading cause of death in New Zealand.[25] Māori and Pasifika peoples are more affected and also carry a higher load of comorbidity.[26] Inequitable health outcomes remain pervasive in New Zealand including for those with respiratory conditions.[27]

Our survey indicates there is an urgent need for better integration of all respiratory services within and between districts and also between rural and urban centres. A proper evaluation of patient outcomes and service performance will be key. There is little information on services provided at the community or primary care level, or those for Māori or Pasifika peoples. The impact of the COVID-19 pandemic was not studied as the survey was completed just before the New Zealand health system was affected, but it is likely to have been significant.

The major reform and restructure of the New Zealand health and disability services[3] aimed to remove duplications in the health system, by replacing 20 DHBs with one single entity, Te Whatu Ora – Health New Zealand, alongside Te Aka Whai Ora – Māori Health Authority. The reforms were considered to have provided a real opportunity to address longstanding inequities, improve access to health services, correct the geographic variation that had characterised previous approaches, and to have ensured services in accordance with the principles of Te Tiriti O Waitangi. Key services such as respiratory services must be involved from the beginning and the learnings from the past must be included in this work.

In conclusion, the 2019/20 survey shows that despite significant advances in particular respiratory interventions, the degree of variation and inequity has not improved since a survey 14 years earlier. Performance and outcomes have not been measured adequately. It is therefore imperative that respiratory clinicians are included in nationally co-ordinated planning of future integrated and equitable services. The current COVID-19 pandemic highlights the importance of adequate, efficient and accessible respiratory services for all New Zealanders, wherever they live and whichever ethnic group they belong to. Without this input, respiratory services will not meet the increasing and complex demands on healthcare delivery, patients will be missing out, geographic and ethnic inequalities will persist, and the "postcode lottery" will not end.

COMPETING INTERESTS

Roland Meyer, Paul Dawkins, James Fingleton and Elaine Yap are members of the Executive of the New Zealand branch of the Thoracic Society of Australia and New Zealand, James Fingleton its President, and Elaine Yap its Past-President. The authors declare no conflicts of interest.

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REFERENCES

1. New Zealand Ministry of Health. Standards for adult respiratory and sleep services in New Zealand, November 2004. Available from: https://www.health.govt.nz/publication/standards-adult-respiratory-and-sleep-services-new-zealand.
2. Garrett J, Chen B, Taylor DR. A survey of respiratory and sleep services in New Zealand undertaken by the Thoracic Society of Australia and New Zealand (TSANZ). N Z Med J. 2009;122(1289):10-23.
3. Department of the Prime Minister and Cabinet. The new health system: April 2021. Available from: https://dpmc.govt.nz/sites/default/files/2021-04/health-reform-white-paper-summary-apr21.pdf.
4. New Zealand Ministry of Health. About elective services patient flow indicators. Available from: https://www.health.govt.nz/our-work/hospitals-and-specialist-care/elective-services/elective-services-and-how-dhbs-are-performing/about-elective-services-patient-flow-indicators.
5. New Zealand Ministry of Health 2010: A framework for credentialling of health professionals. Available from: https//:www.health.govt.nz/system/files/documents/publications/credentialling-framework—nz-health-professionals.pdf.
6. Thoracic Society of Australia and New Zealand: Respiratory function laboratory accreditation/ List of accredited laboratories/ New Zealand – accessed 13 June 2022. Available from: https//:thoracic.org.au.
7. Census NZ. 2018 Census results. Available from: https://www.stats.govt.nz/2018-census/?gclid=CjwKCAjwgr6TBhAGEiwA3aVuIXJ1Fbyx6-KoxBh0em-SRybZpynbVOKE7xyHxsOuws6hz0O6cR-eORoCpS0QAvD_BwE,
8. Bolton CE, Bevan-Smith EF, Blakey JD, Crowe P, et al.; British Thoracic Society Pulmonary Rehabilitation Guideline Development Group; British Thoracic Society Standards of Care Committee. British Thoracic Society guidelines on pulmonary rehabilitation in adults. Thorax. 2013;68 Suppl 2:(2)1-30. doi: 10.1136/thoraxjnl-2013-203808.
9. Community HealthPathways. from: https://www.healthpathwayscommunity.org/About.
10. Prasad JD, Mahar A, Bleasel J, Ellis SJ, et al. The interstitial lung disease multidisciplinary meeting: A position statement from the Thoracic Society of Australia and New Zealand and the Lung Foundation Australia. Respirology. 2017;22(7):1459-1472. doi: 10.1111/resp.13163.
11. Williamson JP, Twaddell SH, Lee YC, Salamonsen M, et al. Thoracic ultrasound recognition of competence: A position paper of the Thoracic Society of Australia and New Zealand. Respirology. 2017;22(2):405-8. doi: 10.1111/resp.12977.
12. New Zealand Ministry of Health -Community health transitional and support services-community oxygen therapy services- Tier level two. November 2012. Available from: https://nsfl.health.govt.nz/service-specifications/current-service-specifications/community-health-transitional-and-support.
13. New Zealand Ministry of Health National Lung Cancer Working Group. 2016. Standards of Service Provision for Lung Cancer Patients in New Zealand (2nd ed). Available from: https://www.health.govt.nz/publication/standards-service-provision-lung-cancer-patients-new-zealand.
14. New Zealand Ministry of Health. The cancer nurse coordinator initiative evaluation. 30 September 2016. Available from: https//:www.health.govt.nz/publication/cancer-nurse-coordinator-initiative-evaluation-final-report-2016.
15. New Zealand Government. Te Aho o Te Kahu – Cancer Control Agency. Available from: https://

www.govt.nz/organisations/te-aho-o-te-kahu.

16. New Zealand Ministry of Health. Guidelines for Tuberculosis Control in New Zealand, 2019. Available from: https://www.health.govt.nz/publication/guidelines-tuberculosis-control-new-zealand-2019.
17. Royal College of Physicians London. Focus on physicians: 2018-19 Census of UK consultants and higher speciality trainees. Available from: https//:rcplondon.ac.uk.
18. Australian Respiratory specialist physicians: TSANZ communication.
19. Lane ND, Brewin K, Hartley TM, Gray WK et al. Specialist emergency care and COPD outcomes. BMJ Open Respiratory Research 2018;5 (1) Available from: http://dx.doi.org/10.1136/bmjresp-2018-000334.
20. Southern DHB Annual Plan 2019/2020. Available from: https://www.southernhealth.nz/sites/default/files/2020-01/SDHB%20Annual%20Plan%202019-20.pdf.
21. Waikato DHB: Snapshot of Waikato DHB. Available from: https://www.waikatodhb.health.nz/about/snapshot-of-waikato-dhb/.
22. Benjafield AV, Ayas NT, Eastwood PR, Heinzer R, et al. Estimation of the global prevalence and burden of obstructive sleep apnoea: a literature-based analysis. Lancet Respir Med. 2019;7(8):687-98. doi: 10.1016/S2213-2600(19)30198-5.
23. Neill A. Domiciliary NIV: State of the Nation. Thoracic Society of Australia and New Zealand, Annual Scientific Meeting 1 May 2021. Available from: https://www.thoracic.org.au/events/event/tsanzsrs-annual-scientific-meeting-2021.
24. Kelly PT. Public CPAP services in Aotearoa: Is it time for system-wide standardisation. Thoracic Society of Australia and New Zealand, Annual Scientific Meeting 1 October 2021. Available from: https://www.thoracic.org.au/events/event/tsanzsrs-annual-scientific-meeting-2021.
25. Telfar Barnard L, Baker M, Pierse N, Zhang J. The impact of respiratory disease in New Zealand, 2018 update. The Asthma and Respiratory Foundation, New Zealand. Available from: https://www.asthmafoundation.org.nz/research/the-impact-of-respiratory-disease-in-new-zealand-2018-update.
26. Gurney J, Stanley J, Sarfati D. The inequity of morbidity: Disparities in the prevalence of morbidity between ethnic groups in New Zealand. J Comorbidity 2020;10:1-11. doi: 10.1177/2235042X20971168.
27. Health Quality & Safety Commission. A window on the quality of Aotearoa New Zealand ‘s health care 2019. Available from: https://www. hqsc.govt.nz> ISBN (online) 978-0-908345-94-6.

Appendix 1: DHB Respiratory and Sleep Services Questionnaire. (Reproduced as supplementary material to this publication.)

Part 1. General information

1. Which district health board do you work in?

2. Who is the clinical lead responsible for adult respriatory and adult sleep services in the DHB you work with?
   Please provide name, role and speciality below.

3. Are there any respiratory disorders included in your DHB list of health priorities?

- Yes
- No

4. Does your DHB provide adult respiratory services from more than one hospital site?

- Yes
- No
- If Yes, please list hospital sites here:

5. Please provide details of the number of FTEs in your DHB **dedicated to audit respiratory services** for the following personnel.
   Please enter your answer in tenths as a whole number i.e., 0.8FTE would be 8 tenths = enter 8.

- Respiratory Physician
- Sleep Physician
- Respiratory Nurse Practitioner
- Respiratory Nurse Specialist
- Respiratory Nurse
- Physiotherapist
- Occupational Therapist
- Smoking Cessation Practitioners
- Respiratory Physiologist
- Community Health Worker
- Social Worker
- Sleep Physiologist/Dedicated Sleep Nurse
- Health Psychologist
- Thoracic Surgeon
- Radiologist respiratory imaging
- Registrars
- Advanced Trainees
- Other

6. Does your DHB have a dedicated adult respiratory specialist service?

- Yes
- No

7. Does your DHB have a dedicated paediatric respiratory specialist service?

- Yes
- No

8. Does your DHB have a dedicated adult **acute** respiratory specialist service?
   Yes
   No

9. Does the general medical service also **provide inpatient care** for patients with acute respiratory illness?

- Yes
- No

10. Does the general medicine service provide **acute cover** for adult respiratory admissions out of hours?

- Yes
- No

11. What is the number of acute respiratory admissions under general medicine per year?

12. Does your DHB provide elective respiratory outpatient clinics?

- Yes
- No

13. What is the number of respiratory First Specialist Assessments (FSA) delivered per year?

14. What is the number of repiratory Follow Ups (FU) delivered per year?

15. Does your service use Respiratory Nurse Practitioner (NP) or Clinical Nurse Specialist (CNS) to deliver FSAs?

- Yes
- No

16. Does your DHB provide respiratory outpatient clinics on more than one site?

- Yes
- No
- If Yes, please list sites

17. Does your DHB provide any respiratory nurse led services?

- Yes
- No

18. Does your nurse led service provide any of the following services?

- OPD
- Asthma
- Bronchiectasis
- Interstitial Lung Disease
- Cystic Fibrosis
- Other (please specify)

19. Who within your DHB provides community based respiratory clinics?

- Physician
- Respiratory NP
- Respiratory CNS
- Specialty RN
- Other (please specify)

Part 2. Diagnostic procedures

20. Please indicate which of the follwoing diagnostic tests are available within your DHB:

- CTPA/HRCT
- Isotope Nuclear Medicine Scan
  PET Scan
- CT Guided Lung Biopsy
- CT or US pleural Biopsy
- Bronchial Artery Embolisation
- Bronchoscopy
- Bronchoscopic blind TBNA
- EBUS
- Bronchoscopic Transbronchial Lung Biopsy TBB
- Cryo Biopsy
- BAL for ILD
- Laser
- Large Airway Stenting
- Bronchial Valve Insertion for management of brochopleural fistula
- Bronchial Valve Insertion for brochoscopic lung volume reduction
- Medical Thoracoscopy
- Surgical Thoracoscopy
- Bedside Ultrasound for Pleural Procedures
- Cardiopulmonary Exercise testing
- Right Heart Catheterisation
- Lung Fuction Testing Including Lung Volume/DLCO
- Respiratory provocation testing
- Forced oscillation technique or other advanced lung fuction testing
- Exhaled Nitric Oxide
- Simulated altitude testing
- Induced Sputum for Tuberculosis
- Induced Sputum for Asthma

21. If your service does not provide EBUS, which district health board do you refer patients to?

22. Please indicate which of the following services are available within your DHB:

- Radiation Oncology
- Medical Oncology
- Thoracic Oncology
- Cadiology
- Allergologist/Immunologist
- Rheumatologist

23. Does your DHB provide training and credentialising in pleural ultrasound?

- Yes
- No

24. How many doctors have undergone TSANZ certification for pleural ultrasound? Provide your answer as a number e.g., 8.

25. Does your service triage brochoscopy referrals?

- Yes
- No
- If Yes, do you have wait time targets and do you meet those targets? Please comment

26. Does your DHB haev any specific respiratory partnership services between primary and secondary providers? e.g., funded spirometry and sleep testing in the community.

- Yes
- No
- If Yes, please list these services here:

27. Please indicate if your DHB provides any of the following dedicated respiratory services for **Māori** patients:

- Smoking cessation
- Asthma
- COPD
- Bronchiectasis
- Sleep apnoea

28. Please indicate if your DHB provides any of the following dedicated respiratory services for **Pacific** patients:

- Smoking cessation
- Asthma
- COPD
- Bronchiectasis
- Sleep apnoea

Part 3. Pulmonary rehabilitation

29. Does your DHB provide Pulmonary Rehabilitation?

- Yes
- No

30. Which type of programme does your DHB provide?

- Hospital Based Programme
- Community Based Programme
- Maintenance Based Programme
- Don't have any

31. If your DHB does provide a community based programme, how many community sites are there?
Please answer with a number e.g., 2.

32. Does the Pulmonary Rehabilitation sevice accept direct referrals from general practitioners?

- Yes
- No
- Not applicable as no service
- Other comments

33. Does the Pulmonary Rehabilitation service accept direct referrals from nurse practitioners and/or physiotherapists?

- Yes
- No
- Not applicable as no service
- Other comments

34. How many **referrals** in total does the Pulmonary Rehabilitation programme recieve per year? (If more than one programme type, please combine total)

35. How many patients **complete** the Pulmonary Rehabilitation programme per year? Complete is defined as equal or greater than 75% attendance.

Part 4. Domiciliary oxygen

36. In your DHB, how many adult patients are recieving community oxygen services?

37. In your DHB, how many adult patients are recieving long-term oxygen therapy (LTOT)?

38. How many adult patients are using portable oxygen?

39. Are the TSANZ guidelines and Ministry of Health specifications applied when oxygen is prescribed?

- Yes
- No
- Not sure

40. Is there a dedicated adult oxygen service physician?

- Yes
- No

41. Who can prescribe or approve Domicilary Oxygen?

- Respiratory SMO only
- Respiratory and General Medicine SMOs
- Palliative Care Specialist
- General Practitioner
- Respiratory Nurse Practitioner or Nurse Prescriber

42. Do adult oxygen patients have a specialist review annually?

- Yes
- No

43. If adult patients do have a specialist review annually, who provides this review?

- Physician
- Respiratory NP/CNS
- Respiratory RN

44. If adult patients **do not have** a specialist review annually, who assesses the patient?

- District Nurse
- General Practitioner
- Other comment (e.g., don't know)

Part 5. Sleep related breathing disorders

45. Does your DHB have a sleep laboratory?

- Yes
- No

46. If there is no sleep laboratory where do you refer patients to?

- The DHB contracts with private provider
- The DHB refers to another DHB
- No service at all

47. Does your sleep laboratory also undertake Paediatric sleep studies?

- Yes
- No
- Not sure

48. Please provide the number of tests for adult patients per category per year:

- PSG/MSLT
- Level 3
- Level 4 e.g., Oximetry Only
- tC02 monitoring

49. Please provide the number of adult patients treated for the following categories:

- CPAP New Patient (per year)
- CPAP Long-Term follow-up
- BiPAP for neuromuscular disease
- BiPAP for sleep disordered breathing
- BiPAP for other conditions
- ASV for sleep disordered breathing/central sleep apnoea

50. Please provide the number of paediatric patients on a NIV/PAP machine

51. Does your DHB provide new CPAP patients with a CPAP machine?

- Yes
- No
- Comment:

52. Do CPAP patients have a scheduled hospital based annual review?

- Yes
- No

53. Does your DHB gift the CPAP machine to the patient?

- Yes
- No
- Not sure

54. Does your DHB provide replacement parts (mask, tubing etc.) for the patient's CPAP machine?

- Yes
- No
- Not sure

55. Does your DHB provide replacement parts (mask, tubing etc.) for the patients with BiPAP/VPAP/ASV machines?

- Yes
- No
- Not sure

56. Does your DHB fund sleep studies provided in the community, either in general practice or at another community base?

- Yes
- No
- If Yes, how many per year?

Part 6. Non-invasive ventilation

57. Does your DHB provide non-invasive ventilation (NIV) treatment for patients with neuromuscular disorders, congenital conditions such as Duchenne myopathy or conditions such as motor nuerone disease?

- Yes
- No

58. Does your DHB provide non-invasive ventilation (NIV) for patients with chronic hypercapnic respiratory failure?

- Yes
- No

59. Does your DHB provide inpatient NIV for patients with acute respiratory failure?

- Yes
- No

60. Who provides this service?

- Emergency Department
- General Medicine
- Respiratory Medicine
- Intensive Care
- High Dependency Unit

61. Is there a lead respiratory physician for the acute NIV service?

- Yes
- No
- Not sure

62. Is this service audited?

- Yes
- No
- Not sure

63. When acute NIV is initiated in a general ward, what is the usual nurse to patient ratio?

- 1:1
- 1:2
- 1:4
- Not sure
- No policy

Part 7. Adult respiratory outpatient services

64. Does your DHB count general respiratory and sleep related referrals separately?

- Yes
- No

65. Please provide annual volumes for adult **general** respiratory outpatient services for the following:

- First Specialist Assessment (FSA)
- Follow-Up Appointments (FU)
- Non Face-to-Face FSA

66. Please provide annual volumes for adult **sleep** outpatient services, for the following:

- First Specialist Assessment (FSA)
- Follow-Up Appointments (FU)
- Non Face-to-Face FSA

67. Does your DHB use formalised triage prioritisation criteria for general respiratory referrals to the outpatient service?

- Yes
- No
- Not sure

68. Does your DHB use specific triage prioritisation criteria for sleep related breathing disorder referrals?

- Yes
- No
- Not sure

69. If Yes, please specify:

70. Does the respiratory service meet the Ministry of Health waiting time requirements – i.e., is the respiratory service Elective Services Patient Flow Indicator (ESPI) 2 compliant with no patients waiting longer than four months for a general respiratory FSA?

- Always
- Usually
- Sometimes
- Rarely

- Never

71. Does the respiratory service meet the Ministry of Health waiting time requirements – i.e., ESPI 2 compliant with no patients waiting longer than four months for a sleep related disorder FSA?

