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Paediatric pelvic fractures: Starship Hospital experience

Mohit Bajaj, Giorgio Stefanutti, Haemish Crawford, Vipul Upadhyay

We have demonstrated that pelvic fractures are an important marker of severe paediatric trauma. While the majority of pelvic fractures can be managed conservatively, some injuries do require surgical intervention. In addition to the fracture itself, surgery is often required for injuries to other organ systems. When evaluating and managing pelvic fractures, a multi-disciplinary approach needs to be employed to prioritise the management of pelvic fracture and associated injuries.

Seasonal variation in Takotsubo syndrome compared with myocardial infarction: ANZACS-QI 16

Jen-Li Looi, Mildred Lee, MSc, Corina Grey, Mark Webster, Andrew To, Andrew J Kerr

Takotsubo syndrome, TS (also known as broken heart syndrome) mimics the presentation of a heart attack. Heart attack shows well-defined temporal patterns in its occurrence throughout the year, which is characterised by a peak in winter and a trough in summer. Our study is the first study to date investigating the seasonal patterns of presentation of TS and heart attack in the Southern Hemisphere. We have demonstrated that the onset of TS differed as a function of season, with the events most frequent in summer and least so in winter. In contrast, incidence of heart attack was highest in winter and lowest in summer. The reasons underlying this seasonal variation observed in TS are still unclear and further studies are needed to investigate the potential link between season variation in TS onset and its underlying cause.

Management of suspected acute coronary syndrome patients admitted to cardiology or non-cardiology services at Auckland City Hospital: implications for future national data collection

Tom Kai Ming Wang, Kok-Lam Chow, Aaron Lin, Alexei Chataline, Harvey White, Matthew Dawes, Greg Gamble, Chris Ellis

The study used comprehensive data from the previous 2012 National ACS (heart attack and unstable angina) audit to consider differences in patient management between those patients cared for by the cardiology and non-cardiology services. The current Ministry of Health-funded National database: the All New Zealand ACS Quality Improvement (ANZACS-QI) database, does not enrol non-cardiology ACS patients (at Auckland Hospital and potentially also at other large-centre hospitals), which will lead to inaccuracies with the data, and limitations to the quality improvement programme. There is a need to ensure complete capture of ACS patients on the National ANZACS-QI database, to allow appropriate assessment of available ACS services.

Renal function monitoring in patients prescribed dabigatran in the Compass Health Primary Health Organisation: a quality improvement audit

Lynn McBain, Anna Kyle

The Compass Health Primary Health Organisation checked every patient prescribed the anticoagulant (blood thinner) dabigatran twice during 2014 and 2016. There was a big increase in patients prescribed dabigatran during this time. Kidney function needs to be monitored if dabigatran is being taken. Ninety-six (96%) percent of patients prescribed dabigatran were taking it for approved reasons and 90% of patients had their kidney function checked each year, which is recommended by treatment guidelines.

Smoking prevalence among doctors and nurses—2013 New Zealand census data

Richard Edwards, Danny Tu, James Stanley, Greg Martin, Heather Gifford, Rhiannon Newcombe

We examined recent smoking trends among doctors and nurses in New Zealand using recent census data. We found that smoking had declined steadily and by 2013 only 2% of male and female doctors and 9% of male and 8% of female nurses were regular cigarette smokers. Smoking was more common among Māori doctors (7%) and nurses (19%), and also among psychiatric nurses. The findings suggest that New Zealand doctors had achieved the Smokefree 2025 goal of minimal (<5%) smoking prevalence and all nurses except psychiatric nurses were on track to do so. Targeted workplace smoking cessation support could be used to reduce smoking among key occupational groups such as Māori nurses.

What do doctors know about assessing decision-making capacity?

Greg Young, Alison Douglass, Lorraine Davison

All doctors need to know how to assess a patient's capacity to make decisions so that they can get informed consent for medical procedures, but also to support a patient who may have a condition that impairs their cognition and who needs to make an important decision, but may not be able to do so. Such patients are vulnerable and need support. We did a survey of hospital doctors of all grades and of GPs to assess what they knew about capacity assessment, whether they wanted to learn more, and what format of teaching they preferred. The majority of respondents could recall seeing a patient with suspected problems with capacity in the previous year, mostly due to cognitive disorders like dementia. There were significant gaps in the respondents' knowledge about capacity assessment, and the respondents described a range of difficulties they perceived with doing capacity assessment. Tutorials, internet-based learning and workshops were equally popular educational methods.

New atrial fibrillation diagnosed perioperatively—anticoagulation practices in a secondary hospital

Alyssa Kirby, Sisira Jayathissa

Atrial fibrillation is an abnormal heart rhythm which can occur around the time of surgery. Atrial fibrillation can lead to serious complications, which include an increased risk of having a stroke in the future. It is not clear whether or not atrial fibrillation before or after surgery should be managed in the same way that patients without surgery are treated. This paper shows current practice at this hospital varies from patient to patient, due to a lack of strong evidence to guide treatment.

Mahi a Atua: a pathway forward for Māori mental health?

Diana Rangihuna, Mark Kopua, David Tipene-Leach

Māori demand on New Zealand mental health services is out of proportion to the size of the Māori population, and the psychiatric service response is limited by lack of capacity. But there is also an inherent lack of capability, that is, the ability of a Western paradigm psychiatric service to meet the needs of an indigenous community. The Mahi a Atua narratives-based programme established in the primary mental healthcare services of the Tairāwhiti/Gisborne area has created a new approach to psychiatric assessment, diagnosis and therapy that is appropriate, but not confined, to the Māori community. This pilot project will be of interest nationwide and will have implications for those dealing with mental health problems and other forms of social distress.

Climate change, human health and the CPTPP

Oliver Hailes, Rhys Jones, David Menkes, Joshua Freeman, Erik Monasterio

Unless you are a politician, activist or business leader, there is a high chance your eyes will glaze over with talk of the Trans-Pacific Partnership Agreement (TPPA). The economic treaty is a technical legal document of around 6,000 pages, and its recent rebranding as the Comprehensive and Progressive Agreement for TransPacific Partnership (CPTPP) serves only to frustrate and confuse laypeople trying to understand its implications. But the influence of the CPTPP on the future health of the New Zealand population is undeniable and, despite the treaty's complexity, it demands the full attention of the nation's health professionals.