- Always
- Usually
- Sometimes
- Rarely
- Never

72. Has your DHB adopted HealthPathways?

- Yes
- No

73. Is HealthPathways uesed the respiratory service referral and triage process?

- Yes
- No
- Not sure

74. Does the respiratory service **reject any general respiratory** referrals?

- Yes
- No
- Not sure
- If answered Yes, list some examples of why a referral many be rejected:

75. Does the respiratory service **reject any sleep disorder** referrals?

- Yes
- No
- Not sure
- If answered Yes, list some examples of why a referral many be rejected:

76. For urgent respiratory FSAs do you see patients within two week?

- Always
- Usually
- Sometimes
- Rarely
- Never

77. For semi-urgent respiratory FSAs do you see patients within six weeks?

- Always
- Usually
- Sometimes
- Rarely
- Never

78. For routine respiratory FSAs do you see patients within four months?

- Always
- Usually
- Sometimes
- Rarely
- Never

79. For respiratory follow-up appointments do you see patients within the expected timeframe?

- Always
- Usually
- Sometimes
- Rarely
- Never

80. When booking follow-up appointments, do you use the acuity index?

- Yes
- No
- Not sure

Part 8. Credentialing and accreditation

81. Has your adult respiratory service undergone external credentialing?

- Yes
- No
- Not sure
- If Yes, please indicate which year the credentialing took place

82. Has your respiratory laboratory undergone TSANZ accreditation?

- Yes
- No
- Not applicable (don't have a respiratory laboratory)
- If Yes, please indicate which year the accreditation took place.

83. Has your sleep laboratory undergone Australian Sleep Association (ASA)/ Australian National Association of Testing Authorities (NATA) accreditation?

- Yes
- No
- Not applicable (don't have a respiratory laboratory)
- If Yes, please indicate which year the accreditation took place.

Part 9. Multidisciplinary team meetings

84. Does your DHB conduct multidisciplinary team meetings (MDM) for **lung cancer**?

- Yes
- No
- If Yes, please state how often these meetings are held e.g., weekly, fortnightly etc.

85. Does your DHB lung cancer MDM discuss patients from other DHBs?

- Yes
- No
- Not applicable (don't have one)
- If Yes, please specify which DHB's

86. If your DHB **does not** have a **lung cancer MDM**, do you refer your patients for case discussions to a larger centre MDM?

- Always
- Usually
- Sometimes
- Rarely
- Never

87. Does your DHB conduct multidisciplinary team meetings for **interstitial lung disease**?

- Yes
- No
- If Yes, please state how often these meetings are held e.g., weekly, fortnightly etc.

88. Does your DHB **interstitial lung disease MDM** discuss patients from other DHBs?

- Yes
- No
- Not applicable (don't have one)
- If Yes, please specify which DHB's

89. If your DHB **does not** have an interstitial **lung disease MDM**, do you refer your patients for case discussions to a larger centre MDM?

- Always
- Usually
- Sometimes
- Rarely
- Never

Part 10. Subspecialist respiratory services

90. Does your DHB conduct subspecialist clinics for adult **cystic fibrosis** patients?

- Yes
- No

91. If Yes, do you accept patients from other DHBs?

- Yes
- No

92. If Yes, please list the DHBs.

93. If your DHB **does not** have a subspecialist service for adult **cystic fibrosis** patients, do you refer your adult patients for reviews at a larger centre?

- Always
- Usually
- Sometimes
- Rarely
- Never

94. Does your DHB conduct subspecialist clinics for **pulmonary artery hypertension** patients?

- Yes
- No
- If Yes, do you accept patients from other DHBs?

95. If your DHB **does not** have a subspecialist service for **pulmonary artery hypertension** patients, do you refer your patients for reviews at a larger centre?

- Always
- Usually
- Sometimes
- Rarely
- Never

96. Does your DHB conduct subspecialist clinics for **interstitial lung disease** patients?

- Yes
- No
- If Yes, do you accept patients from other DHBs? Please list the DHBs.

97. If your DHB **does not** have a subspecialist service for **interstitial lung disease** patients, do you refer your patients for reviews at a larger centre?

- Always
- Usually
- Sometimes
- Rarely
- Never

A health sector response to the commercial determinants of health

Sarah Sharpe, Karen McIlhone, Summer Hawke, Shanthi Ameratunga

ABSTRACT

AIM: To develop and apply a theoretical framework to assess the rigour of a district health organisation's response to the commercial determinants of health (CDoH).

METHODS: The multi-method study incorporated literature reviews of CDoH strategies and ways in which organisations can respond; policy document review; and 12 qualitative, semi-structured, key informant interviews.

RESULTS: A theoretical framework was developed summarising CDoH and potential responses. The organisation has relevant policies, including those concerning corporate relationships and conflict of interest; however, there are opportunities to strengthen policy content and processes. Key themes were identified based on key informants' perceptions: 1) disconnect between community impacts of harmful commodities and awareness/action on CDoH drivers of these impacts; 2) power imbalance between harmful commodity industries and communities; and 3) need for a robust, values-based, Tiriti-aligned response to CDoH.

CONCLUSIONS: The health sector has an important role to play in redressing the power imbalance between harmful commodity industries and communities. Responses include: raising awareness about CDoH; strengthening policies related to interactions with corporations, and in particular considering alignment of values; supporting community actions; and advocating for legislative changes which restrict the power of harmful industries and support healthy environments and communities.

The large losses and inequities in health and wellbeing due to harmful commodities such as tobacco, alcohol, unhealthy food and beverages, and gambling products are well-established.[1–5] Acknowledging the sophisticated means by which industries producing these commodities exploit consumers, and the political economy of globalisation, Kickbusch et al. define the term "commercial determinants of health" (CDoH) as "*strategies and approaches used by the private sector to promote products and choices that are detrimental to health*".[6] Through CDoH, corporations exert power and influence by shaping the societal norms and environments in which people live, grow up, work, play and socialise.[7,8] Harmful products are normalised and consumer choices are shaped for the benefit of corporate profits. Along with the socio-economic determinants of health, racism and colonisation, CDoH are important upstream drivers of health loss and inequities in New Zealand.

The health sector has an important role to play in reducing and preventing the influence and impact of CDoH. The final report of the New Zealand Health and Disability System Review states: "*there is a need for much more concerted action at national, regional and local levels to address the CDoH*".[9] Responding effectively to the CDoH can help achieve the aims of the New Zealand public health system, i.e., to protect, promote and improve the health of all New Zealanders; to achieve equity in health outcomes among New Zealand's population groups; and to build towards pae ora (healthy futures) for all New Zealanders.[10]

Given a lack of guidance on how the health sector can effectively address the CDoH, the aim of this study was to develop and apply a theoretical framework to assess the rigour of a district health organisation's response to CDoH.

Methods

The multi-method study was conducted in 2021 at Counties Manukau Health (CM Health) in three phases, guided by the Institute for Health Improvement's "Plan-Do-Study-Act" cycle.[11] In Phase one ("Plan"), a theoretical framework was developed describing CDoH and how to respond, based on two focused literature reviews and applying principles of Te Tiriti o Waitangi—the Treaty which established the relationship between Māori, the Indigenous people of New Zealand, and the British Crown. Phase two ("Do") involved using the framework to assess CM Health's response to CDoH based on policy document review and perspectives of key informants. In Phase three ("Study"), the framework was refined and recommendations for strengthening the response, in a future "Act" phase, were formulated.

The first literature review aimed to summarise key CDoH mechanisms and strategies. Publications were included in the review if they included a conceptual theory or framework describing what CDoH are and how they exert influence. General background or discussion articles were excluded. MEDLINE electronic database was searched using the search terms "commercial or corporat* AND determinant* AND health or disease*", and was limited to English language publications from 2000 to May 2021. Grey literature (using Google) and snowball searching was conducted. Data from included articles were summarised in table and narrative form. Key aspects of interest included definition of CDoH, type of evidence, mechanisms of influence, and outcomes.

The second literature review aimed to summarise evidence about how health sector organisations can respond to CDoH. A relevant scoping review by Mialon and colleagues published in 2020[12] identified ways to manage the influence of CDoH in the context of public health policy, research and practice. The search strategy in this article was replicated for the period 2019–2021. Expert advice was sought, and Google searching carried out to identify relevant grey literature. Data were summarised in table and narrative form, with a focus on recommended mechanisms, relevant to the health sector, for responding to CDoH.

For the document review, the CM Health intranet, including the document directory and department pages, was searched for relevant policy, procedure and guideline documents. Documents were reviewed against the "response" section of the framework (shown in Figure 1).

Next, a qualitative study explored the perspectives of three key stakeholder groups: CM Health employees, academics/experts on the topic, and people in community organisations. The 12 participants, recruited through a purposive sampling strategy, included four Māori and three Pasifika participants. The sample size was chosen for pragmatic reasons, and the concept of data saturation was not deployed in this study.[13] Participants were provided with a participant information sheet and gave written, informed consent. Semi-structured interviews (conducted by KM) were audio-recorded and later transcribed by a commercial transcription service. Topics explored were outlined in an interview guide and included: 1) perceptions of the visibility of CDoH; 2) perceptions of the current response to CDoH; 3) suggestions for how CM Health could strengthen the response; and 4) thoughts and feedback on the theoretical framework under development. Thematic analysis of data (KM and SS) used a constructivist approach[14] and involved close reading of transcripts, coding of text, categorisation of codes and interpretation of ideas, comparison within and across key stakeholder groups, and development of themes.

Ethics approval was granted by the Auckland Health Research Ethics Committee (reference AH21918) and locality approval by the CM Health Research Office.

Results

Phase 1: development of theoretical framework

This section describes findings from the literature reviews that, together with application of Te Tiriti of Waitangi principles and refinement based on input from key informants, resulted in the framework shown in Figure 1.

Literature review: key CDoH mechanisms and strategies

Of 678 records identified, 28 were potentially relevant based on abstracts, and full texts were reviewed. Nine articles fulfilled the eligibility criteria and were included in the review (Appendix 1).[6,15–22] All articles were descriptive in nature, included conceptual frameworks, and acknowledged impacts and consequences of CDoH. Outcomes described were broad and included political, cultural, social, environmental and health effects. Two articles took a nuanced approach to outcomes, allowing recognition of both positive and negative impacts by corporations.[16,18]

In general, articles described CDoH as being enmeshed within broad political, economic and regulatory environments, allowing CDoH to operate and promote corporate growth.[6,15,16,18–20] Four articles explored the concept of power, which was described as influencing decision making in three ways: 1) direct influence in decision making; 2) indirect influence on agenda setting and limiting choices (e.g., keeping controversial topics off the agenda); and 3) invisible power i.e., shaping public opinion and influencing norms and ideas.[15,18–20] Two articles described broad "vehicles of power" through which harmful commodity industries exert their influence: political environment, preference shaping, knowledge environment, legal and extra-legal environment.[15,19] Overall, the power exerted by corporations was described as prevailing over public health governance and regulatory measures.[6,15,16,18,20]

Five articles described specific strategies used by industries.[6,15,16,18,20] Strategies included: participation in decision making and lobbying;[6,15,16,18,20] marketing and advertising to enhance the appeal of harmful commodities, and shaping the broader narrative about their acceptability and normalisation of consumption in everyday life;[6,15,16,18,20] product modification and extensive supply chains;[6,15,16,18,20] corporate social responsibility practices to enhance public perceptions of corporations, while allowing marketing to be delivered;[6,15,16] sponsorship/donations, funding of research and medical conferences/education to enable corporate control over decision making and the research process;[15,16,20] and revolving door arrangements (where an individual moves between the commercial and public sectors, bringing their influence into their new position or gathering confidential information to take back to the industry) as a means to exert influence.[15,18]

Literature review: response to CDoH in healthcare organisations

No relevant articles were found in the updated search (2019–2021). In addition to Mialon et al,[12] two journal articles[23,24] and two World Health Organization (WHO) documents (i.e., Framework Convention on Tobacco Control[25] and Framework for Engagement with Non-state Actors[26]) were identified through grey literature searching (Appendix 2). Key points summarising how health organisations can effectively respond to CDoH were incorporated into the framework (Figure 1).

Te Tiriti o Waitangi

Application of Te Tiriti o Waitangi is fundamental to responding to CDoH in New Zealand. The first iteration of the theoretical framework was guided by the Hauora principles—tino rangatiratanga, partnership, active protection, equity, and options.[27,28] We envisioned these principles being applied across the five "response" actions, ensuring shared power in active pro-equity decision making about responses to CDoH.

Phase 2: assessment of CM Health's response to CDoH

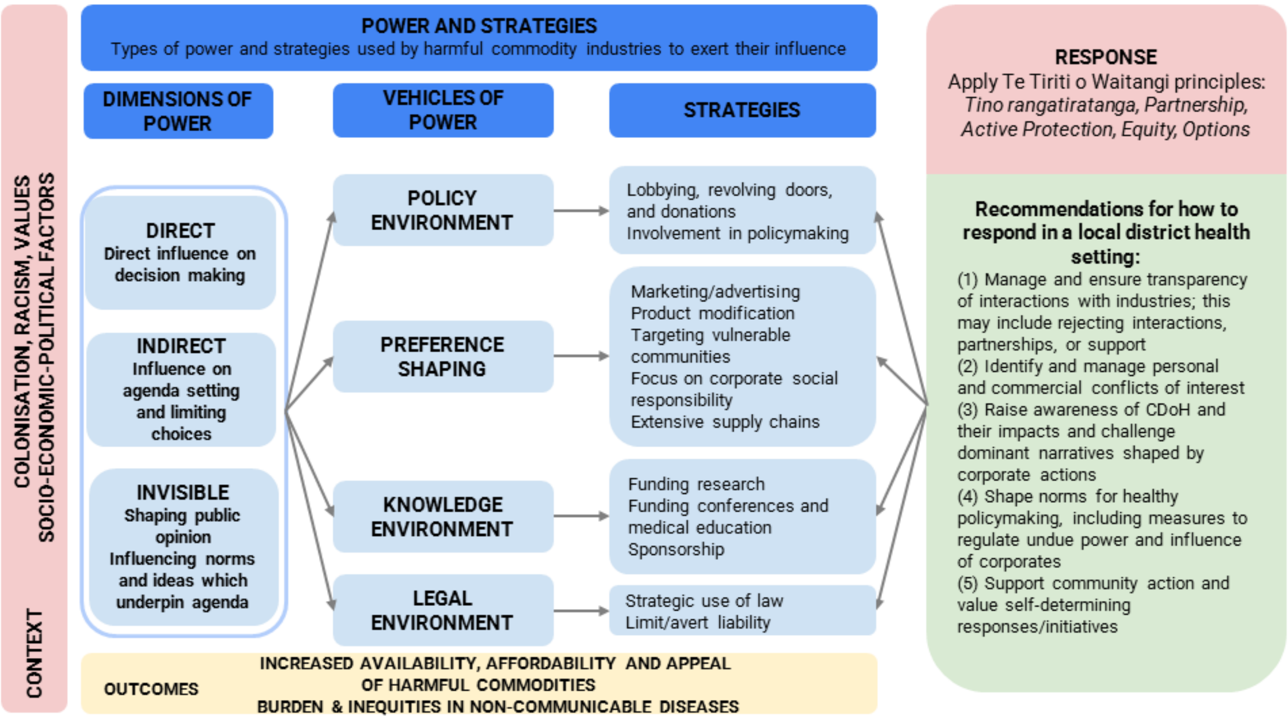
Collectively, the policy document review and stakeholder interviews provided a multi-faceted overview of CM Health's response to CDoH.

Policy document review

CM Health has a suite of policies (see Table 1) that guide management—including decision making and transparency—of corporate interactions and conflict of interest (COI). The organisation applies the State Services Commission Code of Conduct[29] and has a code of conduct policy that applies to all employees.

A comprehensive COI policy provides guidance on the identification, disclosure, and management of COI and aims to "*protect the integrity of CM*

Figure 1: Framework summarising commercial determinants of health and how to respond in a local district health setting.



Health and its employees by helping to ensure that employees perform their duties in a fair and unbiased manner and that decisions are made unaffected by private interests or personal gain". COI is also considered in other policies related to human resources, procurement processes and research. COI and gift registers are maintained by departments.

The Corporate Relationships Policy outlines principles and considerations when establishing relationships with external organisations. It states that "*associations should be avoided with external organisations whose values, practices, products, or branding are or appear to be in conflict with the stated vision, aims, objectives or policies of CM Health.*"

A range of policies address the impacts of harmful commodity industries and support healthy environments. CM Health has a smokefree policy (which includes vaping), an alcohol position statement, and follows the National Healthy Food and Drink Policy.

This policy review did not find specific documentation of responses to CDoH which apply Te Tiriti o Waitangi.

Thematic analysis of key informant interviews

Three themes were developed based on interpretation of interviewees' perceptions of the current situation (including visibility of CDoH and responses to CDoH) and opportunities for strengthening the response. Code categories and quotes that illustrate meaning are described in Tables 2, 3 and 4.

Theme 1: disconnect between community impacts of harmful commodities and awareness/action on CDoH drivers

Key informants described high visibility of adverse health outcomes and experiences of harm. They expressed frustration and anger at the injustice of the current situation, and they perceived the health system (as well as the public sector and Government more broadly) as failing people and communities, particularly Māori, Pasifika, and socio-economically deprived communities. Despite the scale of impacts, it was felt that CDoH as drivers of harm are not acknowledged or well understood. It is paradoxical that CDoH are "invisible" due to normalisation in society when they appear to be everywhere once you become more aware of them: *"how can you not see it? It's just so everywhere"* (Community member, #12). We need to increase awareness and recognise *"that commercial determinants are key drivers of ill health…it's just as important as recognising the broader social determinants [of health]"* (Topic expert, #5).

Theme 2: power imbalance between harmful commodity industries and communities

Participants spoke about corporates having large resources and influence, including in the political sphere. In comparison, people across communities and the health sector have shared concerns about "fighting" against many barriers and change being hard and slow, despite much effort. One participant described how it felt coming before a District Licensing Committee to object to an alcohol licence application: *"I got absolutely slaughtered by lawyers representing the applicant…it was like community objectors were nothing more than a hindrance"* (Community member #8). A common perspective among participants was that the power of corporates who sell harmful products should be restricted and that CM Health could do more to contribute to this, both locally—e.g., improving healthy food choices in the hospital—as well as nationally, by advocating for stronger regulations of harmful products.

Theme 3: need for a robust, values-based, Tiriti-aligned response to CDoH

All participants thought that while CM Health was responding well in some regards (e.g., implementing the National Healthy Food & Beverage Policy), the overall response to CDoH needs to be strengthened, within the organisation as well as more broadly in the public sector and Government. Decisions should be based on our values, with Te Tiriti o Waitangi as the foundation and health and wellbeing as key priorities. It is important to consider the alignment (or not) of values when engaging with corporate entities and to ensure transparency of interactions and identification of COI. Community participants strongly supported the need to value knowledge and initiatives of community and population groups, including Māori, Pasifika and young people, and to collaborate for greater collective impact.

Phase 3: refinement of framework and next steps

The framework was refined based on testing it with, and feedback from, key informants. Overall, they strongly supported the concept and thought it was important to assess and address the health sector response to CDoH. There was broad support for the proposed descriptions of how Te Tiriti o Waitangi would apply in this setting.

Table 1: Summary of relevant policies identified in the document review.