It is now well established, for instance, that the original TPPA would have driven up the price of pharmaceuticals by expanding intellectual property protections and weakening Pharmac's purchasing model.[1] It might have also stymied the government's ability to regulate or ban direct-to-consumer advertising (DTCA) of prescription medicines, an effective marketing tool that drives demand for expensive and potentially harmful drugs.[2] Overall, the treaty was noted for its potential to conflict with policies that advance health and human rights,[3] and was associated with considerable risks to health equity and social justice.[4]

In this viewpoint article, however, we focus on the CPTPP in the context of the global climate crisis and its potential downstream impacts on health. While the treaty pays lip service to broader social and environmental concerns, we will highlight how the CPTPP is geared fundamentally towards the interests of transnational corporations and foreign investors at the expense of concerns about human and environmental health.

Climate change and human health

There is a considerable body of scientific literature and consensus on the harmful impacts of climate change on health. So much so that climate change has been identified as the most serious threat to global public health this century.[5] Direct impacts include death, illness and injury due to heat waves and extreme weather events. Powerful indirect impacts on health are mediated by a complex interaction of social, environmental and economic factors. These include shifting patterns of infectious disease, air pollution, freshwater contamination, impacts on the built environment from sea level rise, forced migration, economic collapse, conflict over scarce resources and increasing food insecurity.[6] The mental health impacts of climate change are likely to be significant and represent a poorly recognised burden on the health system. They include direct and indirect effects, with disproportionate impacts on populations already facing high rates of mental illness and substance use disorders, notably indigenous and socioeconomically disadvantaged communities.[7]

A recent report from the Royal Society demonstrates that climate change is already affecting the health of New Zealanders, and that these impacts will intensify if climate change is allowed to continue unchecked.[8] The overall adverse health impacts will be disproportionately borne by vulnerable groups and those already suffering from disadvantage in Aotearoa: children, elderly, low-income, Māori and Pacific populations.[9,10]

Yet there are significant co-benefits for New Zealanders' health that could be achieved through reduction of emissions in sectors such as transport, housing, energy and agriculture.[9] Indeed, tackling and mitigating climate change has been recognised as perhaps the greatest global health *opportunity* of the 21st century.[11] This opportunity can only be realised through the initiative of a government that is willing and able to make bold changes in social and economic policy.

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Background to the CPTPP

The 11 negotiating parties to the CPTPP represent the remainder of the 12 states (now minus the US) that formally signed the TPPA in Auckland on 4 February 2016: Australia, Brunei Darussalam, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore and Vietnam. In its original form, the TPPA was poised to set the rules for the free flow of goods, services, information and investment around the Pacific Rim, fusing a dozen domestic markets to form a regional bloc embracing some 40% of global GDP and one-third of international trade.[12] However, by dint of Article 30.5.2, the TPPA could not come into force without ratification by the US.[13]

On 8 November 2016, the very same day that the TPPA's proponents were thwarted by Donald Trump's election on an anti-TPPA platform, the World Meteorological Organization (WMO) reported to the United Nations Climate Change Conference in Morocco that the past five years were the hottest on record.[14] This process continues to be accelerated by a global economic model creating ever greater carbon emissions, and there is an emerging consensus that current geological changes signal a new epoch, the Anthropocene, in which human activity is the dominant influence on climate and the environment.[15] The Paris Agreement, signed on 22 April 2016, attempts to address the threats of climate change through national efforts to reduce carbon-intensive industry. Yet these unenforceable commitments are directly at odds with the binding rules of economic treaties like the CPTPP, which effectively underwrite unsustainable patterns of production, transport and consumption based on fossil fuels as the primary energy source.[16]

After some Canadian hesitation during negotiations at the Asia-Pacific Economic Cooperation (APEC) summit in late 2017, a deal was struck by the 11 countries on 23 January 2018 following two days of talks in Tokyo, with plans to sign the revised terms on 8 March in Chile. Only 22 out of the more than 1,000 provisions to the original text have been suspended, not removed, and they can be revived by consensus.[17] Thus, the substance of the CPTPP is identical to that which was signed in early 2016. At this critical juncture, it is vital to examine how the treaty might threaten essential government action on climate change.

Climate change and the CPTPP

Only six of the 30 chapters to the TPPA, now the CPTPP, deal with trade in goods such as meat, milk and motorcars. The rest of the 6,000 pages cover a vast range of matters such as Electronic Commerce, Government Procurement, Labour and Environment. Yet nowhere in the final text is the term "climate change" mentioned.[18]

Article 20.15 appears to address the climate crisis obliquely by acknowledging that "transition to a low emissions economy requires collective action" and that the parties "shall cooperate to address matters of joint or common interest" such as "development of cost-effective, low emissions technologies and alternative, clean and renewable energy sources". Other environmental issues recognised in Chapter 20 include ship pollution of the marine environment, depletion of the ozone layer, overfishing and conservation of flora, fauna and natural resources. But it is important to realise from a legal standpoint that these soft acknowledgements and the vagaries of the environmental "Cooperation Frameworks" (Article 20.12) contrast starkly to the enforceable rules designed to protect the profitability of foreign investments.

The drafters of the CPTPP seem well aware of the important relationship between law, economic growth and the environment: it is widely understood that while the state has a role in regulating private sector access to natural resources at the national level, international law has historically played an important role in securing a globalised, neoliberal approach to resource ownership and exploitation.[19,20] Beyond the impact on particular sectors, the CPTPP would place enforceable limits on the New Zealand government's regulatory powers, analogous to supreme constitutions in countries where the courts can override democratic legislation.[21] Chapter 9 on Investment contains strong and expansive rights for foreign investors—including protection from expropriation without compensation (Article 9.8) and an open-ended guarantee of a "minimum standard of treatment" (Article 9.6)—that are enforced through the investor-state

dispute settlement (ISDS) mechanism. ISDS provisions are included in economic treaties to help resolve disputes between foreign investors and countries in which they have invested, but the process is undergoing a crisis in legitimacy due to concerns about structural biases in favour of investors.[22]

Investor protections under the CPTPP effectively introduce a backdoor mechanism to constrain New Zealand's law-making process by enabling investors to sue governments if they adopt regulations that, for example, erode the expected value of their assets through environmental regulations such as the phasing out of fossil fuel extraction. These protections are not available to New Zealand citizens and businesses, yet they extend to "every asset that [a foreign] investor owns or controls, directly or indirectly, that has the characteristics of an investment, including such characteristics as the commitment of capital or other resources, the expectation of gain or profit, or the assumption of risk" (Article 9.1). This expansive definition goes well beyond real estate and physical assets to cover almost everything that can be wrapped in the cloak of property rights, including this non-exhaustive list of examples: regulatory permits; intellectual property rights; financial instruments such as stocks and derivatives; "turnkey, construction, management, production, concession, revenue-sharing and other similar contracts"; and "licences, authorisations, permits and similar rights conferred pursuant to the [country's] law".