Document name	Key points relating to responses to CDoH
Code of Conduct	Outlines the standards of behaviour and performance expected of employees in order to achieve CMDHB's Vision and Values. Employees must "behave in accordance with our shared values."
Effective Decision Making Manual	Describes decision making procedures and processes for management and executive oversight. Outlines the executive structure of decision making including the functions, responsibilities and accountabilities of the Board and Executive. Outlines how decisions are made. Effective process and transparency are important, including applying accepted practices to manage COI and applying the State Sector Code of Conduct.
Conflict of Interest	Applies to staff and contractors, and covers commercial transactions, recruitment, clinical research, and funding. Describes actual, perceived, and potential conflicts of interest and outlines ways in which these could occur and options for dealing with them. COI is defined as "when it is likely that an employee could be influenced or could be perceived to be influenced by a personal or private interest in any transaction whilst carrying out their responsibilities". Personal and private interests are interpreted broadly, and COI may exist in a range of situations, e.g., if an employee is a member of, or has an affiliation with, an organisation/group that stands to lose or gain from the matter, or if an employee is not able to act impartially and in the public interest.
Gifts, Donations and Sponsorship	The receipt of gifts, donations, and sponsorship must be carefully reviewed, and risks considered, including whether it aligns with CM Health's objectives, functions, and values. Consideration should be given to whether the party making/offering the gift, donation, or sponsorship has or appears to have values, practices, products, or branding which are in conflict with the vision, objectives, or policies of CM Health.
Recruitment	Applicants must declare potential or actual conflict of interest situations. "Revolving door" issues are not considered in the policy.
Discipline & Dismissal	Includes as examples of "*serious misconduct*": accepting gifts/payments while representing CM Health (without proper authorisation), breach of code of ethics, failure to declare conflicts of interest, gambling on CM Health grounds without prior authorisation, unauthorised disclosure of information relating to Counties Manukau DHB as a business.
Northern Region Procurement	Procurement process follows national "government rules of sourcing" and "principles of government procurement" which have a standard conflict of interest policy and ensures procurement processes follow the objectives outlined in the NZ Public Health & Disability Act.
Engagement of Contractors/ Consultants	Follows the same principles as procurement policy. Includes section on equity—contractors must "have the skills and experience required to contribute to Counties Manukau Health's equity goal".
Research Policy	States all research involving CMDHB patients, patient records/information, facilities, resources or staff must have the appropriate ethical and other regulatory approvals in place and throughout the duration of the study. These processes review funding sources and conflicts of interest. Policy notes that it is important that transparency exists in managing funding received for supporting research activity.

Table 1 (continued): Summary of relevant policies identified in the document review.

Document name	**Key points relating to responses to CDoH**
Corporate Relationships	Guiding principles: a) relationships should assist CM Health to achieve its statutory objectives and functions, and support CM Health to realise its visions, values, goals, and planned activities; b) associations should not compromise CM Health's integrity or reputation; c) relationships are to be entered into in a transparent and fair manner; d) relationships should not unduly affect CM Health's impartiality or objectivity; e) relationships should not unduly prevent CMDHB from entering into relationships with other similar organisations; f) associations should be avoided with external organisations whose values, practices, products or branding are, or appear to be, in conflict with the stated vision, aims, objectives or policies of the DHB—this is likely to include (but is not limited to) situations where the proposed sponsor or associated party, product or service is strongly linked to the gambling industry, the production, sale or promotion of tobacco or alcohol, the production, sale or promotion of food or beverages where the overall or specific approach is in conflict with nutrition messages promoted by CM Health, health products whose use is not endorsed by CM Health (e.g., un-researched medicines or devices).
Smokefree	States that all Counties Manukau Health employees, patients and whānau, visitors, volunteers, contractors, and all others accessing Counties Manukau Health grounds and facilities are prohibited from smoking or vaping. Tobacco products are prohibited from being sold and accepted as gifts.
Reducing harms from alcohol in our communities	Position statement which supports: 1) evidence-based strategies that equitably prevent and reduce alcohol-related harm including restricting the availability of alcohol, increasing the minimum legal purchase age, increasing the price of alcohol, reducing alcohol advertising, promotion and sponsorship, and drink driving countermeasures. 2) equitable access to high quality and culturally appropriate healthcare services including assessment for alcohol use, brief and early intervention, and referral to treatment when indicated. 3) improving and refining information on alcohol use and alcohol related harm in the Counties Manukau region. 4) research and evaluation to ensure interventions for alcohol-related harm are effective and equitable.
National Healthy Food and Drink Policy, 2nd edition	Developed by the DHB Healthy Food and Drink Environments Network. Outlines a traffic light system which ensures organisations and their contracted health service providers (with a healthy food and drink contract clause) promote an environment that consistently offers and promotes healthy food and drink options for staff, visitors, and the general public visiting CM Health. This policy has been included in contractual requirements for food vendors at CM Health and has been largely implemented.
Staff Consumption of Alcohol at Special Events	Staff consumption of alcohol at special events at CM Health sites is prohibited unless exemption granted by CEO.
Preventing Alcohol and other Drug use within Mental Health Services	Mental Health wide policy: alcohol and or other drug use are prohibited on all CM Health properties. All staff have the responsibility to prevent entry of alcohol or drugs to inpatient areas.

Table 2: Theme 1 code categories with supporting quotations.

Theme 1: disconnect between the community impacts of harmful commodities and awareness/action on CDoH drivers	
Code category	**Quotations from key informants**
High visibility of adverse health outcomes and inequities due to tobacco, alcohol, and poor nutrition	"*Come and sit in our waiting room as a fly on the wall and…watch what happens here…it's pretty ghastly…the younger and younger people with more and more severe disease*." (DHB employee, #2) "*All our negative statistics are going up whether it's type 2 diabetes, cardiovascular disease, tooth decay…it's commercially driven, the industry have an open slather*." (Topic expert, #10) "*You only need to walk across the road…to see the effects of alcohol and drugs in our community…it's a normality, people aren't scared of people you know because it's normal to see a drunk person every day*." (Community member, #11)
Normalisation and ubiquity of harmful products in everyday community life	"*It's so normal and so accessible and so easy and so cheap to feed yourself on KFC or whatever as opposed to decent food*." (DHB employee #2) "*Kids have to walk past bottle stores and all their signs to get to school and then they have to pass them on the way back.*" (Community member, #8) "*There's a liquor store at every dairy…off the top of my head I can already count four or five, next to every liquor store is a bakery, cheap, very cheap, and then you've got your dairy with the dollar drinks, the fizzies. So, I almost feel like it's set up…it's very much set up in a way to ensure that that's the norm for you*." (Community member, #12)
Community experiences of racism, colonisation, and targeting by harmful commodity industries	"*Unhealthy commodities have bombarded our community, where a lot of Pacific people are in South Auckland*." (Community member, #1) "*I think there is racism with the way decisions are made…particularly in South Auckland with alcohol shops being put in places of Māori communities and neighbourhoods of deprivation, bad kai in those places as well*." (Topic expert, #4) "*What Māori are experiencing today is certainly no different to what our tūpuna, our ancestors, experienced with the availability of alcohol, the harm it was having on the people and the community, and it was just a carry on, it was an ongoing story, the unfortunate thing is that it's got worse*." (Community member, #8)
Response to CDoH is failing	"*Some attempts have been made, but it's not nearly as organised and focused as it should be for an institution like ours. We invest enormous amounts of money into fire brigades and hoses and people with hard hats and jackets and training for those people, but we do nothing about the arsonists who have set fire to everything*." (DHB employee, #2) "*We're failing dismally not just as the DHBs but also as a government as a whole…nothing is proactive*." (Topic expert, #10)
Low awareness and understanding of CDoH as drivers of harm	"*I don't think people think about it. Some people might know but probably don't really think what does it mean? And there would be a lot of people that are just totally unaware*." (DHB employee, #3) "*I think it's missed. I think it's really obvious to people when they are asked to think about it*." (Community member, #11)

Table 3: Theme 2 code categories with supporting quotations.

Theme 2: power imbalance between harmful commodity industries and communities	
Code category	**Quotations from key informants**
Corporates have large financial resources	“*There’s an imbalance in the power and I go back to the alcohol industry in particular, they are so wealthy, they have so much money to throw around, and in comparison, our communities, they’re just not comparable*.” (Topic expert, #5) “*They’ve got so much money; they’ve got the time and the lawyers*.” (Community member, #12)
Corporate influence	“*The commercial interests have had this [power and influence] all to themselves for so long…they are actually organised strategically about keeping it to themselves.*” (DHB employee, #2) “*Industries are more and more engaging in the political space*.” (Topic expert, #5)
Community effort in the face of barriers	“*We are outnumbered*.” (Community member, #1) “*All of the liquor stores everywhere and to get rid of them takes so much effort…it’s so hard and so expensive and so long and so difficult*.” (Topic expert, #6) “*It’s really difficult going against those kind of huge monsters*.” (Community member, #11)
DHB effort, but more action needed	“*It’s really difficult to get them [retailers] on board and keep them on board…just really hard work [regarding implementing healthy food policy in the hospital]*.” (DHB employee, #3) “*I think there is a movement in the right direction like removing the sugary drinks and chips and chocolate things from the vending machines and also being more mindful about what our cafes serve to people, like healthy food options…but there’s still lots more work to be done*.” (DHB employee, #7)
Need to restrict power of corporates who sell harmful products	“*There are companies that do have good [food] product, but they are just not there in the forefront. It would be really good to see them up there*.” (DHB employee, #3) “*There should be restrictions on the power industries have on agenda setting*.” (Topic expert, #5) “*The health sector could do a lot more in terms of influencing law and policy*.” (DHB employee, #7)

Table 4: Theme 3 code categories with supporting quotations.

Theme 3: need for a robust, values-based, Tiriti-aligned response to CDoH	
Code category	**Quotations from key informants**
Values in decision making (links with all code categories below)	"*We've got to make hard choices guided by our values…and be informed by more than short term [thinking].*" (DHB employee, #2) "*Values determine how decisions are made, and who is valued in society and who isn't…and so in that space it is all [about] discrimination, it's sexism, ageism, racism.*" (Topic expert, #4) "*I think it's about ensuring that whoever is making decisions is fully aware of the impact that the decision has on Pacific and Māori people.*" (DHB employee, #9)
Te Tiriti o Waitangi as foundation of response to CDoH	"*I think it would be good to look at those values which currently undermine decision-making and then looking at tino rangatiratanga and whānau being able to self-determine responses.*" (Topic expert, #4) "*For me, Te Tiriti underpins all… [regarding alcohol licencing] I would like to see partnerships where Māori have equal input into decision making.*" (Topic expert, #5) *"I will not accept Pākehā speaking for Māori because that's my mana, that's the mana of Māori…you should not speak for me or my people because what you're doing is you're claiming my mana.*" (Community member, #8)
Address discrimination	"*Are we able to demonstrate in the decision making that this is anti-racist and that we've got a good policy-making environment?*" (Topic expert, #4) "*Children they're like a sponge and they see everything and soak it in. They're walking to school, alcohol, cheap on sale…it's set up…my partner and I we start getting mad, we want to leave just to give our kids a better chance but then at the same time, they should be getting the best chance here.*" (Community member, #12)
Transparency in interactions with industries	"*Transparency is needed…identifying the relationship and making it transparent and then having agenda setting clearly outlined so you can identify if this relationship is not going to support the agenda that we've agreed to then that's a conflict of interest.*" (Topic expert, #5) "*[Regarding transparency] …even though in the DHB we have processes I know there are things that fall through the cracks…I wonder whether we can introduce this at the welcome so from the get-go as a staff member you know your expectations and where your organisation stands, with partnerships.*" (DHB employee, #9)
Value and support community knowledge and initiatives	"*Put more money to where the resources are, and the resources are in the communities, because they know the right solutions for their own communities…they can tell you the right strategy that works for them.*" (Community member, #1) "*We want people to feel strong and healthy and empowered and in control.*" (Topic expert, #6)
Co-ordination and collaboration	*"Imagine if, on an organisational level, everyone had an understanding about this and had a drive to make change, it would be pretty impressive what we could do."* (DHB employee, #7) "*We need to come together and we need to speak with one voice, then we're going to have impact.*" (Community member, #8) "*What does partnership look like in terms of the community? Is it ngā mahi ngātahi? What does that look like?*" (Community member, #8)

The approach, initially developed based on the Waitangi Tribunal Hauora report and the guidance on incorporating Te Tiriti o Waitangi into the health system from the Ministry of Health,[27,28] was further developed based on feedback. Interviewees highlighted the broader context of colonisation and racism leading to unequal treatment by unhealthy commodity industries, and this was incorporated into the framework (Figure 1).

Next steps supported by the literature and recommended by key informants included: raising awareness within CM Health and the community of the CDoH and the impact of harmful commodity industries; strengthening organisational policies relevant to CDoH including those related to interactions with harmful commodity industries and ensuring alignment with Te Tiriti o Waitangi; developing an organisation-wide position statement on CDoH; reviewing and strengthening COI policies, supporting community initiatives and action; and working collaboratively with others towards evidence-based policy and legislation which support healthy environments.

Discussion

This paper describes the development and use of a theoretical framework for assessing a health organisation's response to CDoH. The framework describes the strategies used by harmful commodity industries and how to respond to these, in the context of a health organisation setting. Assessment of CM Health's response to CDoH through policy document review and key informant interviews found that although there are many relevant policies, including those concerning corporate relationships and COI, there are opportunities to strengthen the content of policies (e.g., alignment with Te Tiriti o Waitangi) and processes involved in implementing them (e.g., raising awareness about them and increased transparency of their application). Three key themes were identified based on key informants' perceptions of the current response and opportunities for strengthening the response: 1) disconnect between community impacts of harmful commodities and awareness/action on CDoH drivers; 2) power imbalance between harmful commodity industries and communities; and 3) need for a robust, values-based, Tiriti-aligned response to CDoH.

From one iteration of using the framework, it appears it is able to be practically applied. However, our experience is that, in isolation, a document review is unlikely to provide a complete view. We think policy review should ideally be combined with key informant interviews to provide a more complete assessment of a health organisation's response to CDoH.

Strengths of this research include its basis in theory and evidence related to CDoH, and the use of a range of methods (i.e., literature review, document review and key informant interviews) that were appropriate for the research aim and exploratory nature. Key informant interviews provided rich data for thematic analysis, including from Māori and Pasifika participants, whose inclusion was prioritised in the purposeful sampling method.

There are also some limitations with this study. Firstly, for practical and resourcing reasons, the scale of the study was small, involving focussed literature reviews and a relatively small number of key informants. The document review considered policies, but not processes related to them such as implementation. This was mitigated by seeking input on policy process aspects from key informants. Secondly, the authors acknowledge that in qualitative analysis there is the potential for bias due to framing and interpretations that are shaped by the researchers' assumptions, experiences, and personal beliefs,[30] and that a different interpretation and development of key themes may have occurred if undertaken by different researchers. Research rigour could have been improved by involving more people in the research process and incorporating formal research reflexivity practices. Thirdly, although it was possible to get valuable insights by its application in one organisational setting, the framework should be considered as developmental, and would benefit from further testing and refinement.

CDoH as a field of global health research has expanded over the last decade and has mostly focussed on the drivers and mechanisms through which corporations exert their influence. As described earlier in the results section, just a small number of published papers address how to respond to CDoH, and there is a gap in research and guidance about responding at a local, organisational level. The authors are not aware of other published literature exploring this concept in a health organisation setting. The global Governance, Ethics, and Conflicts of Interest in Public Health (GECI-PH) network, launched in 2018, has identified the need for frameworks, policies and tools that can be used to manage the influence of private sector actors on public health policy, research, and practice.[31] The framework and approach for assessment developed in this study could be used for such a purpose in health and other public sector organisations in New Zealand. It can also be used as a starting point for conversations within organisations about CDoH, their impact, and how organisations should respond. The next step indicated by this research is the implementation of a strengthened response to CDoH. Future research should address implementation issues and explore factors that are likely to enable success, such as leadership, organisational readiness, appropriate resourcing, and capability within the organisation (including legal expertise).

This paper highlights the powerful influence exerted by harmful commodity industries through CDoH, and how these drive adverse health and wellbeing impacts experienced by people and communities. The health sector has an important role to play in redressing the power imbalance that exists between harmful commodity industries and people, whānau and communities. Responses include raising awareness about CDoH, supporting community initiatives and actions, and contributing to and advocating for evidence-based policy and legislation that restrict the power of harmful industries and support healthy environments and communities. Recommended responses also include raising awareness within organisations of organisational polices that exist to mitigate adverse impacts of CDoH; reviewing and strengthening policies related to COI and ensuring these cover both personal and commercial interests; and reviewing and strengthening policies, processes and systems to support a more transparent and values-based approach to identify and manage corporate interactions, engagements and relationships.

There is an opportunity for such responses to CDoH to be addressed within the new health entities created in the current New Zealand health reforms. The Pae Ora (Healthy Futures) Bill states that the health sector should protect and promote people's health and wellbeing, which includes undertaking preventative measures and addressing the wider determinants of health. While it is important to acknowledge progress already made in responding to CDoH, such as in the area of tobacco control (underpinned by the Framework Convention on Tobacco Control and Smokefree legislation), there is much work to be done across health and other public sectors to realise the enormous potential for gains in health, wellbeing and equity outcomes through applying a more pro-active, systematic and sophisticated response to the CDoH.

COMPETING INTERESTS

Nil.

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REFERENCES

1. World Health Organization. Noncommunicable diseases progress monitor 2022. Geneva: World Health Organization, 2022.
2. Shield K, Manthey J, Rylett M, Probst C, Wettlaufer A, Parry CDH, et al. National, regional, and global burdens of disease from 2000 to 2016 attributable to alcohol use: a comparative risk assessment study. Lancet Public Health. 2020;5(1):e51-e61.
3. Connor J, Kydd R, Shield K, Rehm J. The burden of disease and injury attributable to alcohol in New Zealanders under 80 years of age: marked disparities by ethnicity and sex. N Z Med J. 2015;128(1409):15-28.
4. Kelly S, Swinburn B. Childhood obesity in New Zealand. N Z Med J. 2015;128(1417):6-7.
5. Browne M, Greer N, Kolandai-Matchett K, Rawat V, Langham E, Rockloff M, Palmer Du Preez K, Abbott M. Measuring the Burden of Gambling Harm in New Zealand. Central Queensland University and Auckland University of Technology, 2017.
6. Kickbusch I, Allen L, Franz C. The commercial determinants of health. Lancet Glob Health. 2016;4(12):e895-e6.
7. Mialon M. An overview of the commercial determinants of health. Global Health. 2020;16(1):74.
8. de Lacy-Vawdon C, Livingstone C. Defining the commercial determinants of health: a systematic review. BMC Public Health. 2020;20(1):1022.
9. Health and Disability System Review. Health and Disability System Review - Final Report - Pūrongo Whakamutunga. Wellington: HDSR, 2020.
10. New Zealand Parliament. Pae Ora (Healthy Futures) Bill 2022 [9 May 2022]. Available from: https://legislation.govt.nz/bill/government/2021/0085/latest/LMS575405.html.
11. Langley GL, Moan R, Nolan KM, Nolan TW, Norman CL, Provost LP. The Improvement Guide: A Practical Approach to Enhancing Organizational Performance. 2nd ed. San Franciscso: Jossey-Bass; 2009.
12. Mialon M, Vandevijvere S, Carriedo-Lutzenkirchen A, Bero L, Gomes F, Petticrew M, et al. Mechanisms for addressing and managing the influence of corporations on public health policy, research and practice: a scoping review. BMJ Open. 2020;10(7):e034082.
13. Braun V, Clarke V. To saturate or not to saturate? Questioning data saturation as a useful concept for thematic analysis and sample-size rationales. Qualitative Research in Sport, Exercise, and Health. 2019;13(2):201-16.
14. Braun V, Clarke V. Using thematic analysis in psychology. Qualitative Research in Psychology. 2006;3(2):77-101.
15. Madureira Lima J, Galea S. Corporate practices and health: a framework and mechanisms. Global Health. 2018;14(1):21.
16. Rochford C, Tenneti N, Moodie R. Reframing the impact of business on health: the interface of corporate, commercial, political and social determinants of health. BMJ Glob Health. 2019;4(4):e001510.
17. Freudenberg N, Galea S. Corporate practices. In: Galea S, editor. Macrosocial Determinants of Population Health. New York: Springer; 2007.
18. Baum FE, Sanders DM, Fisher M, Anaf J, Freudenberg N, Friel S, et al. Assessing the health impact of transnational corporations: its importance and a framework. Global Health. 2016;12(1):27.
19. Jamieson L, Gibson B, Thomson WM. Oral Health Inequalities and the Corporate Determinants of

Health: A Commentary. Int J Environ Res Public Health. 2020;17(18).

20. Wood B, Baker P, Sacks G. Conceptualising the Commercial Determinants of Health Using a Power Lens: A Review and Synthesis of Existing Frameworks. Int J Health Policy Manag. 2021.
21. Knai C, Petticrew M, Mays N, Capewell S, Cassidy R, Cummins S, et al. Systems Thinking as a Framework for Analyzing Commercial Determinants of Health. Milbank Q. 2018;96(3):472-98.
22. Buse K, Tanaka S, Hawkes S. Healthy people and healthy profits? Elaborating a conceptual framework for governing the commercial determinants of non-communicable diseases and identifying options for reducing risk exposure. Global Health. 2017;13(1):34.
23. McKee M, Stuckler D. Revisiting the Corporate and Commercial Determinants of Health. Am J Public Health. 2018;108(9):1167-70.
24. Robertson NM, Sacks G, Miller PG. The revolving door between government and the alcohol, food and gambling industries in Australia. Public Health Res Pract. 2019;29(3).
25. World Health Organization. Guidelines for implementation of Article 5.3 of the WHO Framework Convention on Tobacco Control. Geneva: World Health Organization, 2012.
26. World Health Assembly. Framework of engagement with non-State actors. Geneva: World Health Organization, 2016.
27. Waitangi Tribunal. Hauora: Report on Stage One of the Health Services and Outcomes Kaupapa Inquiry. Lower Hutt, New Zealand: Waitangi Tribunal, 2019.
28. Ministry of Health. Te Tiriti o Waitangi Framework 2020 [9 May 2022]. Available from: https://www.health.govt.nz/our-work/populations/maori-health/te-tiriti-o-waitangi.
29. State Services Commission. Standards of Integrity & Conduct. Wellington: New Zealand Government, 2007.
30. Subramani S. Practising reflexivity: Ethics, methodology and theory construction. Methodological Innovations. 2019;12(2):1-11.
31. Nakkash R, Mialon M, Makhoul J, Arora M, Afifi R, Al Halabi A, et al. A call to advance and translate research into policy on governance, ethics, and conflicts of interest in public health: the GECI-PH network. Global Health. 2021;17(1):16.

Appendices

Appendix 1: Summary of findings from literature review one.

Authors (year)	Definition of CDoH	Type of evidence	Mechanisms of influence of CDoH	Outcomes of CDoH
Kickbusch, Allen & Franz (2016)[6]	Widely cited definition: "Strategies and approaches used by the private sector to promote products and choices that are detrimental to health".	Narrative and descriptive article to introduce a new definition of the CDoH and framework.	Three main drivers: Internationalisation of trade and capital, demand of growth, expanding outreach of corporations. Four main channels: 1) Marketing, which enhance the desirability and acceptability of unhealthy commodities. 2) Supply chain ensures industry influence globally. 3) Lobbying, which can impede policy barriers. 4) Corporate citizenship, which can deflect attention away from industry through emphasis on corporate social responsibility.	Health outcomes determined by influence of corporate activities on social environment in which people live and work. Environment shapes lifeworlds, lifestyle and choices of consumers.
Lima & Galea (2018)[15]	Specific definition not given, however discusses the role of commercial entities in shaping their products, driving consumption, and influencing population health.	Narrative and descriptive article introducing a framework of corporate practices, building on the three dimensional view of power by Steven Lukes	Framework depicts dimensions, vehicles, practices, and outcomes of corporate power. The vehicles of power are the political environment, preference shaping, knowledge environment, legal and extra legal environments. Multiple practices of power listed. Relevant to local health organisation setting: lobbying, revolving door, donations, direct participation in committees and policy formulation, corporate social responsibility, marketing and advertising, product modification and targeting vulnerable communities.	Outcomes of power: Influence on macrosocial determinants of health, risk factors, and population health.
Rochford, Tenneti & Moodie (2019)[16]	Specific definition not given, discusses "considering the impact of business on health…requires reconciling such an initiative with the other practices—both health promoting and detracting—of these corporations".	A narrative and descriptive article introducing a 'reframed inquiry' framework to describe the interaction between business and health.	Domains of framework: Environment e.g., govt., political economy, civil society; Business Entities incorporating their scale, position, sector; Internal processes of business e.g. employee relations & physical infrastructure; External processes. Six main external processes: 1) Product and/or service delivery. 2) Marketing and advertising. 3) Supply chain management. 4) Political donations, lobbying and regulatory capture. 5) Funding of research, participation in standard-setting. 6) Corporate citizenship and sponsorship.	Includes a scale of effects from negative to positive, covering health, environment, political, cultural, social effects.

Appendix 1 (continued): Summary of findings from literature review one.

Authors (year)	Definition of CDoH	Type of evidence	Mechanisms of influence of CDoH	Outcomes of CDoH
Freudenberg & Galea (2007)[17]	Specific definition not given, discusses corporations as a social determinant of health.	Narrative and descriptive literature review of corporate practices that harm health with conceptual framework	Four broad corporate practices that harm health: 1) Production and design, e.g., shift to production of more profitable but less healthy products, resist addition of health enhancing features in order to avoid increased production costs, redesign products to reach new markets where harm to health is greater. 2) Marketing, e.g., increase population exposure to harmful products, misrepresent health consequences of products in order to encourage consumption, target vulnerable populations for marketing, by-pass legal restrictions. 3) Retail distribution, e.g., increase access to and availability of unhealthy products. 4) Pricing, e.g., lower prices of unhealthy products to attract new customers, raise prices of health-enhancing products to increase profit.	Health outcomes: morbidity, disability, mortality, disparities. Examples of health impacts: Alcohol—motor vehicle accidents, cirrhosis, liver cancer, homicide, suicide Food and beverages—obesity, heart disease, diabetes, some cancers, tobacco—cancers, heart disease, respiratory diseases.
Baum et al. (2016)[18]	Specific definition not given, states "an increasing amount of research indicates that while there are some positive effects there are significant negative impacts on health from corporate structures, products and practices"	Narrative and descriptive article discussing the health impact of transnational corporations (TNC's) and development of a corporate health impact assessment framework	Three main aspects of framework for conducting a corporate health impact assessment: 1) Political economic and regulatory context for the TNC's activities at global, national, and local levels. 2) Structure, practices, and products of the TNC, including political and business practices, products, distribution, and marketing methods and strategies. 3) Understanding the health and equity impacts of the TNC's activities, recognising both positive and adverse impacts on health in domains including workforce and work conditions, social conditions, natural environment, consumption patterns, and economic mediated impact on health.	Framework allows for recognition of both positive and adverse impacts on health by TNCs.
Jamieson et al. (2020)[19]	References Kickbusch's definition and acknowledges power as an underpinning construct.	Narrative and descriptive article introducing a framework combining the three dimensional view of power by Lukes with Kickbusch's framework, in the context of oral health inequalities.	Dimensions of power: visible, hidden, and invisible. Vehicles of power/drivers: political environment (e.g., lobbying, participation in committees and policy formulation, international treaties), preference shaping (e.g., corporate social responsibility, marketing and advertising, product modification and targeting vulnerable populations), knowledge environment (e.g., funding medical education and research), legal environment (e.g., limit liability, threaten litigation). Channels as per Kickbusch, i.e., Marketing, Supply chain, Lobbying, Corporate citizenship.	Influence on macrosocial determinants of health. Risk factors for oral health inequalities—increased availability, acceptability and affordability of tobacco, sugar sweetened beverages, sugar. Oral health outcomes e.g., increased caries, periodontal disease, oral cancer.

Appendix 1 (continued): Summary of findings from literature review one.

Authors (year)	Definition of CDoH	Type of evidence	Mechanisms of influence of CDoH	Outcomes of CDoH
Wood et al. (2021)[20]	Discusses concepts of power being at the heart of CDoH.	Narrative and descriptive article introducing a framework based on theory of power by Foucault and synthesising key features of other CDoH frameworks.	Origins of corporate power—material, ideational. Nature of corporate power: Instrumental (direct influence over other actors), Structural (shaping the real or perceived options of other actors), Discursive (shaping the ideas and interests of other actors).	Manifestations of corporate power: corporate outcomes, social outcomes (including risk factors and population health outcomes), ecological outcomes.
Knai et al. (2018)[21]	"*Unhealthy commodity industries are industries in which a significant share of their product portfolio comprises unhealthy products including tobacco, alcohol, energy-dense and low-nutrient foods and beverages, and gambling services*." Refers to the strategies and approaches used to promote products and services that are detrimental to health (Kickbusch reference).	Narrative and descriptive article introducing a systems thinking framework to analyse how unhealthy commodity industries influence public health policy.	Based on Donella Meadow's systems thinking framework, incorporating: 1) Elements of a non-communicable disease (NCD)-genic system, e.g., individual citizens, individuals' skills, system's physical structures. 2) How industries interact with others to shape an NCD-genic system, e.g., physical interconnections and information flows. 3) How industries influence a system's purpose, including intended and unintended consequences. Highlights interconnections and how unhealthy commodity industries achieve their goals.	Framed in context of high worldwide burden of NCDs.
Buse, Tanaka & Hawkes (2017)[22]	References Kickbusch definition. Framed in relation to NCDs i.e., "*risks for many of the major NCDs are associated with the production, marketing and consumption of commercially produced food and drink, particularly those containing sugar, salt and transfats, alcohol and tobacco.*"	Narrative and descriptive analysis of framework and related health governance literature.	Uses an existing conceptual framework designed to classify the involvement of the commercial sector in global governance for health. Presents three models of interaction between public and private sectors: 1) Self-regulation by industry. 2) Regulation through partnership. 3) Regulation of the private sector by the public sector.	Growing burden of NCDs, notably cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes.

Appendix 2: Summary of findings from literature review two.

Authors (year)	Type of evidence	Recommended mechanisms for responding to CDoH
Mialon et al. (2020)[12]	A scoping review identifying mechanisms for addressing and managing the influence of corporations on public health policy, research, and practice.	Four main types of mechanisms: 1) Management of interactions with industry and of conflicts of interest, e.g., policies on engagement, conflicts of interest, funding, and gifts. 2) Transparency of these interactions and conflict of interest. 3) Identification, monitoring and education about the practices of corporations and associated risks to public health. 4) Prohibition of interactions with industry, e.g., rules related to lobbying and 'revolving door' practices, limit interactions with tobacco industry in line with FCTC.
McKee et al. (2018)[23]	A review article exploring the development of the concept of the corporate determinants of health and how public health professionals can respond to them.	1) Challenge the dominant narratives shaped by corporate actions. 2) Shape norms for healthy policymaking, supporting measures that impose checks and balances on corporate power. 3) Support communities that stand up to powerful corporations, evaluate and communicate successes. 4) Align with other social movements committed to challenging the concentration of power in the hands of these corporations.
Robertson et al. (2019)[24]	Exploratory Australian study establishing the incidence of the "revolving door" phenomenon (where individuals move between positions in government and in alcohol, food, and gambling industries).	Adopt and enforce tighter post-government employment codes for public servants, e.g., policies such as enforceable cooling-off periods before moving to industry or lobbyist roles, bans on information sharing by former government representatives.
World Health Organization (2012)[25] *Guidelines for implementation of Article 5.3 of the WHO Framework Convention on Tobacco Control (FCTC)*	The FCTC requires all convention parties to protect public health from tobacco industry interference. This document outlines guiding principles and recommendations for implementation of Article 5.3.	1) Raise awareness about the addictive and harmful nature of tobacco products and about tobacco industry interference with Parties' tobacco control policies. 2) Establish measures to limit interactions with the tobacco industry and ensure the transparency of those interactions that occur. 3) Reject partnerships and non-binding or non-enforceable agreements with the tobacco industry. 4) Avoid conflicts of interest for government officials and employees. 5) Require that information provided by the tobacco industry be transparent and accurate. 6) De-normalise and, to the extent possible, regulate activities described as "socially responsible" by the tobacco industry, including but not limited to activities described as "*corporate social responsibility*". 7) Do not give preferential treatment to the tobacco industry. 8) Treat State-owned tobacco industry in the same way as any other tobacco industry.

Appendix 2 (continued): Summary of findings from literature review two.

Authors (year)	Type of evidence	Recommended mechanisms for responding to CDoH
World Health Organization (2016)[26] *Framework of engagement with non-state actors*	Outlines principles which ensure that any engagement with non-state actors (non-governmental organisations, private sector entities, philanthropic foundations and academic institutions) demonstrates a clear benefit to public health and protects the World Health Organization from any undue influence in decision making processes.	WHO's engagement with non-State actors is guided by the following overarching principles. Any engagement must: 1) Demonstrate a clear benefit to public health. 2) Conform with WHO's Constitution, mandate and general programme of work. 3) Respect the intergovernmental nature of WHO and the decision-making authority of Member States as set out in the WHO's Constitution. 4) Support and enhance, without compromising, the scientific and evidence-based approach that underpins WHO's work. 5) Protect WHO from any undue influence, in particular on the processes in setting and applying policies, norms and standards. 6) Not compromise WHO's integrity, independence, credibility and reputation. 7) Be effectively managed, including by, where possible avoiding conflict of interest[2] and other forms of risks to WHO. (8) Be conducted on the basis of transparency, openness, inclusiveness, accountability, integrity and mutual respect.

Beyond muddy waters: Three Waters reforms required to future-proof water service delivery and protect public health in Aotearoa New Zealand

Tim Chambers, Nick Wilson, Simon Hales, Marnie Prickett, Edward Ellison, Michael G Baker

ABSTRACT

A 2016 drinking water-related campylobacteriosis outbreak in Aotearoa New Zealand made much of an entire town sick leading to reforms colloquially called "Three Waters", which aims to improve the management and delivery of waste, storm and drinking water systems. Public discourse on the Three Waters reforms has been dominated by anti-co-governance rhetoric, concerns around privatisation and loss of local control and alternative less comprehensive reform models. This debate has drowned out the fundamental problem statement justifying the reforms, that is, the management of drinking water resources is currently: 1) demonstrably inadequate to protect public health and promote health equity; and 2) economically inefficient. We discuss four areas where the proposed Three Waters reforms are likely to address current and future challenges and improve public health. We conclude by outlining four areas of remaining contention.

The "Three Waters" Reforms in New Zealand

In 2016, drinking water contaminated with animal faeces made much of an entire town sick (~8,000 people), with 58 hospitalisations and four deaths, costing an estimated NZ$21 million.[1,2] The outbreak was an outcome of systemic flaws in Aotearoa New Zealand's regulatory system for drinking water, which were highlighted in the ensuing Government Inquiry.[3] This Inquiry led to the Three Waters Review[4] and subsequent reforms colloquially called "Three Waters" that are responsible for reforming the waste, storm and drinking water systems in the country.

The Three Waters reforms include three main aspects: 1) the establishment of an independent Crown water services regulator; 2) establishment of a new regulatory framework for drinking water; and 3) reform to water delivery services.[4] The first two elements have been established and received broad support from politicians, the public, central and local governments, and the water sector. The final aim, to reform water delivery services, has become the most contentious aspect of the total Three Waters reforms package.

The Water Services Entities Bill is currently being considered by the New Zealand Parliament (public submissions closed in July 2022). The Bill proposes amalgamating the water services controlled by 67 city and district councils, into four Government entities.[5] It is proposed that the entities will have equal representation from Māori (Indigenous people of the New Zealand) and council members on regional representation boards. Māori representatives will be selected by local Iwi (tribes), while council members include any councillor or member of senior management with the appropriate expertise. The regional representation board is responsible for providing the strategic direction for the entity and appointing an executive board with the technical expertise to run the entity.

Public discourse around the reforms has been largely focused on issues of co-governance outlined above, with some concern about privatisation, loss of local decision making and potentially reduced accountability. Unfortunately, the two key issues driving reform have been drowned out in public discourse: 1) the current approach to water services is far from adequate to protect public health; and 2) individual councils cannot typically support the necessary upgrades in their water services without major additional funding, potentially from ratepayers.

Problems with the current water management system

Currently, it is conservatively estimated that 34,000 people get enteric illness from drinking water in New Zealand each year.[6] Subsequent water quality reports also show one in four people drink from a water supply that is not fully compliant with the drinking water standards.[7] Taumata Arowai, the new water regulator, released its first annual drinking water quality report in July 2022, which showed that in its first two months of operation, there were 82 breaches of the drinking water standards and 27 boil water notices.[7]

It is difficult to accurately estimate the full extent of the public health burden from contaminated drinking water in New Zealand due to three main factors. First, current drinking water testing and reporting requirements for many contaminants are largely based on a national testing programme conducted between 1996–2004.[8] Water supplies testing below 50% of the maximum acceptable value (MAV) for certain chemical contaminants within this programme did not require ongoing monitoring. For example, only about 18,000 people in 2020 were on supplies required to test for lead (a heavy metal being a potential contaminant from old piping).[9] The well documented lead contamination event in 2020 in Waikouaiti (a town in East Otago) was proactively detected by Dunedin City Council as part of operational rather than regulatory testing.[10] Prior to 2020, records provided to researchers only contained two tests for lead in the entire Dunedin City Council distribution system (despite this being one of the country's oldest cities).[11]

Second, there is currently no centralised database of drinking water quality in New Zealand. Recently, researchers at the University of Otago requested drinking water quality data from councils, and received over 3,000 Adobe portable document format laboratory reports and 300 custom Microsoft Excel files. The lack of a centralised database has prevented effective public heath surveillance and research—in particular, of the impact of contaminants below the current MAVs.[11] Third, our understanding of the health impacts of certain contaminants is still incomplete. For example, the MAV for nitrate is 11.3mg/L nitrate nitrogen, but emerging evidence suggests increased risks of bowel cancer[12] and pre-term births[13] at 0.87 mg/L and 5mg/L, respectively (albeit these relationships still involve some uncertainty and have not yet been proven to be causal).[14]

The current water service delivery is also contributing to health inequities. Over the 2009–2016 period, supplies serving fewer than 5,000 people accounted for virtually all (96%) of test samples with unacceptable levels of contamination by bacteria.[15] Historically, people living in socioeconomically deprived areas are exposed to greater public health risks due to their water supplies possessing less robust barriers to contamination and/or treatment processes than those living in less deprived areas.[16] Current water service delivery has impacted Māori by impeding their customary rights to waterways relied upon for mahinga kai (traditional food sources) and through poor service delivery to some communtities.[17] It is estimated small/rural supplies will require a 13-fold increase in today's water charges to meet the future needs of the water services compared to a seven-fold increase for city supplies.[17] Thus, people on smaller supplies and living in high deprivation: 1) receive the poorer quality water; 2) have fewer safeguards or protections against contamination; and 3) have the least capacity to address these systemic inequities.