Admittedly, the CPTPP contains a boilerplate safeguard: "non-discriminatory regulatory actions by a [government] that are designed and applied to protect legitimate public welfare objectives, such as public health, safety and the environment, do not constitute indirect expropriations, except in rare circumstances" (Annex 9B.3(b)). But notice all the investor-friendly qualifications buried within this exception: "non-discriminatory"; "legitimate"; "except in rare circumstances". Investment lawyers are trained (and paid handsomely) to exploit such loopholes, which many ISDS cases internationally have invoked to challenge public health and environmental legislation.[23] For instance, a Canadian energy company brought a claim of US$15 billion against the US under the North American Free Trade Agreement (NAFTA) after the Obama administration cancelled construction of the Keystone XL pipeline, intended to link Canada's tar sands and the Gulf of Mexico, on environmental grounds including concerns about climate change.[3]

The 22 adjustments in the rebranded agreement have admittedly introduced modest improvements in some specific, technical areas. For example, doctors should be pleased to see that the suspension of Articles 18.50 and 18.51 temporarily removes the requirements for countries to strengthen their data- and market-protection settings for biologics, thereby allaying fears that public access to cutting-edge medicines will be limited through cost-prohibitive monopolies. However, these interim adjustments do nothing to address the core problems with the CPTPP and its less obvious but more serious long-term impacts on health caused by climate disruption. Despite official assurances that ISDS concerns have been remedied, the suspensions in the Investment Chapter only prevent investors from using that mechanism if the dispute concerns a private contractual relationship with the New Zealand government, distinct from a claim against public regulatory measures, or if the investor is based in Australia.[17] Moreover, these suspensions will almost certainly be abandoned if the US seeks to join at a later date, as the Trump administration has indicated recently, which is by far the most frequent home state of claimants under ISDS provisions: as at the end of 2014, about 130 claims had been initiated by US investors, nearly twice as many as the second most litigious state.[24] Notably, over 85% of damages paid by governments under economic treaties with the US have resulted from investor claims over resources and the environment.[25]

So, if we peel back the window dressing, the fundamental objective of treaties like the CPTPP remains to protect the business interests of investors (primarily transnational corporations) by limiting the legislative power of future governments, even if they gain a democratic mandate for change.[26,27] The effect of the Investment Chapter, in particular, is not

so much to reform current policy but to prevent future progressive or precautionary reforms through obligations that make it more difficult for governments to regulate in response to public health and environmental risks.[28] At the very least, New Zealand's negotiators should have demanded an ISDS "carve-out" to support action on climate change, similar to the clause that excludes tobacco control measures from ISDS action (Article 29.5).[29] Instead, if ratified, the CPTPP would shore up the existing model of underregulated economic growth and impede the adoption of a more balanced, interventionist and sustainable approach to development, despite overwhelming evidence that urgent and decisive reforms are needed to address the climate threat to human health.

Concluding remarks

Since 1984, successive governments in New Zealand and other countries in the Organisation of Economic Cooperation and Development (OECD) have actively pursued a broadly neoliberal policy agenda characterised by transforming public property and social services into tradable assets and creating a regulatory landscape that prioritises interests of foreign investors.[30] As we have noted, international economic treaties such as the CPTPP have been a key mechanism through which this agenda has been consolidated and expanded. However, in light of climatic impacts alone, it is now clear that this model of economic development is unsustainable, dangerous to population health and in urgent need of fundamental reform.

The Labour-led Government has launched into its first term with bold plans to align New Zealand's economy with priorities dictated by the urgency of the climate crisis. This will include introducing a Zero Carbon Bill to set statutory targets for transitioning to net-zero carbon emissions by 2050; health professionals will have the opportunity to contribute to the nationwide consultation beginning in May. Ironically, the Government's ambition in this regard would be seriously undercut by signing a treaty that underwrites the economic status quo and creates strong legal headwinds for essential regulatory action. A systematic and independent assessment of the CPTPP's anticipated impacts on climate disruption, and on mitigation strategies, should therefore be undertaken and released for public discussion before the treaty is ratified. The assessment should also include an analysis of the projected impacts on population health and equity. Such an assessment is particularly critical as climate change poses such clear risks to the health of New Zealanders, and the constraints on climate action conferred by the CPTPP (as presently formulated) would prevent important steps to protect our health and create a fairer society.

Competing interests:
Nil.

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Paediatric pelvic fractures: Starship Hospital experience

Mohit Bajaj, Giorgio Stefanutti, Haemish Crawford, Vipul Upadhyay

ABSTRACT

AIM: Pelvic fractures constitute between 0.3% and 4% of all paediatric injuries, with a mortality rate up to 25%. This study aims to review the experience with pelvic fractures at Starship Children's Hospital and demonstrate its role as a marker of severe trauma.

METHODS: A retrospective review of children with pelvic fractures managed at our institution in the 20-year period between July 1995 and May 2015 was performed. The search identified 179 consecutive children admitted with a pelvic fracture. Data fields collected included patient details, mechanisms of injury, investigations performed, length of hospital stay, management and complications. Data was also collected on Injury Severity Score (ISS), Glasgow coma scale (GCS), transfusion requirements and details of associated injuries (both orthopaedic and non-orthopaedic).

RESULTS: Median age was eight years (IQR 5-12 years) with 65% boys. The median Injury Severity Score (ISS) was 9 (IQR 4-22). Pedestrian-motor vehicle injuries were most common at 46% of cases, followed by passengers injured in motor vehicle accidents accounting for 23% (n=41). Associated injuries were present in 68% (n=122) of patients, with other orthopaedic fractures (42%, n=75) and thoracic injuries (33%, n=59) most common. Management of pelvic fractures was primarily non-operative, with only 7% (n=13) requiring operative intervention. In comparison, operative procedures for associated injuries were much more common and were required in 38% (n=68) of cases.

CONCLUSION: Pelvic fractures represent an important marker for severe trauma. Patterns of paediatric pelvic fractures reported by other studies around the world are very similar. Understanding the patterns in which pelvic fractures and their associated injuries occur and the outcome of treatment is fundamental to the establishment of effective preventative, diagnostic and therapeutic interventions.

Trauma is a leading cause of mortality in the paediatric patient population.[1] Pelvic fractures are uncommon in children, but can occur as a result of high-energy blunt trauma, such as vehicular injury. Pelvic fractures constitute between 0.3 and 4% of all paediatric injuries, with a mortality rate up to 25%.[2]

The presence of a pelvic fracture is often a marker of severe trauma and should alert the clinician to actively exclude and treat associated life-threatening soft-tissue injuries. The severity of associated injuries and complications, especially those of the central nervous system, which accompany pelvic fracture, result in greater morbidity and mortality than the pelvic injury itself.[3–5]

Objectives

This study aims to review the experience with pelvic fractures at Starship Children's Hospital and demonstrate its role as a marker of severe trauma. We compare the mechanisms of injury, clinical presentation, management and outcomes of children presenting with pelvic fractures in New Zealand with other studies published in English language literature.