The current system is economically inadequate

Public health outcomes aside, the current model of water service delivery is economically inadequate. An economic assessment conducted by the Water Industry Commission for Scotland for the New Zealand context, estimated that between NZ$120 to $185 billion of investment will be needed over the next 30 years to replace and refurbish existing infrastructure, to and upgrade the Three Waters assets to meet drinking water and environmental standards.[18] Councils would collectively need to increase their annual spend from $1.4 billion per year to between $4–6 billion per year to address this deficit.[17] Even so, these costs may underestimate the true costs of building adequate system resilience against the effects of climate change (e.g., storm damage, flooding, and sea level rise) increasing intensification of agriculture, and potential seismic instability. These threats are all particularly important in the New Zealand context given the vulnerability to climate events and earthquakes.

Possible public health improvements through Three Waters reforms

There are four main areas where Three Waters reforms could address the current and future challenges outlined above. The first is through the *standardisation* of drinking water monitoring, reporting, and record keeping. Taumata Arowai has already established new rules for drinking water monitoring which will increase the frequency of sampling and the range of contaminants required for testing.[19] In lieu of a national database, which Taumata Arowai has not yet publicly committed to establishing, the process for obtaining data from four entities will be more streamlined than relying on 67 councils with varying data management capacities. Furthermore, the four new entities will likely have the appropriate data science and management expertise required to retrieve data quickly and efficiently. This assessment is reinforced by our experience with larger councils providing more data, faster, than smaller councils.[11]

The second area where amalgamation could improve public health is by ensuring each water entity has the appropriate *technical expertise* to ensure safe delivery of water services. Water New Zealand (the industry body for the Three Waters sector) has estimated the water sector will need an additional 6,000–9,000 skilled workers over the next 30 years if safe drinking water standards are to be met.[20] It seems unrealistic to expect each of the 67 councils to have sufficient expertise in all areas required to ensure optimal public health outcomes from water service provision—for example, to have a groundwater hydrologist, engineers, spatial data specialist, and public health expertise. A recent information request to all councils found that complete spatial files on the water supply boundaries, the areas they provide water to, was only available for 63% (42/67) of councils.[11] Likewise, our recent analysis of community water fluoridation showed that councils that fluoridate water were only able to achieve fluoride levels required for optimal oral health benefit 54% of time between 1992 and 2022.[21]

The third area of improvement is through increasing the *availability of capital and creating system efficiencies*. Councils have strict borrowing covenants that limit the amount they can borrow as measured against the revenue that is collected. Wellington City Council for example is expected to hit its debt limit within the next decade.[22] Figure 1 demonstrates the additional debt limits of the new water entities compared against the current debt limits of councils.[23] Amalgamation would provide entities with larger balance sheets which facilitates greater borrowing, at lower interest rates, required to fund major infrastructure projects. This is because non-revenue generating or loss leading services provided by councils will not consolidated into the overall balance sheet of the new entities. In addition, amalgamation into four entities would enable the economies of scale required to improve overall system efficiencies—by as much as 45%.[17]

The fourth area of improvement is through better *decision making* by an executive board with technical expertise rather than elected officials. Subsequent reports have pointed to political decision-making being a key contributing factor to the underinvestment in Three Waters infrastructure and a key challenge to addressing these problems.[22,23] For example, data presented to the Wellington City Council Mayoral Taskforce showed that renewals for Three Waters infrastructure have typically been $10–20 million per year less than depreciation revenues, meaning only 50–60% of the revenue collected for water assets from rates was actually spent on those assets.[22] Figure 2 shows the depreciation revenue collected by the Wellington City Council and the amount actually spent each year since 2006.[22] Another example of short-term decision making at the local government level comes from water metering. In those areas implementing water metering, operational costs have decreased (~25%), water usage has decreased (~25%) and between ~65–80% of people actually paid less for their water after implementation.[22,24] Despite this, almost every Mayor implementing water metering in New Zealand has failed to be re-elected the following election, suggesting water management may be one contributing factor to unsuccessful re-elections. Lastly, the current system does not provide a clearly defined or consistent role for mana whenua (Māori with territorial rights in an area), which has led to decision making that is prejudicial to Māori interests.[17] For example, the placement of Three Waters infrastructure or effluent discharges that impact mahinga kai or taonga (treasured resources), or that some Māori communities are underserved by poor quality Three Waters services or none at all.[17]

Figure 1: Comparison of current council Three Waters debt capacity and additional debt capacity for the new water service entities following reform (figure from Department of Internal Affairs (2021)).[23]

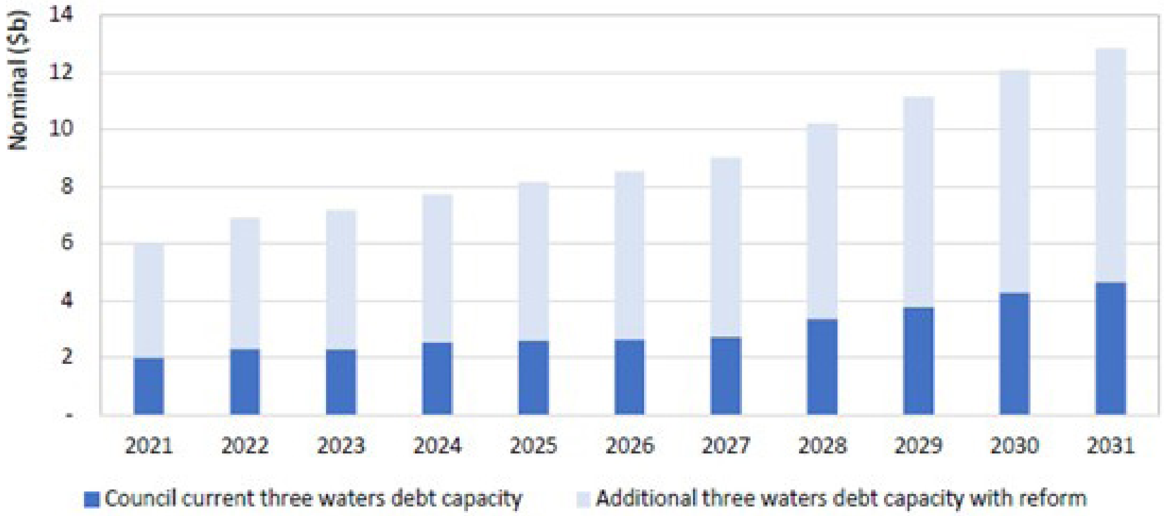
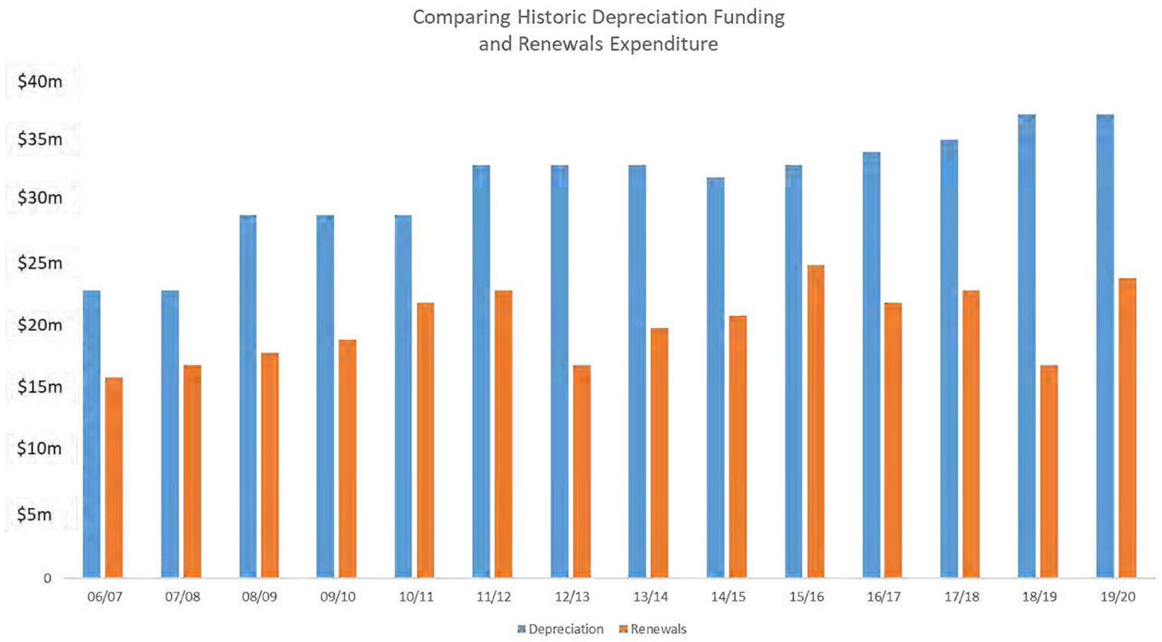


Figure 2: Historic depreciation funding and renewals expenditure by the Wellington City Council on Three Waters infrastructure from 2006 to 2020 (figure from The Mayoral Taskforce on the Three Waters (2020)).[22]



Remaining areas of contention

Four areas of the Bill that have drawn substantial criticism are the co-governance arrangement between Māori and councils, potential for privatisation, loss of local decision making over key assets, and the potential for less comprehensive alternative reform models.

Co-governance

The Water Services Entities Bill proposes co-governance between Māori and the council executive on the regional representation board (as opposed to the technical executive board), which has been met with some strong resistance and dominated public discourse. It is important to state that the proposed co-governance will not impact on ownership of water assets. All shares in the water entities will be held by councils, with each council holding shares in the new entity proportional to their population.[5]

Instead, co-governance represents an acknowledgement of the Crown's obligations under Te Tiriti o Waitangi (The Treaty of Waitangi).[25] Te Tiriti o Waitangi, which outlines the relationship between New Zealand governments and Māori and is New Zealand's founding document, has two versions—Māori and English. Colonial governments believed Māori had ceded sovereignty, the Māori signatories believed they had retained rangatiratanga (sovereignty) over their lands, waters, villages and taonga. The resulting "one size fits all" governance frameworks, absent of Māori values and beliefs, had a widespread negative impact on the well being of whānau (family) and hapū (communities) at an inestimable cost to the nation.[26] There was no notion of using both knowledge systems or seeking collaboration between the Treaty partners.

Since the establishment of the Waitangi Tribunal in 1975, Te Tiriti o Waitangi settlements have become mainstream, while modern legislation increasingly enables Māori to partner with central and local government in the management of resources and delivery of services. For example, co-governance between the Government and Māori has been successful for many years in environmental management,[27] while many councils already have co-governance arrangements on their executive with Māori wards and Iwi-appointed councillors or voting rights on council committees. Co-governance is a collaboration that draws on both western and Māori knowledge systems, is innovative and adaptable to challenges, and draws communities together in a common effort to overcome persistent and systemic problems. Particularly by reducing the historic incidence of despoilation of customary food and natural resources and ensuring equitable access and delivery of services to Māori and their papakainga (land).

Privatisation

Some public discourse has focused on the Water Services Entities Bill providing an avenue to privatisation of water assets. This is an important consideration for services that govern a need as fundamental as drinking water. However, any decision to privatise water assets under the Bill would require: 1) unanimous support from all councils (meaning one vote could veto any decision); 2) 75% support from an entity's representative group (which means Māori representatives could veto privatisation in any entity); and 3) 75% support in a public referendum in the entity's area.[5] Thus, privatisation of any water assets would need super majority support from the council executive, Māori representatives, and the public. To further protect against privatisation, these safeguards should be entrenched in the Water Services Entities Bill—requiring a super majority (e.g., 75% of Parliament) to overturn these clauses.

Loss of local control or reduced accountability to communities

While loss of local control is a commonly cited concern, it requires some deconstruction as it appears to mean different things to different people and groups. The broad criticism is that transfer of responsibility for water infrastructure to four government entities will remove community and local council control over decision making, making it more difficult to have local needs and perspectives taken into consideration. The Auditor General, in his submission on the Water Services Entities Bill, cites concerns about the potential to reduce decision makers accountability to the communities they serve. The summary reads: "*as currently drafted in the Bill, the accountability arrangements and potential governance weaknesses, combined with the diminution in independent assurance noted earlier, could have an adverse effect on public accountability, transparency, and organisational performance.*"[28]

However, for some groups "local control" has a related but differently motivated meaning. The most prominent groups campaigning on opposition to the reforms are also engaged in broader anti- Government lobbying.[29–32] Alongside sharing concerns that echo the Auditor General, these groups also characterise the reform's potential loss of local control as being part of an "asset grab" by Government on behalf of Māori or as part of a hidden Government agenda for Māori co-governance of New Zealand by 2040.[31] It appears that "loss of local control", for some, means loss of Crown or Pākehā control.

Additionally, as former Attorney General and Minister for Treaty Negotiations Chris Finlayson notes: *"people who are frightened by co-governance think they'll be locked out of access to our natural resources*."[33] Notably, some of campaign material from these groups refers not to water infrastructure but simply to water.[30] Water for private enterprise has been available on a largely first come first served basis in New Zealand and in parts of the country this has led to council facilitation of overallocation of water (negatively impacting human and environmental health).[34,35] Some agricultural water users particularly are concerned that loss of local control may mean loss of access to water for their private use.[36,37]

Less comprehensive reform models

Several councils have proposed regional cooperation agreements as an alternative model for reform (e.g., Hawke's Bay;[38] Hamilton–Tauranga partnership[39]). Similar models in Australia have improved water delivery effectiveness and efficiency (e.g., in New South Wales),[40] but so too have major amalgamations in Tasmania and Victoria which were similar to the current Three Waters proposal.[41]

Nevertheless, the experience of regional cooperation in New Zealand is limited and underwhelming. Wellington Water was established in 2014 to manage Three Waters services for six council serving about 400,000 people, but its performance has been hindered by multiple issues. First, this regional co-operation model still relies on council decision making by elected officials which is politically influenced to make short-term decisions as highlighted above. Second, co-ordinating, often competing, priorities among the participating council has been a complex and time-consuming process. An inquiry into Wellington Water's failure to consistently provide community water fluoridation over a number of years stated: *"the need to advise each council individually consumes a lot of time and resources, and having different requirements for each council makes service delivery more complex*."[42] It is worth mentioning a raft of other problems with Wellington Water including failure to manage waste water discharge that resulted in major system failings including 6.5 million litres of wastewater entering Wellington Harbour in 2019; an estimated 70 million litres of untreated water entering stormwater or freshwater bodies or simply flowing onto the streets annually; and around 700 blockages every year.[22] While Wellington Water inherited aged and fractured infrastructure and has had to face major operational and capital funding gaps since its inception, the governance and funding structures that caused these baseline problems for Wellington Water would likely remain unchanged in other regional co-operation models. Furthermore, Wellington Water, and any other regional corporation model, is still financially constrained by council debt caps and balance sheets outlined above, which have inhibited major infrastructure investments.

Conclusions

Good quality drinking water that is free of hazardous contaminants is a fundamental human right and a key element of the Sustainable Development Goals.[43,44] Water contamination in New Zealand has had severe consequences for human health and is an ongoing public health threat.[1–3] Consequences are borne disproportionately by smaller and the most deprived communities, with Māori disproportionately comprising the latter. The current regulatory arrangements for water services are inadequate, are economically unsustainable, and are inefficient. The amalgamation proposed in the Water Services Entities Bill provides an opportunity to resolve previous systemic flaws outlined in the Government Inquiry into Havelock North and to future proof the country's Three Waters. Most importantly, the proposed new legislation is likely to more robustly, and efficiently, improve the protection of public health and uphold the right to clean, safe water.

COMPETING INTERESTS

Nil.

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REFERENCES

1. Gilpin BJ, Walker T, Paine S, Sherwood J, Mackereth G, Wood T et al. A large scale waterborne Campylobacteriosis outbreak, Havelock North, New Zealand. J Infect. 2020;81(3):390-395. doi: 10.1016/j.jinf.2020.06.065
2. Wilson B, Jones N, Wood T, Jagroop-Dearing A, Kubovy J, Baker MG. Clinical outcomes of campylobacteriosis: a case series analysis of hospitalisations associated with the Havelock North Campylobacter outbreak. N Z Med J. 2021;134(1547):71-84.
3. Department of Internal Affairs. Government inquiry into Havelock North drinking water report of the Havelock North Drinking Water Inquiry*:* Stage 2. Auckland (NZL)2017. Accessed 11 Feb 2020. Available from: https://www.dia.govt.nz/diawebsite.nsf/Files/Report-Havelock-North-Water-Inquiry-Stage-2/$file/Report-Havelock-North-Water-Inquiry-Stage-2.pdf.
4. Department of Internal Affairs. Three Waters Review: Te Tari Tawhenua. Wellington (NZL): Department of Internal Affairs;2020. Accessed 11 Feb 2021. Available from: https://www.dia.govt.nz/Three-waters-review.
5. New Zealand Parliament. Water Services Entities Bill. Wellington (NZL)2022. Accessed 19 Jul 2022. Available from: https://www.legislation.govt.nz/bill/government/2022/0136/latest/whole.html?search=sw_096be8ed81c2922d_priv_25_se&p=1#LMS671870.
6. Ball A. Estimation of the burden of water-borne disease in New Zealand: preliminary report. Wellington (NZL): Ministry of Health;2006. Accessed 20 Dec 2021. Available from: https://www.health.govt.nz/system/files/documents/publications/water-borne-disease-burden-prelim-report-feb07-v2.pdf.
7. Taumata Arowai. Drinking Water Regulation Report 2021. Wellington (NZL): Taumata Arowai;2022. Accessed 19 Jul 2022. Available from: https://www.taumataarowai.govt.nz/assets/Uploads/Governance-docs/Drinking-Water-Regulation-Report-2021.pdf.
8. ESR. Archived dataset from Ministry of Health's Priority Two Chemical Determinands Identification Programme 1995-2004. Christchurch (NZL): Institute of Environmental Science and Research;2019. Accessed 10 Mar 2019.
9. Ministry of Health. Annual Report on drinking-water quality. Wellington (NZL): Ministry of Health;2020. Accessed 25 Feb 2021. Available from: https://www.health.govt.nz/system/files/documents/publications/annual-report-drinking-water-quality-2018-2019-25june2020.pdf.
10. Uwins-England H, McKenzie J. Review of health response into Waikouaiti water supply lead contamination. Wellington (NZL)2021. Accessed 19 Jul 2022. Available from: https://www.health.govt.nz/system/files/documents/publications/final-report-health-response-into-waikouaiti-water-supply-lead-contamination31mar2021.pdf.
11. Chambers T, Hales S, Wilson N, Baker M. Improvements to drinking water monitoring, reporting and record-keeping needed to protect health. Policy Quarterly. 2022;18(23-27). Available from: https://ojs.victoria.ac.nz/pq/article/view/7571/6727.
12. Schullehner J, Hansen B, Thygesen M, Pedersen CB, Sigsgaard T. Nitrate in drinking water and colorectal cancer risk: A nationwide population-based cohort study. Int J Cancer. 2018;143(1):73-79. doi: 10.1002/ijc.31306.