Patients and methods

Study design

Starship Children's Hospital provides the largest paediatric surgical and trauma service in New Zealand, with an average of 1,000 trauma admissions annually over the past decade. A retrospective review of children with pelvic fractures managed at our institution in the 20-year period between July 1995 and May 2015 was performed. Patients were identified from the hospital coding and trauma registry. The search identified 179 consecutive children admitted with a pelvic fracture.

Variables

Data fields collected included patient details, mechanisms of injury, investigations performed, length of hospital stay, management and complications. Data was also collected on Injury Severity Score (ISS),[6] Glasgow coma scale (GCS),[7] transfusion requirements and details of associated injuries (both orthopaedic and non-orthopaedic).

Associated orthopaedic injuries were defined as all bony fractures excluding skull, rib and facial fractures. Associated non-orthopaedic soft tissue and visceral injuries were sub-divided into major chest trauma (haemothorax, pneumothorax and lung contusion), closed head trauma (traumatic brain injury, intra-cerebral haemorrhage, cranial and all facial fractures), abdominal injuries (solid organ injury and viscous perforation) and urogenital trauma (bladder, urethral or vaginal injury).

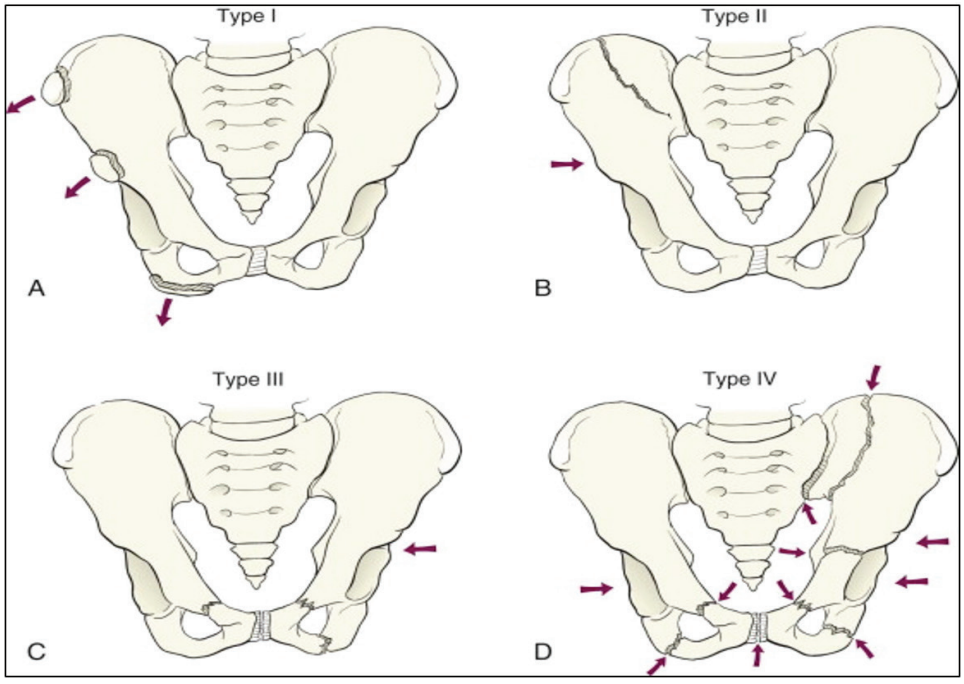
Radiologist reports of all plain radiographs, including computed tomography scans when available, were used to classify each pelvic fracture according to the system proposed by Torode and Zieg (Figure 1).[8,9] This classification, based exclusively on plain radiography, remains the best and most widely used system for describing paediatric pelvic fractures.[10] It considers both anatomic and mechanical factors, relating mechanism of injury to severity of deformity. With the increased diagnostic use of cross-sectional imaging, modifications to the original Torode and Zieg classification have been proposed and shown to be predictive for significant morbidity and mortality in the setting of trauma.[1]

Statistical methods

All collected data was recorded on an Excel 2010 spreadsheet (Microsoft Companies, Richmond, USA). The distribution of descriptive variables was expressed as median with inter-quartile range (IQR). All analyses were conducted using the Statistical Analysis System (SAS) software suite (North Carolina, USA). A p-value <0.05 was used to denote statistical significance.

The Chi-squared test was used to determine differences in proportion between independently distributed datasets. This included comparison of differences in patients' sex, side of pelvic fracture and whether patient weight predicted likely mechanism of injury. A Spearman's correlation test was used to measure the strength of the monotonic relationship between pelvic fracture complexity and the ISS. A Wilcoxon test was used to compare non-parametric matched samples, including the difference in ISS values between cases with mortality and the rest.

Figure 1: The Torode and Zieg classification of pelvic fractures.



Arrows show the direction of force. A, Type I: avulsion fractures. B, Type II: iliac wing fractures. C, Type III: simple ring fractures. D, Type IV: ring disruption fractures. Isolated acetabular fractures were added to the Type III group for completeness, as first proposed by Silber et al.[10] Reproduced from Tachdjian's Pediatric Orthopedics[9] with permission.

Table 1: Prevalence of mechanisms of injury reported in the literature (%).

Authors	Date	Patients	Location	Drive side	Pedestrian	Passenger	Bike/cyclist	FALL	MISC
Current	2015	179	Auckland (NZ)	Left	46	23	10	12	9
Banerjee (16)	2009	44	London (UK)	Left	66	14	4	16	-
Nabaweesi (12)	2008	219	Baltimore (USA)	Right	52	32	-	8.5	7.5
Chia (4)	2004	125	Sydney (Australia)	Left	69	13	6	8	4
Grisoni (13)	2002	57	Ohio (USA)	Right	40	32	7	16	-
Silber (9)	2001	166	Philadelphia (USA)	Right	60	22	1	13	4
Upperman (11)	2000	95	Pennsylvania (USA)	Right	47	26	5	3.5	18.5
Rieger (15)	1997	54	Munster (Germany)	Right	31.5	24	22	2	20.5
Lane-O'Kelly (14)	1995	68	Dublin (Ireland)	Left	72	6	6	9	7

Results

Participants

Over the study period, 179 patients were treated at Starship Hospital with a pelvic fracture. There were 116 boys (65%) and 63 girls (35%), this difference in sex being significant (Chi-square test p<0.0001). The median age of the children was eight years (IQR, 5–12 years).