13. Sherris A, Baiocchi M, Fendorf S, Luby S, Yang W, Shaw G. Nitrate in drinking water during pregnancy and spontaneous preterm birth: A retrospective within-mother analysis in California. Environ Health Perspect. 2021;129(5):057001. doi: 10.1289/EHP8205
14. Chambers T, Douwes J, t Mannetje A, Woodward A, Baker M, Wilson N et al. Nitrate in drinking water and cancer risk: the biological mechanism, epidemiological evidence and future research. Aust N Z J Public Health. 2022 Apr;46(2):105-108. doi: 10.1111/1753-6405.13222.
15. Ministry of Health. Data from the Ministry of Health drinking water compliance register. Ministry of Health;2016. Accessed 1 Jun 2021. Retrieved via personal correspondence.
16. Hales S, Black W, Skelly C, Salmond C, Weinstein P. Social deprivation and the public health risks of community drinking water supplies in New Zealand. J Epidemiol Community Health. 2003 Aug;57(8):581-3. doi: 10.1136/jech.57.8.581.
17. Department of Internal Affairs. Regulatory Impact Assessment: Decision on the reform of three waters service delivery arrangements. Wellington (NZL): Department of Internal Affairs;2022. Accessed 19 Jul 2022. Available at: https://www.dia.govt.nz/diawebsite.nsf/Files/Three-waters-reform-programme-2022/$file/regulatory-impact-assessment-decision-on-the-reform-of-three-waters-service-delivery-arrangements.pdf.
18. Water Industry Commission for Scotland. Economic analysis of water services aggregation. Scotland (UK): Water Industry Commission for Scotland;2021. Accessed 19 Jul 2022. Available at: https://www.dia.govt.nz/diawebsite.nsf/Files/Three-waters-reform-programme/$file/wics-final-report-economic-analysis-of-water-services-aggregation.pdf.
19. Taumata Arowai. DRAFT Drinking Water Quality Assurance Rules 20 December 2021. Internet: Taumata Arowai;2022. Accessed 28 Jan 2022. Available at: https://te-puna-korero.taumataarowai.govt.nz/regulatory/drinking-water-quality-assurance-rules/user_uploads/drinking-water-quality-assurance-rules-.pdf.
20. Water New Zealand. Strategy aims to address three waters workforce shortage. Water New Zealand;2022. Accessed 19 Jul 2022. Available at: https://www.waternz.org.nz/News-and-Events/Story?Action=View&Story_id=1663.
21. Chambers T, Hobbs M, Broadbent J. Inconsistent compliance with optimal fluoride levels for oral health benefit by New Zealand drinking water suppliers. J Public Health Dent. 2022 Oct 7. doi: 10.1111/jphd.12548.
22. The Mayoral Taskforce on the Three Waters. The Mayoral Taskforce on the Three Waters report. Wellington (NZL): Wellington City Council;2020. Accessed 22 Aug 2022. Available at: https://wellington.govt.nz/-/media/environment-and-sustainability/water/files/2020/mayoral-taskforce-three-waters-taskforce-report.
23. Department of Internal Affairs. Transforming the system for delivering three waters services: The case for change and summary of proposals. Wellington (NZL): Department of Internal Affairs;2021. Accessed 22 Aug 2022. Available at: https://www.dia.govt.nz/diawebsite.nsf/Files/Three-waters-reform-programme-2022/$file/Three-waters-reform-case-for-change-and-summary-of-proposals-15-June-2022.pdf.
24. Central Otago District Council. Information on impact on water metering. 2022. Accessed 22 Aug 2022. Personal Correspondence.
25. Trezise J, Vowles J, Moody G, Dowsett J. Commitments to equality in Te Tiriti mean co-governance. online: Newsroom;2022. Accessed 19 Jul 2022. Available at: https://www.newsroom.co.nz/commitments-to-equality-in-te-tiriti-mean-co-governance.
26. Waitangi Tribunal. Hauora: report on stage one of the health services and outcomes kaupapa inquiry. Wellington (NZL): Waitangi Tribunal;2019. Accessed 22 Aug 2022. Available at: https://forms.justice.govt.nz/search/Documents/WT/wt_DOC_152801817/Hauora%20W.pdf.
27. Fisher K, Parsons M. River co-governance and co-management in Aotearoa New Zealand: enabling Indigenous ways of knowing and being. Transnational Environmental Law. 2020;9(3):455-480.
28. Auditor-General. Submission to the Finance and Expenditure Committee on the Water Services Entities Bill. Wellington (NZL): The Controller and Auditor-General;2022. Accessed 2 Aug 2022. Available at: https://oag.parliament.nz/2022/submission-water-services.
29. Taxpayers' Union. Petition: stop three waters. https://www.taxpayers.org.nz/three_waters. Published 2022. Accessed 2 September, 2022.
30. Groundswell New Zealand. Defeat three waters, defend local control. https://www.itsyourwater.nz/. Published 2021. Accessed 2 September, 2022.
31. New Zealand Centre for Political Research. He Puapua and Three Waters. New Zealand Center for Political Research;2022. Accessed 2 Aug 2022. Available at: https://www.nzcpr.com/wp-content/uploads/2021/10/PeoplesPress-HePuapua2.pdf.

32. Hobson's Pledge. Three Waters = tribal control over fresh water. https://www.hobsonspledge.nz/three_waters. Published 2021. Accessed 2 September, 2022.
33. Finlayson C. Co-governance should be embraced — not feared. E-tangata. 2022. Available at: https://e-tangata.co.nz/comment-and-analysis/chris-finlayson-co-governance-should-be-embraced-not-feared/. Published 29 May 2022. Accessed 2 September 2022.
34. Robson-Williams M, Painter D, Kirk N. From pride and prejudice towards sense and sensibility in Canterbury water management. Australasian Journal of Water Resources. 2022:1-20. doi: 10.1080/13241583.2022.2063483
35. Taylor LB, Fenemor A, Mihinui R, Sayers TA, Porou T, Hikuroa D et al. Ngā Puna Aroha: towards an indigenous-centred freshwater allocation framework for Aotearoa New Zealand. Australasian Journal of Water Resources. 2021;25(1):27-39. doi: 10.1080/13241583.2020.1792632
36. Anderson D. They're stealing our water! Rural News. 2021. Accessed 2 September 2022. Available at: https://www.ruralnewsgroup.co.nz/rural-news/rural-general-news/they-re-stealing-our-water.
37. Palmer R. Rural water schemes should remain in private ownership - working group. 2022. Accessed 2 September 2022. Available at: https://www.rnz.co.nz/news/political/468212/rural-water-schemes-should-remain-in-private-ownership-working-group.
38. Napier City Council. Councils favour Hawke's Bay alternative to Government's three waters reform proposal. Napier (NZL): Napier City Council;2022. Accessed 22 Aug 2022. Available at: https://www.napier.govt.nz/services/water/article/1769/councils-favour-hawkes-bay-alternative-to-governments-three-waters-reform-proposal.
39. Waikato Herald. Three Waters Reform: Hamilton City Council proposes alternative regional entity with Tauranga. Hamilton (NZL): Waikato Herald;2022. Accessed 22 Aug 2022. Available at: https://www.nzherald.co.nz/waikato-news/news/three-waters-reform-hamilton-city-council-proposes-alternative-regional-entity-with-tauranga/OTIXJYZZM2KTT2UOIFRSQPHYG4/.
40. Local Government New South Wales. Central NSW Councils Submission to the Productivity Commission National Water Reform Inquiry. Sydney (AUS): Local Government New South Wales;2017. Accessed 22 Aug 2022. Available at: https://lgnsw.org.au/common/Uploaded%20files/Submissions/lgnsw-and-water-directorate-submission-to-productivity-commission-national-water-reform-inquiry.pdf.
41. Water Services Association of Australia. Urban water governance in Australia: submission to NZ three waters review. Water Services Association of Australia;2018. Accessed 22 Aug 2022. Available at: https://www.wsaa.asn.au/sites/default/files/publication/download/Australian%20water%20reform%20insights_WSAA%20format%20-%2025102018%20for%20website.pdf.
42. Martin Jenkins. Inquiry into the cessation of water fluoridation by Wellington Water. Wellington (NZL): Martin Jenkins;2022. Accessed 22 Aug 2022. Available at: https://www.wellingtonwater.co.nz/assets/Inquiry-into-the-cessation-of-fluoridation-by-Wellington-Water-FINAL-REPORT.pdf.
43. United Nations General Assembly. Resolution 64/292: The human right to water and sanitation. Geneva (CHE): United Nations;2010. Accessed 17 Feb 2021. Available at: https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/64/292.
44. United Nations General Assembly. Transforming our world: The 2030 agenda for sustainable development. Geneva (CHE): United Nations;2015. Accessed 15 Mar 2021. Available at: https://sdgs.un.org/sites/default/files/publications/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf.

A diagnosis fifteen years in the making

Anthony R Brownson, David W Orr, Emily Carr-Boyd

ABSTRACT

A 52-year-old male with a diagnosis of non-alcoholic fatty liver disease re-engages with the medical system and is found to have an unexpected diagnosis.

Case report

A 52-year-old male was reviewed in the hepatology outpatient clinic with chronically elevated cholestatic liver enzymes.

Dating back twelve years, gamma-glutamyl transferase (GGT) was elevated at x3–5 upper limit of normal and alkaline phosphatase (ALP) x2–3 the upper limit of normal. Liver synthetic function was normal. Medical history was relevant for type 2 diabetes mellitus treated with metformin.

A review by Gastroenterology in 2016 showed his serologic liver screen was unremarkable, with no evidence of viral hepatitis; including chronic hepatitis B and C, and no evidence of autoimmune hepatitis or an inherited liver condition. Abdominal ultrasound revealed diffuse hepatic steatosis. The gastroenterology opinion was of non-alcoholic fatty liver disease (NAFLD) based the patient's history of type 2 diabetes, hepatic steatosis on ultrasonography and a negative serological liver screen. A FibroScan performed in 2017 showed an elevated liver stiffness of 14.0kPa, consistent with advanced fibrosis or early cirrhosis. A liver biopsy was considered but the patient was lost to follow-up.

In 2020, the patient re-engaged with his general practitioner and was referred to hepatology. He reported chronic right upper quadrant pain. The pain was constant and worse at night. It was not associated with meals and was managed with regular tramadol. He was otherwise systemically well with a stable weight and a BMI of 25.5. There were no features of metabolic syndrome other than type 2 diabetes. He did not drink alcohol or use illicit drugs.

On examination there was no peripheral stigmata of chronic liver disease. Abdominal examination revealed mild right upper quadrant tenderness with no hepatosplenomegaly, ascites or peripheral oedema.

The GGT and ALP were persistently elevated, while the remaining liver enzymes were unremarkable. A repeat non-invasive liver screen was negative. An abdominal ultrasound revealed a liver of mildly patchy echotexture with no focal lesions or signs of portal hypertension. FibroScan showed a liver stiffness of 10.3kPa, consistent with moderate to severe fibrosis.

Due to the elevated hepatic stiffness with a clinical diagnosis of non-alcoholic fatty liver disease a liver biopsy was performed to determine whether he would need surveillance for hepatocellular carcinoma, as there were no other clinical features to suggest the patient had cirrhosis. The histology showed non-caseating, epithelioid granulomas. There was mild steatosis and Metavir stage 3–4 fibrosis. There were no specific features to identify the aetiology of the granulomatous hepatitis.

Full blood count and extended electrolytes were unremarkable. Human immunodeficiency virus serology and QuantiFERON-TB gold were negative. Serum angiotensin converting enzyme was within normal range. Brucellosis serology was negative. Stool examination did not reveal ova, cysts or parasites. Computer tomography scan demonstrated heterogeneity of liver attenuation however no other abnormality was seen within the chest, abdomen or pelvis.

The patient was born in Ethiopia before immigrating to New Zealand 15 years prior to the review. He was raised near Lake Tana; this was his family's water source in which they swam and bathed. He recalled episodes of rectal bleeding as a child and an episode of "liver pain", which was treated with traditional remedies. In 2008, a year after arriving in New Zealand, he presented to hospital with a chronic perianal fistula. This was managed with incision and drainage and antibiotics.

Considering the new clinical information, the liver biopsy was re-examined. Deeper levels of the tissue revealed numerous eosinophils within the granuloma, as well as a small amount of central necrotic debris (Figure 1). A Ziehl-Neelsen stain was repeated on the deeper levels of tissue, and this highlighted parasitic remnants within the granuloma (Figure 2).

Schistosomal antibodies were strongly positive at titres greater than 2,560. This test was performed with the Fumouze IHA assay which has a 76% sensitivity, and 95% specificity for *Schistosoma mansoni.*

The patient received eradication treatment with praziquantel to treat his hepatic schistosomiasis. He has been referred for upper gastrointestinal endoscopy to investigate for varices.

Discussion

Schistosomiasis causes considerable morbidity and mortality. It is estimated that more than 200 million people are infected, most of whom live in Africa.[1]

The acute manifestations of infection are Swimmer's Itch and acute schistosomiasis or "Katayama's fever";[2] however, the main burden of disease is due to chronic infection involving either the gastrointestinal or genitourinary system, depending on which species of the flat worm the patient is infected with. In rare instances embolisation of eggs and worms can cause neurologic and pul-

Figure 1: The image on the left shows a liver core biopsy containing a lobular granuloma (x100). The image on the right shows the granuloma with numerous eosinophils present and central necrotic debris (x400).

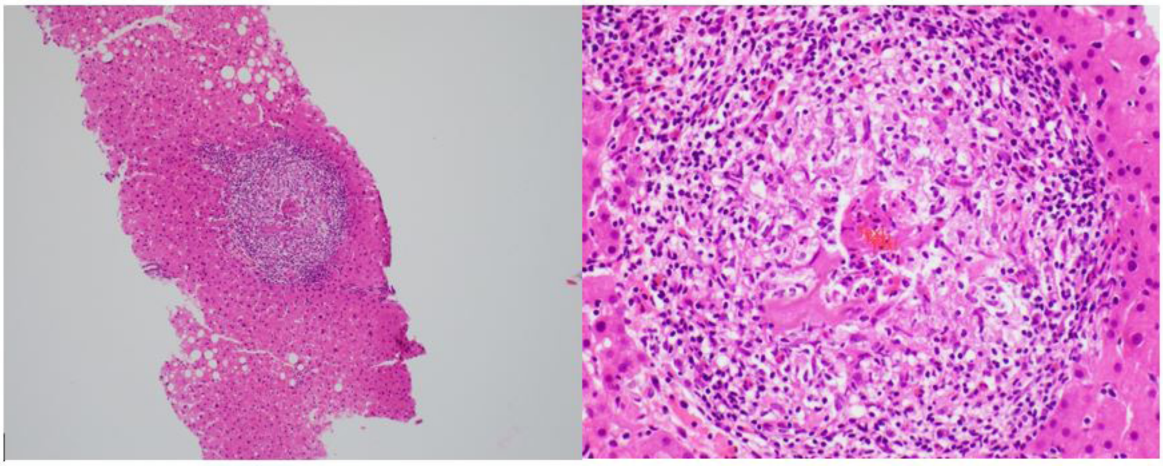
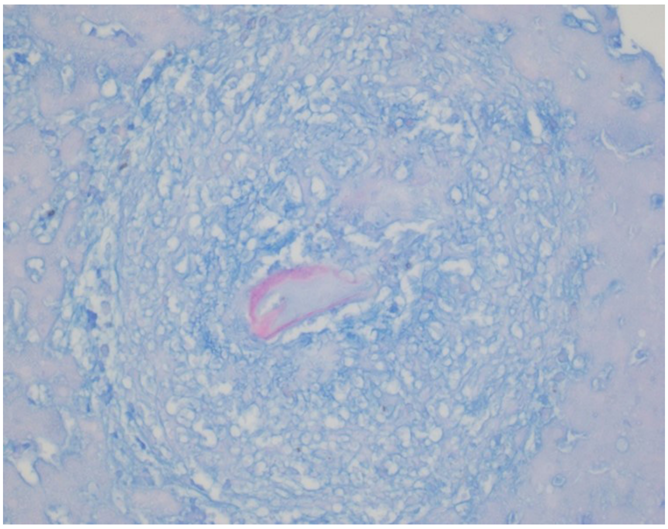


Figure 2: Ziehl-Neelsen stain showing parasitic remnants present in the centre of the granuloma (x400).



monary disease, and glomerulopathy can occur from immune complex deposition in the kidney. Adult worms evade the host immune system, and instead, it is the eggs which cause pathological damage by inducing a Th-2 immunogenic response leading to formation of eosinophilic granulomas. Clinical disease depends on several factors including the number of eggs trapped in tissue, their anatomical location, the duration of infection, and the intensity if the host immune response.[3]

Hepatic schistosomiasis is one of the most common causes of non-cirrhotic portal hypertension worldwide.[4] *S. mansoni* is responsible for most cases in Africa and South America, and *S. japonicum*, in Asia. Eggs are laid in the mesenteric veins lodge in the intestine causing luminal disease, or they are carried into the portal veins and become trapped in the portal venules. Liver injury results from a granulomatous reaction around trapped eggs in the presinusoidal space. Classically, patients develop "pipestem" portal fibrosis with presinusoidal portal hypertension.[5] Liver synthetic function is typically preserved, and patients present with complications of portal hypertension rather than hepatocellular failure. Heavily infected individuals may develop advanced periportal fibrosis at a young age, while focal portal granulomas may be the only abnormality in older patients with lighter infection,[4] as was the case with our patient.

Twenty-one point nine percent of refugees arriving in New Zealand between 1995–1999 had positive schistosomal serology.[6] These numbers have fallen to 3.2% between 2010–2014,[6] reflecting the different infection rates in refugee country of origin. Ethiopia has high rates of schistosomiasis with approximately 5 million people[1] or 8% of the population infected. Our patient's wife was given refugee status, and our patient travelled to New Zealand on a family reunification visa to join her. He had a medical examination in Ethiopia before departure but unlike his wife, he was not seen in the New Zealand refugee clinic. Non-refugee migrants from endemic areas are not routinely screened for schistosomiasis, and the cost of medical care in the primary care setting may be prohibitive. The patient was not evaluated for schistosomiasis during the admission in 2008, but *S. mansoni* resides in the gastrointestinal system and perianal fistulae are well-documented complications of anorectal infection.

Our patient was diagnosed with hepatic schistosomiasis 15 years after immigrating to New Zealand. Active hepatic schistosomiasis has been reported in a Portuguese solider 34 years after returning from Angola.[7] Tropical diseases like schistosomiasis are rarely seen in New Zealand, and the necessary pathological examination is often not performed without the pathologist being aware of the travel history.

Our patient did not have the classic features of hepatic schistosomiasis and the diagnosis remained elusive until liver biopsy was performed. Unrecognised schistosomiasis can lead to significant morbidity, mortality and healthcare expense. This case raises the question about whether New Zealand should implement universal schistosomal screening in new immigrants from countries with endemic infection.

Liver biopsy is not usually performed in patients with metabolic risk factors who meet the diagnostic criteria for NAFLD. However, in patients with abnormal liver function tests and a normal serological liver screen, liver biopsy has been shown to make an alternative diagnosis to NAFLD in 25.3% of patients with or without an abnormal echo pattern on abdominal ultrasonography.[9] While histological examination is not required to make a diagnosis of NAFLD, it is the only investigation which confirms the diagnosis. This case highlights the role of liver biopsy in NAFLD. Liver biopsy can be used to accurately stage the degree of liver fibrosis and should be considered in cases of diagnostic uncertainty.[10]

COMPETING INTERESTS

Nil.