At presentation, 62 children (34.6%) had a depressed level of consciousness with a GCS less than 15. Thirty-four children (19%) had a severe traumatic brain injury with a GCS less than 9. The median ISS was 9 (IQR 4–22).

The median hospital stay was five days (IQR 2–12). Sixty-four patients (35.8%) required admission to the intensive care unit, with their stay lasting a median of three days (IQR 1–6). Forty-four children (24.5%) required a packed red blood cell transfusion during their stay, with a median requirement of two units (IQR 2–5 units). All children that required a transfusion had one or more associated injuries.

Mechanism of injury

The most common mechanism of injury was a pedestrian struck by a motor vehicle in 46% (n=83) of cases. Passengers in motor vehicle accidents accounted for 23% (n=41) of presentations and this was the second most common injury mechanism, followed by falls in 13% (n=24) and bicycle-motor vehicle collisions in 10% (n=17). Eight children were injured playing sport (4.5%). A further six (3%) had miscellaneous mechanisms of injury, including two cases of non-accidental injury.

In the pedestrian struck by motor vehicle group, nine children were injured by a motor vehicle in a residential driveway. In children 10 years or younger, this mechanism accounted for 54% of cases (64/117), reducing to only 30% beyond the first decade of life (19/62). This difference was statistically significant (Chi Square test, p<0.0021).

Twenty-two (26%) of the 83 children struck by motor vehicles had bilateral pelvic injuries. Additionally, there was a predominance of right-sided pelvic injuries (41%, n=34) versus left-sided injuries (32%, n=27), but this did not achieve statistical significance (Chi-square test Test p=0.0523).

The mechanisms involved leading to pelvic injuries are remarkably consistent across the world, with motor vehicle-related injuries being most common in all studies[4,10,12–17] (Table 1). We further compared the mechanism of injury prevalence between left-hand drive and right-hand drive countries. Interestingly, we note that pedestrian-motor vehicle injuries occurred more frequently in left hand driven countries, while passengers injured in motor vehicles were more frequent in right-hand driven countries.

Table 2: Injury Severity Score (ISS) of pelvic fracture types and associated injuries.

Torode/Zieg # type	I	II	III	IV	IV	Sum
Median ISS (IQR)	4.0 (4–9)	9.0 (4–20)	6.0 (4–17.5)	13.0 (9–29)	13.0 (9–29)	-
Number of patients	5	33	84	57	57	179
Closed head injury	-	9	24	22	22	55 (31%)
Thoracic injury	-	12	22	25	25	59 (33%)
Abdominal injury	-	10	15	22	22	47 (26%)
Genitourinary injury	-	-	6	9	9	15 (8%)
Other orthopaedic fractures	-	9	35	31	31	75 (42%)
Patients with associated injuries (%)	-	57.5	63	88	88	122 (68%)

Fracture classification

Almost half of the fractures (47%, n=84) in the study were of the Torode and Zeig Type III classification (single ring fractures or isolated acetabular fractures). Type IV fractures (ring disruption fractures) were the second most common at 32% (n=57).

The median injury severity score (ISS) for each fracture type was determined; for Type I fractures it was 4 (IQR 4–9), the median ISS for Type II fractures was 9 (IQR 4–20), 6 (IQR 4-17.5) for Type III fractures and 13 (IQR 9–29) for Type IV fractures (Table 2). An increase in the complexity of the fracture type in the Torode and Zeig classification correlated with an increase in the ISS (Spearman correlation coefficient = 0.625, p=0.0006).

Management

Associated injuries occurred in 68% (n=122) of patients. Other orthopaedic fractures (42%, n=75) and thoracic injuries (33%, n=59) were most common, followed by injuries to the head (31%, n=55), abdomen (26%, n=47) and lastly the urogenital region (8%, n=15). This cohort suffered fewer cranial injuries compared to other studies, but had higher rates of orthopaedic, thoracic and abdominal injuries[4,10,14–17] (Table 3).

Table 3: Associated injuries in pelvic fractures comparison (%).

Authors	Year of publication	Location	Closed head	Thorax	Abdominal	Genito-urinary	Other orthopaedic #
Current	2015	Auckland (NZ)	31	33	26	8	42
Banerjee[17]	2009	London (UK)	12	34	14	-	13
Chia[4]	2004	Sydney (Australia)	44	27	17	17	42
Grisoni[14]	2002	Ohio (USA)	26	7	14	4	49
Silber[10]	2001	Philadelphia (USA)	39	20	17	9	54
Rieger[16]	1997	Munster (Germany)	48	10	19	24	27
Lane-O'Kelly[15]	1995	Dublin (Ireland)	38	16	4	16	24

Management of the pelvic fractures was conservative in 93% of patients, with only 13 cases requiring surgical intervention. Nearly all fractures that required surgical management were either Type III or IV. There was one Type I fracture which required operative intervention for fixation of a significantly displaced avulsed segment of the left anterior superior iliac spine (ASIS).

Four patients required external fixation and stabilisation (all Type IV fractures with pelvic instability), seven required an open reduction and internal fixation while two patients required manipulation and reduction of the hip under anaesthetic. One patient required an initial external fixation and subsequent open reduction and internal fixation of anterior pubic symphysis fracture.

Operative procedures for associated injuries were much more common and were required in 38% (n=68) of cases. These included nine emergency laparotomies, four diagnostic laparoscopies, two thoracotomies and 13 neurosurgical procedures (craniotomy, craniectomy, evacuation of SDH and placement of EVD). Two children in the current study's cohort suffered a transection of an iliac vessel and both underwent successful embolisation. The most commonly performed surgical intervention was open reduction and internal fixation of other orthopaedic long bone fractures (19 procedures).

Mortality

Eleven children died in our study (6.1%). Eight children were struck by motor vehicles and two were passengers in a motor vehicle accident. One death was as a result of multiple injuries secondary to non-accidental trauma suffered at home.

The mean ISS in the 11 children who died was 36.5 (range 17–59), whereas the remainder had a mean ISS of 14.8 (range 4–59). The difference in ISS in these groups was statistically significant (Wilcoxon Two-Sample test, $p<0.0001$).

All fatalities had significant associated injuries to other organ systems and were of Type II, III and IV pelvic fracture classification (Table 4). Among these, nine were directly attributable to severe head injuries while two patients died of a combination of severe injuries to the head, chest, abdomen and pelvis. There were no deaths directly attributable to the pelvic fracture.

Table 4: Summary of deaths (n=11).

Child	Age (years)	Pelvic fracture type	Admission GCS	ISS	Cause of death
1	1	II	4	45	Severe head injury
2	2	II	3	17	Abdominal (multiple liver lacerations) + severe head injury + pelvis (fractured left ilium)
3	3	III	3	30	Severe head injury
4	4	III	3	43	Severe head injury
5	8	III	3	38	Severe head injury
6	10	IV	8	27	Severe head injury
7	11	IV	3	59	Severe head injury
8	12	III	3	43	Severe head injury
9	13	III	8	29	Severe head injury
10	14	III	4	41	Abdominal (splenic injury) + thoracic (bilateral haemothorax) + pelvic injury (ring disruption fractures)
11	14	IV	3	29	Severe head injury

Discussion

Paediatric pelvic ring injuries constitute 0.3–4% of all paediatric injuries.[1] With the exception of avulsion injuries, they occur secondary to high-energy blunt force trauma. Fifty to 80% of pelvic fractures in children are caused in road traffic crashes, mostly when the child is struck by a motor vehicle.[4,10,14–17] In our study, 79% of all injuries were caused by motor vehicles, with 46% of the children overall being pedestrians struck by motor vehicles. Significantly, children under 10 years of age were more frequently struck by motor vehicles compared to older children.

In our analysis, we noted that pedestrian-motor vehicle injuries occurred more frequently in left-hand driven countries while passengers injured in motor vehicles were more frequent in right-hand driven countries. While many variables would certainly contribute to this finding, it is nonetheless an important facet to consider in the local and global development of preventative measures.

The implications of pedestrian-motor vehicle accidents are significant and can give a characteristic pattern of injuries, described by Waddell and Drucker.[18] Children are usually struck from the side when running onto the road or cycling in the near lane. Initial impact from the car bumper causes lateral compression injuries to the femur/pelvis and the trunk on one side, following which the child is thrown, striking the contra-lateral side of head on the ground.[18] The fracture patterns seen in this study support this finding, as does the distribution of the associated injuries.

The greater cartilaginous volume and bony plasticity of the paediatric pelvis provides an increased capacity for energy absorption. Additionally, the symphysis pubis and sacroiliac joints also have increased elasticity and flexibility.[10,11] Together, these factors result in considerable force being required to disrupt the integrity of the pelvic ring and cause a fracture. Soft tissue trauma to the perineum and buttocks should alert the treating physicians to potential underlying pelvic fracture.

As considerable force is required to fracture the pelvis, it is important to recognise that significant trauma has also occurred to other physiological systems; associated injuries should be expected and investigated. With a compliant chest wall and lack of abdominal musculature, the underlying viscera and soft tissues in children are less well protected and are more easily injured.[10] Within our study, associated injuries involving the chest wall, abdominal organs, head injuries and the genito-urinary system occurred in 68% of patients. In the setting of significant blunt trauma even a 'minor' paediatric pelvic fracture should be seen as a 'red flag' indicating a potentially serious systemic injury.

In a recent systematic review of the literature incorporating 25 studies of pelvic fracture management since 1966 (sample sizes n=13–1,190), the average mortality rate was 6.4%. In addition, there was no significant change in the mortality rates of children with pelvic fracture noted during the last 30 years.[1] The mortality rate from the current study is 6.1% (n=11). All of the 11 children who died in the current cohort had a head injury and this was the direct cause of death in nine. Snyder et al demonstrated that children with associated CNS injury have a 10-fold increase in mortality than children without CNS injury.[19] Associated closed head injuries were the primary cause of mortality in multiple paediatric studies from around the world.[4,10,17]

Unlike adult trauma patients, fatal exsanguination is uncommon and a rare cause of death. Paediatric vasculature is smaller and vessels have a more effective vasoconstriction response, are less friable and have not undergone atherosclerotic change as in adults.[3,20] Children typically sustain lateral compression injuries.[21] This configuration does not cause increase of the pelvic volume and is thus mechanically less likely to precipitate haemorrhage. Both these factors likely account for the reduced incidence of fatal exsanguination in children compared to adults. In our series, only two patients required angiographic embolisation of ruptured iliac vessels. Other paediatric studies have reported a similarly low incidence of vascular intervention.[22]

Treatment of paediatric pelvic fracture is primarily non-operative.[5,15] Only 7% (n=13) of the children in this cohort were managed operatively. In this study, majority of pelvic fractures were managed with bed

rest and occasionally with traction and then mobilisation. Traction was used until stability was achieved. The younger patients were sometimes treated in a hip spica. It is important that the abdomen has been "cleared" before the application of spica as further assessment is near impossible. Occasionally an external fixator was used when the injured child was haemodynamically unstable and source of bleeding was not clear. The remodeling potential of the immature skeleton,[23] coupled with the high success rates noted in patient studies,[5,15,24] are proposed as the rationale for this conservative approach.

Some long-term follow-up studies have however reported significant residual morbidity with this approach, due primarily to low back pain and leg length discrepancies. Operative stabilisation of pelvic ring has started to play an increasing role in the management of pelvic fractures over the past decade, with the treatment aims being anatomical reduction and maintenance of a symmetrical pelvis.[25] Currently, there are no established guidelines for operative management as evidenced by the wide range of rates of operative interventions from 0.6 to 30% in the literature.[1]

Limitations of this study include its retrospective nature, both in aspects of data collection and in that the results are compared against similar retrospective reviews in the literature. Additionally, long-term morbidity outcomes and Quality of Life scores were not examined. It is certainly something that will be a useful addition to the analysis and would be best collected prospectively to reduce bias.

Conclusion

We have demonstrated that pelvic fractures are an important marker of severe trauma. Patterns of paediatric pelvic fractures reported by studies around the world are very similar, with motor vehicle accidents the highest occurring mechanism of injury. When evaluating and managing pelvic fractures, a multi-disciplinary approach needs to be employed to prioritise the management of pelvic fracture and associated injuries.

Competing interests:
Nil.

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Seasonal variation in Takotsubo syndrome compared with myocardial infarction: ANZACS-QI 16

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ABSTRACT

BACKGROUND: The incidence of myocardial infarction (MI) is characterised by seasonal variation, with a winter peak and summer trough. Takotsubo syndrome (TS) mimics MI, but is thought to have a distinct aetiology and may exhibit a reversed pattern of seasonal variation. This study investigated the seasonal variation in the incidence of TS in comparison to MI.

METHODS: Two hundred and sixty consecutive patients with TS (95% women, median age 66 years) admitted between March 2004 and December 2016 in the Auckland region of New Zealand were identified. The study population was grouped into three-month intervals (seasons) according to the date of admission to analyse for potential seasonal variations in the incidence. The TS cohort was compared with 36,376 patients who presented with acute MI in the Auckland region (40% women, median age 71 years) between March 2004 and December 2016.