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REFERENCES

1. Steinmann P, Keiser J, Bos R, Tanner M, Utzinger J. Schistosomiasis and water resources development: systematic review, meta-analysis, and estimates of people at risk. Lancet Infect Dis. 2006 Jul;6(7):411-25.
2. Visser LG, Polderman AM, Stuiver PC. Outbreak of schistosomiasis among travelers returning from Mali, West Africa. Clin Infect Dis. 1995 Feb;20(2):280-5.
3. Gryseels B, Polman K, Clerinx J, Kestens L. Human schistosomiasis. Lancet. 2006 Sep 23;368(9541):1106-18.
4. Dunn MA, Kamel R. Hepatic schistosomiasis. Hepatology. 1981 Nov-Dec;1(6):653-61.
5. Cheever AW. A quantitative post-mortem study of Schistosomiasis mansoni in man. Am J Trop Med Hyg. 1968 Jan;17(1):38-64.
6. Reeve AMF. Change in health profile of refugees resettling in New Zealand, 1980-2014. N Z Med J. 2020 Dec 18;133(1527):51-70.
7. Vieira P, Miranda HP, Cerqueira M, Delgado Mde L, Coelho H, Antunes D, Cross JH, da Costa JM. Latent schistosomiasis in Portuguese soldiers. Mil Med. 2007 Feb;172(2):144-6.
8. Chalasani N, Younossi Z, Lavine JE, Charlton M, Cusi K, Rinella M, Harrison SA, Brunt EM, Sanyal AJ. The diagnosis and management of nonalcoholic fatty liver disease: Practice guidance from the American Association for the Study of Liver Diseases. Hepatology. 2018 Jan;67(1):328-357.
9. Skelly MM, James PD, Ryder SD. Findings on liver biopsy to investigate abnormal liver function tests in the absence of diagnostic serology. J Hepatol. 2001 Aug;35(2):195-9.
10. Nalbantoglu IL, Brunt EM. Role of liver biopsy in nonalcoholic fatty liver disease. World J Gastroenterol. 2014;20(27):9026-9037.

Medical students and informed consent—response to “Consent for Teaching”

Sarah C Rennie, Alan F Merry, Suzanne Pitama, Papaarangi Reid, Jeanne Snelling, Simon Walker, Tim Wilkinson, Warwick Bagg

The authors of this letter are currently engaged in revising “*Medical Students and informed consent: A consensus statement prepared by the Faculties of Medical and Health Science of the Universities of Auckland and Otago, Chief Medical Officers of District Health Boards, New Zealand Medical Students’ Association and the Medical Council of New Zealand*”.[1] We disagree with Dr Gray’s[2] proposal that the consensus statement[1] is flawed. Gray argues the consensus statement is couched in ethical terms that prioritise patient autonomy, which is inconsistent with the approach of balancing the quadruple aim of quality medical practice.[3] The quadruple aim encompasses improving population health, patient experience, healthcare team wellbeing and reduced costs.[3] What Gray does not acknowledge is the Code of Health and Disability Services Consumers’ Rights,[4] as set out in the Health and Disability Commissioner Act 1994,[5] is the law in Aotearoa New Zealand. Thus, the consensus statement on medical students and informed consent was written to reflect the law in the most pragmatic way possible. In particular, Right 6, the “*right to be fully informed*”, and Right 7, the “*right to make an informed choice and give informed consent*”.

We make no apology for supporting patient autonomy in the consensus statement. Patients have an ethical and legal right to understand “who, how and why” will be engaged in their healthcare—particularly if it is for learning. Gray does not acknowledge the distinction made in the consensus statement between involvement of students primarily for the benefit of their education, and involvement that may occasionally be necessary for the care of patients, such as when a qualified clinician is unavailable at a cardiac arrest. Doctors have an ethical and legal duty to ensure patients and their whānau are fully informed to the extent practicable in the circumstances. A student’s need to be educated does not trump this duty. Patients should understand what their healthcare will involve, by whom and for what purpose, and have an input into these decisions. Such informed shared decision making will result in better patient outcomes, reduced costs, improved population health, patient experience and team wellbeing—the process of obtaining consent, done well, is consistent with the quadruple aim of quality medical practice and has the potential to enhance it.

Informed consent encompasses much more than the alternative term “agreement” proposed by Gray. Consent is a word commonly used in both professional and lay settings and has meaning. Informed consent, rather than just assent, must be gained by supervising clinicians for student involvement in teaching. It encompasses the nuances involved in both patient and whānau agreement to patients engaging in student learning—this naturally will be influenced by the relationship the clinician has with the patient and their whānau. As is stated in the consensus statement, informed consent is an ongoing process that patients can withdraw at any stage, however, agreement is simply an outcome of a discussion.

Gray makes two factually inaccurate comments. First, that in requiring students to obtain consent for teaching, the CS recommendations are asking students to do something not required of graduate doctors. Indeed, this requirement for informed patient consent when trainees are involved in the provision of patient care has been unequivocally reinforced in Health and Disability Commissioner opinions.[6,7] Second, Gray suggests that while the CS refers to the apprenticeship model, the requirement for consent for teaching runs counter to the use of this model in other settings. However, it is registered healthcare professionals, not students, who are required to obtain consent for teaching and any aspect of patient care. Students instead have the responsibility to ensure that consent has been obtained. Within the apprenticeship model, healthcare professionals can and should provide opportunities for medical students to learn and demonstrate informed consent, but this doesn’t negate the responsibility for consent that lies with the healthcare professional.

We agree that greater attention should have been paid to cultural safety within the consensus statement. Doctors essentially hold the power in the doctor–patient relationship and must consider how this reflects on the way they engage with the patient.[8] It is important for doctors and medical students to reflect on the impact of their own culture and attitudes, and not to impose their own values onto patients and their whānau. The consensus statement is currently being revised to ensure that cultural safety in Aotearoa is properly encompassed in the consent process. The principles of patient and whānau involvement and autonomy remain central. Good communication with a focus on doctors reflecting on their own views and biases is a vital part of the consent process—not separate to it, and it doesn't negate the need for consent. The days of applying health and teaching of health to patients without their understanding and consent are gone. This outdated approach is simply not acceptable within current medical education frameworks or practice, or within New Zealand law as reflected by the HDC code of patient rights. A recent publication from the University of Auckland[9] indicates that consent for student involvement in teaching by patients can and is being obtained well for most patients in obstetrics and gynaecology. However, the results for patient consent for medical student teaching in other sensitive exams are disappointing, and the reports of students being coerced into conducting sensitive exams on patients without consent is deeply concerning.[9] We can and must do better, even in busy, rushed clinical environments.

In summary, apart from the important matter of cultural safety, we disagree with Gray and think that all clinicians in Aotearoa can uphold the law, which in this matter we also believe to be ethically appropriate.

COMPETING INTERESTS

Nil.

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REFERENCES

1. Bagg W, Adams J, Anderson L, Malpas P, Pidgeon G, Thorn M, et al. Medical Students and informed consent: A consensus statement prepared by the Faculties of Medical and Health Science of the Universities of Auckland and Otago, Chief Medical Officers of District Health Boards, New Zealand Medical Students' Association and the Medical Council of New Zealand. N Z Med J. 2015 May 15;128(1414):27-35.
2. Gray B. Consent for teaching. N Z Med J. 2022 Jul 1;135(1557):64-69.
3. Bodenheimer T, Sinsky C. From triple to quadruple aim: care of the patient requires care of the provider. Ann Fam Med. 2014;12(6):573-576.
4. Health and Disability Commissioner. Health and Disability Commissioner (Code of Health and Disability Services Consumers' Rights) Regulations 1996.
5. Health and Disability Commissioner Act 1994.
6. Health & Disability Commissioner. Radiologist did not obtain consent for registrar to observe ultrasound at teaching hospital (00HDC06794). 2001. Available at: https://www.hdc.org.nz/media/2582/00hdc06794casenote.pdf. Accessed Jul 26, 2022.
7. Health & Disability Commissioner. Complication during eye surgery (13HDC01345). 2015. Available at: https://www.hdc.org.nz/media/2041/13hdc01345casenote.pdf. Accessed Jul 26, 2022.
8. Te Kaunihera Rata o Aotearoa Medical Council Zealand. Statement on cultural safety. 2019.
9. Bhoopatkar H, Campos CFC, Malpas PJ, Wearn AM. Adherence to a national consensus statement on informed consent: medical students' experience of obtaining informed consent from patients for sensitive examinations. N Z Med J. 2022 May 20;135(1555):10-18.

Novel use of technology

Gaenor Bell, Brad Peckler, Christine Coulter

To the Editor, we would like to describe a situation that is not uncommon these days, in which we have come up with a novel solution.[1] I am a Trainee Intern (TI) doing a rotation in General Practice (GP) where unfortunately my GP supervisor came down with COVID-19. As she was not unwell with it, we decided that we would still see patients and her nurse and I would act as a surrogate.

Recently, I had participated in a simulation study using Google Glass™ (Glass), where the TI was the sole "physician" in a simulated trauma resuscitation and a stroke call in a "rural Emergency Department (ED)", with an ED or neurology consultant on the other end of the Glass. I discussed this concept with the GP and her nurse, and we contacted the study investigators to use the Glass for consults. This technique has been used with scribes but not TIs.[2]

The Glass has a camera, microphone and a speaker on them that allow the GP to communicate directly with the patient and myself. Wearing the Glass allowed my hands to be free to examine the patient or type notes at the same time as consulting. The GP was able to observe throughout and communicate directions or ask the patient questions as required. This made the consultation very efficient.

The set-up evolved as we learned how to use the technology. The connection was set up prior to the patient arrival. I was able to see the GP in the top right-hand corner of the Glass. We set up a computer in the consult room to join the meeting. This allowed the patient to now see the GP (at home) on the computer, and they were able to directly talk to her. This set-up provided a more personal and realistic remote consult, and improved connection between doctor and patient.

A challenge we encountered was that the volume wasn't sufficient for a more softly spoken or hard of hearing patient. To overcome this, the GP switched over to a microphone headset she had at home, which improved her volume, and I sat closer to the patient.

The patients seen with the Glass were impressed by the technology and the enhanced care provided to them, as is consistent with the published literature.[3] One remarked that he had received better service than usual (and he is probably right, we did spend more time with him!).

We found out that the Glass resolution wasn't great for examining skin lesions. Some consults did take longer, and some of this was due to troubleshooting the technology, but a major contributor was that the usual time cues were not present and contributed to time "getting away". I think this would improve with practice and with creating a flow when using the Glass and the team together.

I found a common thread in the use of the Glass with the GP and the simulated ED study. In both situations, there was uncertainty on who was ultimately driving the encounter. Was it the experienced clinician the one at home or the one with the patient? It was difficult, at times, for the in-person clinician to decide to use the consultant on the Glass for advice, direction, or "just in case." There would need to be clear guidelines for this to be used regularly and practiced.

I can see a need for both of these roles in various settings, but there needs to be a clear discussion before using the Glass to establish the roles so there is no confusion. As a TI, I found myself wanting to "give it a go", but on occasion the seniors stepped in early and took over the consultation, rendering me an observer or facilitator, rather than an active participant.

This was an unusual experience, but entirely predictable in this pandemic—and it was educational, novel and fun. I think this is feasible technology and fit for the purpose. The set-up was quick and easy, and the Glass was comfy to wear. It was a great way to get involved clinically whilst having some senior support in the background, if needed. They'll definitely ensure that junior staff sleep better after those tricky clinical scenarios because someone experienced is helping and watching over along the way. The consultant GP's perspective was that they felt, while being contagious, that the Glass was a great way to use and train more junior staff while being able to continue servicing patients.

The low-tech Glass version was purchased from the USA by the University; they have now ceased production but are still available. The Glass communicated with the expert at home via Google

Meet™ which, like using FaceTime or a phone call, do not record the encounter, but in addition include password-protected interactions that are on the same level, as is commonplace in workplace meetings these days. This technology has been investigated thoroughly and formally in the TI's ED study mentioned above (submitted for publishing). Currently underway is a similar study, in which we are utilising the learnings gathered from these two experiences and exploring alternative smart-glasses useability in the specific clinical setting of neonatal intensive care unit (NICU) retrievals. Currently, this type of technology has an exponential clinical uptake, including studies we are aware of in international settings, still in their trial phase. However, there was a news report circulating of the use of smart glasses with augmented and virtual reality for the separation of conjoined twins. [4] This technology is the way of the future in many clinical settings.

COVID-19 has created a strange and different working environment. It has created increased work and increased stress but as Brené Brown has gone on the record to say: "*vulnerability is the birthplace of creativity, innovation and change*." [5]

COMPETING INTERESTS

Nil.

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REFERENCES

1. Wilson MW, Scherz A, Waldie AM, Moore PP. Remote videoconference supervision of emergency orbital decompression with restoration of vision. Emerg J Australasia. 2021;33(6)1129-1130. doi.org/10.1111/1742-6723.13871.
2. Sutter Health - Vitals [Internet]. Remote Scribes for Clinicians – Google Glass and Sutter Health. 2020 Nov 18. Available at: https://vitals.sutterhealth.org/remote-scribes-for-clinicians-google-glass-and-sutter-health/.
3. Odenheimer S, Goyal D, Jones VG, Rosenblum R, Ho L, Chan AS. Patient Acceptance of Remote Scribing Powered by Google Glass in Outpatient Dermatology: Cross-Sectional Study. J Med Internet Res. 2018;20(6):e10762. doi: 10.2196/10762.
4. BBC News – Technology [Internet]. Conjoined twins separated with the help of virtual reality. 2022 Aug 1. Available at: https://www.bbc.com/news/technology-62378452.
5. McKnight L. How a crisis is the mother of innovation [Internet]. Acuity Mag. 2020 Sep 3. Available at: https://www.acuitymag.com/business/how-a-crisis-is-the-mother-of-innovation.

The Care Coordination Process: an opportunity to evaluate the impact of structural reform

Mariana Hudson, Emily A Gill

An effective care coordination process is integral to high quality and equitable healthcare[1] and should be evaluated. The Pae Ora (Healthy Futures) Bill outlines significant health reforms for Aotearoa New Zealand that prioritises improved health services for "*all of us*". The aims are "*simpler and more coordinated*" care that is "*more equitable, accessible, cohesive and people-centred*".[2] Measurement of care coordination may assist evaluation of how the reforms' aims are being achieved. However, we are unaware of New Zealand-based research that explores care coordination within primary care. Therefore, we present a definition of care coordination that has been mapped to measurement tools.

A systematic review by the Agency for Healthcare Research and Quality (AHRQ)[3] found a paucity of care coordination-specific measures. Their definition of care coordination is the most cited[4] and describes a process that occurs most often during and in response to care transitions, which includes between providers, across settings, between encounters or care episodes and within same-service care teams. Informed by their review, they organised requirements of the care coordination process into nine activities (Table 1) and suggested measures for each.[3,4] Appendix 1 illustrates how these measures map according to the activities. As a process that occurs across settings and providers, the AHRQ framework highlights that all team members involved in a patient's care participate in these activities.

To consider the AHRQ's evidence-based and measurable description of care coordination within New Zealand, we considered a rural primary care setting. Rural New Zealanders have a significant higher mortality rate than those living in urban areas[5] and contend with reduced access to health services while experiencing higher costs for services that are available,[6] and these inequities are compounded for Māori.[5] Such factors contribute to complex and chronic medical conditions that require care to be frequently transferred between providers and across settings,[7] which is when the care coordination process occurs.[3] Therefore, rural primary care is an appropriate setting from which to consider care coordination.

We applied the nine activities of the AHRQ framework to hypothetical clinical scenarios. We drew on our experiences as primary care providers (e.g., pharmacist and general practitioner (GP)) in a rural community with a significant proportion of Māori residents. No patient information was accessed, and the scenarios combine common clinical encounters.

We imagined the persona of a woman with end-stage renal failure being considered for dialysis who is Māori, in her late 50s, and works in management from her rural residence but frequently travels to urban centres. She lives in a self-contained unit with her supportive whānau, including two mokopuna who are in their final years of school. She is an active member of the community, being the secretary on several land trusts. She regularly initiates contact with her GP, community pharmacist and the hospital-based renal team. The scenarios (Table 2) describe episodes of care, including a transition to and from hospital for anaemia-induced mild heart failure.

Gaps are apparent throughout activities of care coordination in our experience of delivering complex medical care. Responsibility is not clearly established for aspects of care across healthcare settings, which can cause delays, errors, and frustrations (e.g., medicine changes; outpatient appointments scheduling coordination). Communication exchange between health providers can default to patients-as-messengers, who are surprised to learn that their GP or pharmacist is unaware of changes. When care transitions across settings, information transfer often requires manual updates to patient files and/or contacting another provider to ensure appropriate follow-up. Determination of patient goals, and what supports are required to achieve these, often require patients to volunteer this informa-

Table 1: AHRQ care coordination activity definitions.[3]

Care coordination activities	**Description summary**
Establish accountability or negotiate responsibility	It is made clear to the patient and all participants in the patient's care who is responsible for aspects of that care, and that accountability exists for failures. The person(s) primarily responsible for key care activities, and the extent and duration of that responsibility, is known.
Communicate (interpersonal; information transfer)	Knowledge and information are shared so that everyone has the information they need. Two key modes for this communication are through personal direct interactions (e.g., in-person, phone/video calls, instant messages, emails, letters) and information transfer (e.g., medical records, test results, medication lists, radiology images).
Facilitate transitions	Activities are designed to ensure timely and complete transmission of information or accountability when some aspect of care is transferred between two or more providers. Transitions include across settings (e.g., to and from hospital) and when care needs change (e.g., from paediatric to adult care).
Assess needs and goals	Determination of patient's goals to take care of their health and what they need to achieve this.
Create a proactive plan of care	One or more providers jointly create a plan with a patient and/or family that covers patient needs and goals, routine tasks, and anticipate the progression of medical needs.
Monitor, follow-up, and respond to change	Proactive enquiry on identified health concerns, the impact of health or treatment on daily life, and where gaps need addressing to achieve goals. Care plans are refined to accommodate new information or circumstances and to address gaps.
Support self-management goals	Education and support are tailored to patient capacity and preferences about involvement in their own care, so that patients manage their health in their preferred residence.
Link to community resources	Provide information about available resources, refer as required, and assist with connecting to the resources (e.g., timing of, and transport to, appointments).
Align resources with patient and population needs	Health care resources are allocated according to the needs of patients and populations.

Table 2: Hypothetical scenarios to demonstrate the care coordination process in a rural primary care setting in New Zealand, according to AHRQ activities.