RESULTS: The onset of TS differed as a function of season (p=0.02), with the events most frequent in summer (n=77, 30%) and least so in winter (n=46, 18%). In contrast, incidence of MI also varied by season (p=0.0003), with highest events in winter and lowest in summer.

CONCLUSION: The pattern of seasonal variation in TS is reversed compared with MI, with peaks during summer.

Several cardiovascular events, including acute myocardial infarction (MI), show well-defined temporal patterns in their occurrence throughout the year, which is characterised by a peak in winter and a trough in summer.[1–4] Takotsubo syndrome (TS) (also known as apical ballooning syndrome or stress-induced transient left ventricular dysfunction) closely mimics the presentation of MI. It is characterised by acute but rapidly reversible left ventricular (LV) dysfunction in the absence of obstructive coronary disease. TS was named on the basis of similarities between the appearance of the LV in systole and the round-bottomed narrow-necked Japanese fishing pot used for trapping octopuses. The condition tends to occur in postmenopausal women after a stressful event.[5] The prevalence of TS is reported to be 1% to 2.5% in patients presenting with acute coronary syndrome (ACS) and 12% in women presenting with anterior ST-elevation myocardial infarction (STEMI).[6,7] Thus, coronary angiography is necessary for definitive differentiation between TS and ACS. Despite its favourable long-term prognosis and low in-hospital mortality (1–3%),[5,8] TS is not considered a benign condition because of the occurrence of life-threatening complications during the acute phase, related to haemodynamic instability (eg, acute heart failure and cardiogenic shock) in a substantial proportion of patients. Templin et al[9] recently reported almost 22% of TS patients had serious in-hospital complications with rates equal

to or higher than those of patients with ACS. They found that in-hospital death occurred more frequently among men than among women. Furthermore, TS patients also had severe complications, including ventricular tachycardia, ventricular thrombus and ventricular rupture.

The aetiology of TS is currently poorly understood but appears to be distinct from myocardial infarction.[10,11] One line of evidence suggesting a distinct aetiology for TS is a possible reversed pattern of seasonal variation in presentation. Citro R et al[12] recently reported a chronobiological pattern of onset of TS, with most events occurring during the morning hours and summer. Other studies subsequently reported a circadian (morning) and a seasonal (summer) higher frequency of TS.[13,14] Two studies[15,16] had previously demonstrated a different circadian pattern between TS and ST-segment elevation MI, suggesting that the two conditions do not share a common pathophysiology. There is no study to date comparing the chronobiological variations in the occurrence of TS and MI in the Southern Hemisphere, and there is little data on the seasonal variation in the occurrence of MI between men and women. Therefore, we aimed to investigate whether there is any difference between the seasonal variation of TS in comparison to patients who presented with MI.

Method

The TS study population was prospectively identified from three coronary care units in the public hospitals in the Auckland region (Middlemore Hospital, Auckland City Hospital and North Shore Hospital) between March 2004 and December 2016, and comprised 260 consecutive patients who fulfilled the diagnostic criteria of TS proposed by the Mayo Clinic group:[17] (1) transient hypokinesis, akinesis, or dyskinesis in the left ventricular mid segments with or without apical involvement; regional wall motion abnormalities that extend beyond a single epicardial vascular distribution; and frequently, but not always associated with a stressful trigger; (2) the absence of obstructive coronary disease or angiographic evidence of acute plaque rupture; (3) new ECG abnormalities (ST-segment elevation and/or T-wave inversion) or modest elevation in cardiac troponin; and (4) the absence of phaeochromocytoma and myocarditis clinical (age, gender, presentation, coronary risk factors), laboratory, electrocardiographic (ECG), echocardiographic and angiographic data of the study population were obtained at the time of the index admission. After TS diagnosis was made, clinical staff involved in the care of the patients (ie, nurses and doctors) made specific enquiry regarding possible stressors.

The MI comparison cohort comprised of all patients who presented to the three major public hospitals in the Auckland region with acute MI between March 2004 and December 2016. A total of 36,376 of patients (21,790 men and 14,586 women) with acute MI as the primary discharge diagnosis were identified (International Classification of Disease 10 (ICD10) code consistent with MI (I21x, I22x). Transfers (intra- and inter-hospital) were accounted for in each patient by bundling together all episodes of care that occurred within 24 hours of each other. The data was extracted for the All New Zealand Acute Coronary Syndrome Quality Improvement (ANZACS-QI) programme from the National Health Board (Ministry of Health) from the National Minimum Dataset, a national collection of public hospital discharge information collected by the Ministry of Health, New Zealand.

Chi-square goodness of fit test was performed to analyse for potential seasonal variations in the incidence of TS. To analyse the potential seasonal variations in the incidence of TS and MI, the study population was grouped into three-month intervals (seasons) according to the date of admission. Seasons were classified as December through February (summer), March through May (autumn), June through August (winter) and September through November (spring). The mean, minimum and maximum atmospheric temperatures (°C) were obtained from the Meteorological Service of New Zealand for the day each TS patient was admitted. TS patients were then grouped according to month of presentation and the monthly mean data calculated. The role of gender in the seasonal variations in the incidence of MI was also analysed.

Statistical analysis

Categorical data were summarised in terms of frequency and percentage. Continuous data were presented in terms of mean ± standard deviation, and median (inter-quartile range). For continuous variables, comparisons between groups were performed by the non-parametric Mann-Whitney U test as the data were not normally distributed. For categorical variables, Pearson's chi-squared test was used. All P-values reported were two tailed and a p-value <0.05 was considered significant. Data were analysed using SAS statistical package, version 9.4 (SAS Institute, Cary, NC).

Access to the ANZACS-QI national ACS cohort is as part of the Vascular Informatics using Epidemiology & the Web (VIEW) research programme was approved by the Northern Region Ethics committee Y in 2003 (AKY/03/12/314) and by the national Multi-Region Ethics Committee in 2007 (MEC/01/19/EXP). The data for the TS cohort is obtained from the clinical audit investigating clinical features, prognostic predictors and outcomes of TS to assess the recurrence rates of TS, and was approved by the Health and Disability Ethics Committees (NTX/11/EXP/288).

Results

Clinical characteristics

The clinical characteristics of the TS and MI populations are summarised in Table 1. The median age of the TS population was 66 years (IQR 56–72 years). The majority of patients were women (n=247, 95%) and the majority of both cohorts were European. A stressful trigger (defined as an unusual emotional or physical stress occurring before symptom onset) was identified in 200 (77%); 118 patients had an emotional stressor and 82 patients reported a physical stressor (defined as medical conditions that trigger TS). Sixty TS patients had no identifiable stressor.