Activity type[3]	Scenario
Establish accountability or negotiate responsibility	Both the GP and renal team adjust medication treatment frequently, but who has responsibility for ensuring prescriptions align for appropriate dispensing is unclear. Errors or delays in dispensing occur, when two scripts are received with different instructions from different providers within a few days. Chronological dispensing may be an error because the latter prescriber (e.g., GP), when requested to "repeat all long-term medications", has not received communication about a particular medicine change (e.g., renal team). Alternatively, a pharmacist may question this change which causes delay while messages are left by patient and/or pharmacist for prescribers, and workflow is interrupted to find time for a conversation to clarify which prescription to dispense. This scenario is repeated every 3–6 months.
Communicate (interpersonal; information transfer)	The patient's medicines are dispensed in monthly blister packs and the pharmacy requests a repeat of these medicines, from her GP, 2 weeks prior to when a new 3-monthly prescription is required. Neither the pharmacy nor the GP are aware that she has had a recent appointment with the renal team. When the renal team changes a medicine, a hand-written script is either scanned and emailed to the patient's nominated pharmacy or the patient delivers the paper to that pharmacy. The formal letter about this change arrives in the patient's GP file days or weeks later, so when a request to the GP from the pharmacy arrives for the 3-monthly prescription, the recent change by the renal team is not reflected in the new prescription. The patient is used to medicine changes and assumes what is in her pack is what her doctors intend for her to have.
Facilitate transitions	A discharge summary is electronically received by the GP within 12 hours of an acute medical admission with anaemia-induced mild heart failure. Several referrals have been made, with a note asking the GP to follow-up. Medicines have been changed, which require manual entry into the GP health record. The community pharmacy is not automatically informed of the hospitalisation nor of discharge medicine changes. Clarifying the discharge plan is time consuming, as there is no email or phone number to directly communicate with the provider responsible for the hospitalisation and discharge plan.
Assess needs and goals	Balancing work with her whānau's needs is the patient's priority. The patient presents to the GP asking which of the follow-up appointments are required, because she cannot take three days off work to travel for three appointments she's received at different locations on different days (e.g., gynaecology, echocardiogram, renal). The GP supplies the patient with the 0800-referral-centre number and suggests the patient ask for the direct dial number of the 3 relevant schedulers and encourages the patient to liaise with the schedulers so that appointments align. She mentions her frustration to the pharmacist when collecting medicines. She was unable to get through to schedulers and so left voice messages asking for re-schedules because of appointment conflicts with her work. The pharmacist offers to ring the various schedulers.
Create a proactive plan of care	The patient is supplied with a generic Heart Failure Plan booklet, which she finds an interesting read. However, she feels well since the blood transfusion and so is not sure this booklet is relevant, especially as there is mention of restricting how much she drinks which conflicts with the previous advice of drinking plenty to help her kidneys. The hospital pharmacy had also supplied her with a Medication Card which listed her medicines when she left hospital, but changes have happened since then, so she puts the card in a box with all her other medical paperwork. She wonders whether she or anyone will look at it again.

Table 2 (continued): Hypothetical scenarios to demonstrate the care coordination process in a rural primary care setting in New Zealand, according to AHRQ activities.

Activity type[3]	**Scenario**
Monitor, follow up, and respond to change	The patient is struggling with constipation and thinks this is from the new medicines, so rings the pharmacy. The pharmacist explains the iron supplements are the likely culprit but advises the patient to book an appointment with her GP. During this conversation, the pharmacist notes that a long-term medicine is about to be delisted from the funding schedule so phones the GP clinic and leaves a verbal message with reception. A hand-written note is left for the GP that says "medicine x is being delisted, needs alternative; pt has constipation". This non-urgent task is addressed a day later, with a script for an alternative medicine, and a task sent to the nurse team, requesting the patient be contacted about the constipation.
Support self-management goals	In addition to the existing blood pressure machine the patient bought a few years ago, upon the advice of the renal team, she now has been advised to weigh herself regularly as part of heart failure management. She buys a scale and writes down her weights next to her blood pressure readings, in a notebook, that she will take to her next appointment. Her weight increases, and she attributes this to reduced physical activity due to lots of recent work commitments.
Link to community resources	The patient's mokopuna have started messaging her more frequently when she is away, and she suspects they would benefit from professional support that helps them understand more about her health problems and provide a mechanism for them to express their concerns. When she mentions this to her medical team, the GP suggests asking the renal team, and the renal team suggest she visit the Kidney Health website. However, there is no regional office near her, and after a few clicks of not finding a quick way to connect with someone, she puts this in the too-hard basket.
Align resources with patient and population needs	The GP and pharmacist discuss how many patients have been buying blood pressure machines, upon the advice of doctors, and wonder whether they should create a combined report of this need to seek funding. However, both GP and pharmacy services are at capacity for creating such reports and they worry it would be a waste of time.

tion and self-advocate. Multiple care plans from different health services cause confusion, and follow-up often depends on a patient alerting providers of a change. Education about self-management is not always tailored to support implementation of recommendations (e.g., equipment access; response to self-measurements). Community resources can be difficult to access, and health providers are not routinely empowered to address population needs.

Patients who contend with complex chronic medical conditions need high-quality care for improved health,[8] and the process of care coordination is a cornerstone of high-quality primary care.[1] A systemic review[9] of care coordination measures found the activities most evaluated are communication and information transfer, how needs and goals are assessed and self-management support. Few studies measured how monitoring and follow-up responds to change in care needs and creation of proactive plans of care. The review highlighted the importance of understanding care coordination from multiple perspectives including patient/family, healthcare provider and the system representative. Patient experiences of care coordination are influenced by severity of health conditions, age and ethnicity,[10] which may explain the lack of generalised descriptions of patient-level care coordination experience despite multiple survey tools.[9] Healthcare providers focus on information transfer, with digital technology being both an enabler and barrier to improving coordination,[11] and system-level representatives highly ranked data sharing, multiple healthcare providers taking charge of aspects of care, and patient needs.[12]

Our anecdotal experience highlights the need to prioritise the measurement and evaluation of care coordination in New Zealand. "Care coordination" is only mentioned once in the latest *Budget 2022 Initiatives by Vote – Health* as part of the $1 million "Comprehensive Primary Care Teams" initiative that "*will combine traditional primary care services (GPs and registered nurses) with physiotherapists, practice-based pharmacists, care coordinators, and registered social workers/kaiāwhina*".[13] Care coordination must be understood, acted upon and structurally supported to enable a team process, rather than exist as an individual's role. This process consists of nine measurable activities[9] that all providers who are involved in an individual's care should perform. Mention of "care coordination" in policies and job descriptions should align with evidenced-based definitions, so that collaboration is prioritised; all team members are resourced to understand, and participate in, the activities of care coordination; and evaluation can occur.

The "Comprehensive Primary Care Teams" establishment investment should be evidenced-based and focussed on the process of high-quality care coordination that occurs most often during care transitions between providers and across settings. Research and evaluation are important approaches to ensure investment in care coordination will improve health.

COMPETING INTERESTS

Nil.

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REFERENCES

1. Starfield B. Primary care and equity in health: the importance to effectiveness and equity of responsiveness to peoples' needs. Humanity Soc. 2009;33(1-2):56-73.
2. Te Whatu Ora | Health New Zealand: Te Kāwanatanga o Aotearoa | New Zealand Government. ; 2022. Available from: https://www.tewhatuora.govt.nz/. [accessed Nov 16 2022].
3. McDonald KM, Schultz E, Albin L, Pineda N, Lonhart J, Sundaram V, et al. Care Coordination Measures Atlas Update. Rockville, MD: Agency for Healthcare Research and Quality; 2014. https://www.ahrq.gov/ncepcr/care/coordination/atlas.html [accessed Nov 16 2022].
4. Peterson K, Anderson J, Bourne D, Charns MP, Gorin SS, Hynes DM, et al. Health care coordination theoretical frameworks: a systematic scoping review to increase their understanding and use in practice. J Gen Intern Med. 2019;34(1):90-8.
5. Whitehead J, Davie G, de Graaf B, Crengle S, Fearnley D, Smith M, et al. Defining rural in Aotearoa New Zealand: a novel geographic classification for health purposes. N Z Med J. 2022;135(1559):24-40.
6. Fearnley D, Kerse N, Nixon G. The price of 'free'. Quantifying the costs incurred by rural residents attending publically funded outpatient clinics in rural and base hospitals. J Prim Health Care. 2016;8(3):204-9.
7. Schoen C, Osborn R, Squires D, Doty M, Pierson R, Applebaum S. New 2011 survey of patients with complex care needs in eleven countries finds that care is often poorly coordinated. Health Aff. 2011;30(12):2437-48.
8. Blumenthal D, Chernof B, Fulmer T, Lumpkin J, Selberg J. Caring for high-need, high-cost patients—an urgent priority. N Engl J Med. 2016;375(10):909-11.
9. Schultz EM, Pineda N, Lonhart J, Davies SM, McDonald KM. A systematic review of the care coordination measurement landscape. BMC Health Serv Res. 2013;13:119.
10. Benzer JK, Singer SJ, Mohr DC, McIntosh N, Meterko M, Vimalananda VG, et al. Survey of Patient-Centered Coordination of Care for Diabetes with Cardiovascular and Mental Health Comorbidities in the Department of Veterans Affairs. J Gen Intern Med. 2019;34(Suppl 1):43-9.
11. Gill E, Dykes PC, Rudin RS, Storm M, McGrath K, Bates DW. Technology-facilitated care coordination in rural areas: What is needed? Int J Med Inform. 2020;137:104102.
12. Nicolet A, Perraudin C, Wagner J, Gilles I, Krucien N, Peytremann-Bridevaux I, et al. Patient and Public Preferences for Coordinated Care in Switzerland: Development of a Discrete Choice Experiment. Patient. 2022 Jul;15(4):485-496.
13. Robertson HG. Wellbeing Budget 2022. In: Finance Mo, editor.: Te Kāwanatanga o Aotearoa | New Zealand Government. 2022;118. https://budget.govt.nz/budget/pdfs/wellbeing-budget/b22-wellbeing-budget.pdf. [accessed May 24 2022.]

Appendix 1: Number of activities & approaches measured by Individual Measures as listed in 'Care Coordination Master Measure Mapping Table, Health Care Professional(s) Perspective.' pg. 56 AHRQ 2014 Care Coordination Measures Atlas.[3]

		Measures as referenced in AHRQ Atlas																									
Coordination activities		**5**	**7a**	**7b**	**8**	**11b**	**12a**	**12b**	**17d**	**18**	**20**	**22b**	**23**	**27**	**28**	**38c**	**38d**	**38e**	**38f**	**43**	**46**	**62**	**63**	**72**	**74**	**75**	**77**
Establish accountability or negotiate responsibility		1	1	1		**1**			🟥	1	1	1				1	1	1		1	1	1			1		
Communicate	All communication	1	1	1		**1**	1	1	**1**			1	1					1	1	1	1	1			1		1
	Interpersonal communication		1	1	1	**1**	1	1	**1**			1	1		1					1					1	1	1
	Information transfer	1	1	1	1	**1**	1	1	**1**	1	1	1	1	1		1	1	1	1			1		1		1	1
Facilitate transitions	Across settings	1				🟥			**1**			1		1		1	1	1	1	1					1	1	1
	As coordination needs change					**1**						1															
Access needs and goals		1				**1**	1	1	**1**		1		1	1			1	1	1	1	1				1		
Create a proactive plan of care		1		1	1	**1**	1		🟥			1	1	1				1	1			1					
Monitor, follow-up and respond to change		1				**1**	1	1	**1**		1	1	1												1	1	1
Support self-management goals		1			1	**1**			**1**		1	1					1	1	1						1		
Link to community resources		1				**1**			**1**			1		1				1							1		

Appendix 1 (continued): Number of activities & approaches measured by Individual Measures as listed in 'Care Coordination Master Measure Mapping Table, Health Care Professional(s) Perspective.' pg. 56 AHRQ 2014 Care Coordination Measures Atlas.[3]

	Measures as referenced in AHRQ Atlas																									
Coordination activities	**5**	**7a**	**7b**	**8**	**11b**	**12a**	**12b**	**17d**	**18**	**20**	**22b**	**23**	**27**	**28**	**38c**	**38d**	**38e**	**38f**	**43**	**46**	**62**	**63**	**72**	**74**	**75**	**77**
Establish accountability or negotiate responsibility	1	1	1		**1**			🟥	1	1	1				1	1	1		1	1	1			1		
Align resources with patient and population needs	1			1	**1**			**1**		1						1	1							1		
Broad approaches																										
Teamwork focussed on coordination		1	1		**1**	1	1		1			1	1	1					1	1	1			1		
Healthcare home								**1**																1		
Care management	1				**1**						1		1													
Medication management								**1**	1	1					1		1	1				1				
Health IT-enabled coordination					🟥			**1**																	1	
Number of items measured	**11**	**5**	**6**	**5**	**13**	**8**	**6**	**12**	**5**	**7**	**11**	**6**	**7**	**2**	**4**	**6**	**10**	**7**	**6**	**4**	**5**	**1**	**1**	**11**	**5**	**5**

Notes: 11b – Family-Centred Care Self-Assessment Tool – Provider version.
17d – Primary Care Assessment Tool – Facility Expanded Edition (PCAT - FE), John Hopkins.
Red cells – activity NOT measured.

John Bower Morton

4 January 1935–19 September 2022

MB ChB 1961, BMedSc 1959 (University of Otago),
FRCS Edin 1969, FRACS 1975

John Morton was born in Invercargill, was the son of John Thomas and Johan Morton (neé Calder) and grew up on Top View Farm, Seaward Downs near Edendale in Southland. John attended the one-teacher Seaward Downs School, and Southland Boys' High School. At the latter, he excelled in singing and began his sailing journey, which later included helping to build and sail the *Tuarangi* to Australia.

John graduated MB ChB in 1961 from the University of Otago. In 1959, he had also completed a BMedSc in the Microbiology Department, where he first became interested in the transplantation of human tissues. While he was a student, he was awarded a Blue for yachting.

He worked at Wellington Hospital between 1962 and 1964 as a junior doctor, where he first saw patients with chronic kidney failure, and was involved with the vascular access provision for the dialysis treatment of a man with a crush injury causing acute renal failure. This experience sparked a lifelong interest in the provision of vascular access for patients needing haemodialysis. While working in Wellington he met Irene Wood, a laboratory technician at the hospital. They were married in 1965 and had three children: Lisa, Carolyn and Bruce. John and Irene separated in 1982, and John married his former theatre nurse, Allison Coster in 1986.

In 1965, he joined the surgical training scheme established by Sir Brian Barratt-Boys at Auckland Hospital. While he was there, the first kidney transplant in New Zealand was done and John gained his first experience in donor nephrectomy and with assisting in transplant operations.

In 1968, he travelled to Edinburgh as a ship's doctor and worked for a short time at the University of St Andrews as an assistant lecturer in the Department of Anatomy, before being appointed registrar in the Nuffield Transplantation Surgery Unit headed by Professor Sir Michael Woodruff. It was here where he trained as a renal transplant surgeon.

John joined the newly established Academic Department of Surgery at Christchurch Hospital in 1973 and set up its kidney transplant programme. He was Chairman (1988–1992) followed by Clinical Director (1992–1996) of the Department of General and Vascular Surgery at Christchurch Hospital. He was made an Associate Professor of Surgery in

1979. From 1973 to his retirement from surgical practice in 1996, John provided skilled and compassionate care for hundreds of kidney patients in the South Island who remember him with affection and respect.

In the early days of kidney transplantation in New Zealand, John was a leader in how best to obtain permission for organ donation, compassionately taking into account the needs of grieving families. He worked tirelessly to improve the public's understanding of the benefits of organ donation, and to improve the rate of donation.

He pioneered the introduction of modern brain death protocols critical to ensuring community support for organ donation after death, and also the development of a national standard of practice for solid organ transplantation.

John's wisdom and encouragement were key factors in the start of living donor kidney transplantation at Chistchurch Hospital in 1974, and in the Christchurch Transplant Group carrying out the first altruistic non-directed living kidney transplant in Australasia in 1998.

John was a dedicated and popular clinical teacher. He was awarded the University of Otago's Gold Medal for Excellence in Teaching in 2013. Two of his surgical trainees—Justin Roake and Stephen Munn—became transplant surgeons and professors of surgery.

In 1996, John took up a position as Medical Advisor to the Resident Medical Officer Unit at Christchurch Hospital, and became a Living Donor Counsellor for the South Island Renal Transplant Service.

John was a member for ten years, and Chairman for five, of the Medical Council of New Zealand's Complaints Assessment Committees.

John had an interest in ethics from an early age. He enjoyed teaching medical ethics to his students, and was Chairman of the Christchurch Hospital Ethics Committee for ten years, from 1980–1990. Another interest, influenced by Archie Cochrane's writings, was the study of the effectiveness of surgical interventions.

John is survived by his sister, three children and two grandsons.

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This obituary was compiled by Kelvin Lynn, Kidney Health New Zealand;
Justin Roake, Vascular Endovascular & Transplant Surgery; and John's children.

Birth Control

NZMJ, 1922, Editorial

Editorial

In medical journals recently, there have appeared reports of conferences in which prominent doctors have advocated birth-control and the use of contraceptives, and these reports have shown that the medical profession is divided upon this subject. The question has been discussed in all ages from the time of Plato and Aristotle, but the first essay in systematic form was published by Malthus in 1798. On reading Malthus, Darwin was strengthened in the belief that natural selection is the inevitable result of the rapid increase of animal life, and that this increase leads to the struggle for existence. What is true as regards the lower animals does not apply equally in regard to mankind. The theories of Malthus were generally correct, but his conclusions did not present by any means the whole truth, and the progress of colonization, of sanitation and health measures, the international exchange of food supplies, and other factors in the progress of the last century have falsified part of the verdict at which Malthus arrived. He contended that *there is a natural tendency in population to increase faster than the means of subsistence.* This contention appears to be futile when it is considered that in 1798 the population of Europe was much less than in the year 1898, and at this latter period the people generally had never been so well fed. The French peasantry were almost starving at the close of the eighteenth century. The Napoleonic wars levied their toll on population, and while the people steadily increased during the last hundred years such factors as epidemics and poverty, on which Malthus relied for the suppression of population, markedly diminished. What with the progress of the means of transport, the possibilities of intensive cultivation, and the progress of science generally, it would be a bold man who would say that this old brown Earth could not carry on its surface, at some future period, a population twenty times greater than to-day.

But we are less concerned with Malthus than with Malthusianism, except to observe that Malthus gave no sanction whatever to the theories and practices now currently known as Malthusianism. He approved only of the principles of moral self-restraint—“Do not marry until you have a fair prospect of supporting a family,” he said. This is a wise injunction, but it is carried too far when the cost of living is inflated by far too high a standard of living. On this point the present generation in New Zealand compares unfavourably with the early settlers. We have no words sufficient to express our contempt for people who are healthy and living in fairly good economic conditions who get married with the intention of having no children. The limitation of families among the poor has something to commend it, but it is hardly ever practised, and in other classes of society, where there is no justification on medical grounds, it results from selfishness in its most revolting form on the part usually of the mother. When this practice is common it is a sign of national decay. Unfortunately it is common in New Zealand, where there is probably less excuse than in any other part of the habitable globe. That this artificial check to population should receive the sanction of any section of the medical profession seems almost incredible. When many of the best and bravest of our young men have perished in the Great War and when the urgent need of this country and the Empire is population, it is not only surprising that Malthusianism should be advocated by medical men or even by laymen, but it is monstrous… We have read the arguments advanced by the advocates of the general and extended use of contraceptives, and they do violence to everything that is sacred to the name of nature, morality, science and common-sense. We may charitably suppose that these false prophets are working in a murky and vitiated atmosphere in which they mistake change for progress.