There were more men in the MI population (n=21,790, 60%, p<0.0001) in comparison to the TS population (Table 1) and the MI population was older than the TS population (median age 71 years, IQR 59–82 years, p<0.0001).

Seasonal variation in TS presentation

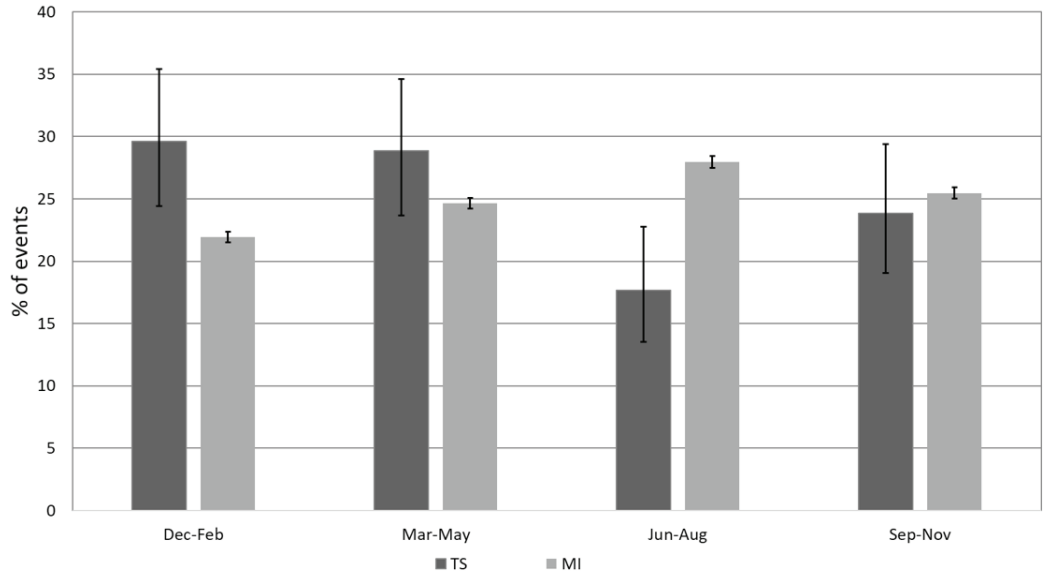
The onset of TS differed as a function of season (p=0.02, Figure 1), with the peak in summer (n=77, 30%) and the nadir in winter (n=46, 18%). In contrast, there was

Table 1: Comparison of clinical characteristics of patients with Takotsubo cardiomyopathy and patients with myocardial infarction.

Baseline characteristics	TS (n=260)	MI (n=36,376)	P-value
Gender, n (%)			<.0001
Male	13 (5.0)	21,790 (59.9)	
Female	247 (95.0)	14,586 (40.1)	
Age			<.0001
Mean ± SD	63.9±11.9	70.0±14.7	
Median (IQR)	66 (56–72)	71 (59–82)	
Ethnicity, n (%)			<.0001
Māori	41 (15.8)	2,795 (7.7)	
Pacific	13 (5.0)	4,376 (12.0)	
Asian	15 (5.8)	3,429 (9.4)	
European	191 (73.5)	25,776 (70.9)	
Stressor on admission, n (%)	200 (76.9)	N/A	
Type of stressor			
Emotional	118 (45.4)	N/A	
Physical	82 (31.5)		
No stressor	60 (23.1)		

TS, Takotsubo syndrome; MI, myocardial infarction; N/A; not applicable.

Figure 1: Seasonal variation in the occurrence of Takotsubo syndrome (TS) and myocardial infarction (MI).



significant seasonal variation in the occurrence MI compared to TS (p=0.0003, Figure 1) with more MI cases occurring in the winter quarter (28%) than the other seasons and least in the summer quarter (21%). Figure 2 demonstrates the average monthly temperature in Auckland region and the monthly incidence of TS during the study period. The temperature was lowest during June through August (winter) and was highest during December through March (summer and early fall). Because TS occurs predominantly in women, we investigated the seasonal variation in MI in men and women separately. The seasonal variation was very similar for both sexes. (p=0.48, Figure 3).

To analyse for potential variation in the incidence of TS according to stressor types (physical stressor, emotional stressor and no stressor), the TS patients were grouped into three subgroups. The seasonal variation in TS incidence was similar for each stressor subgroup (p=0.7, Figure 4).

Figure 2: The average monthly temperature (left y-axis, diamonds) in the Auckland region and the monthly incidence of Takotsubo syndrome (right y-axis, crosses).

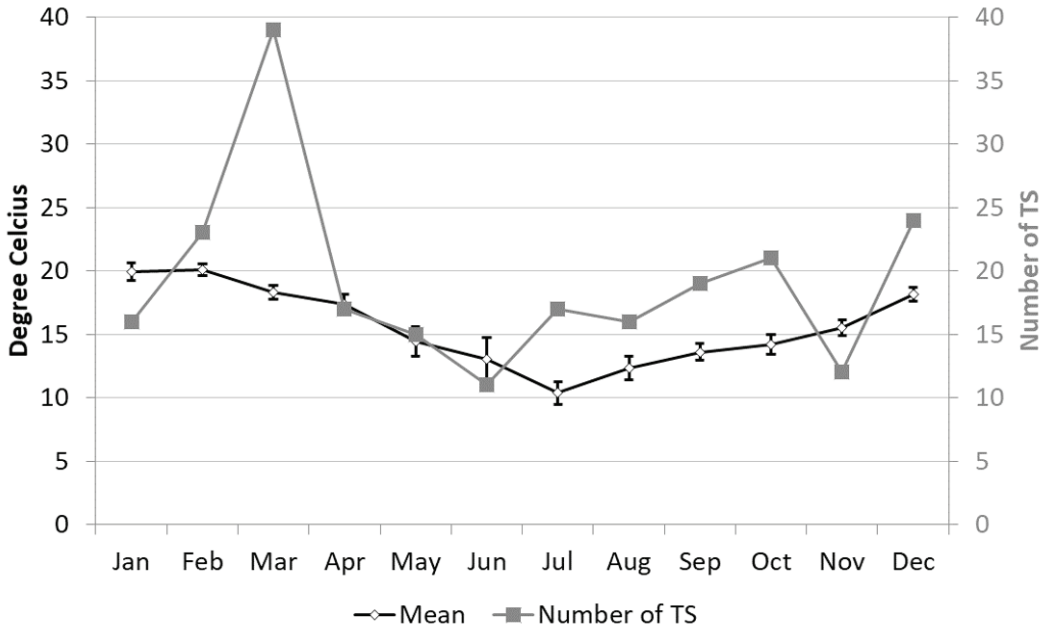


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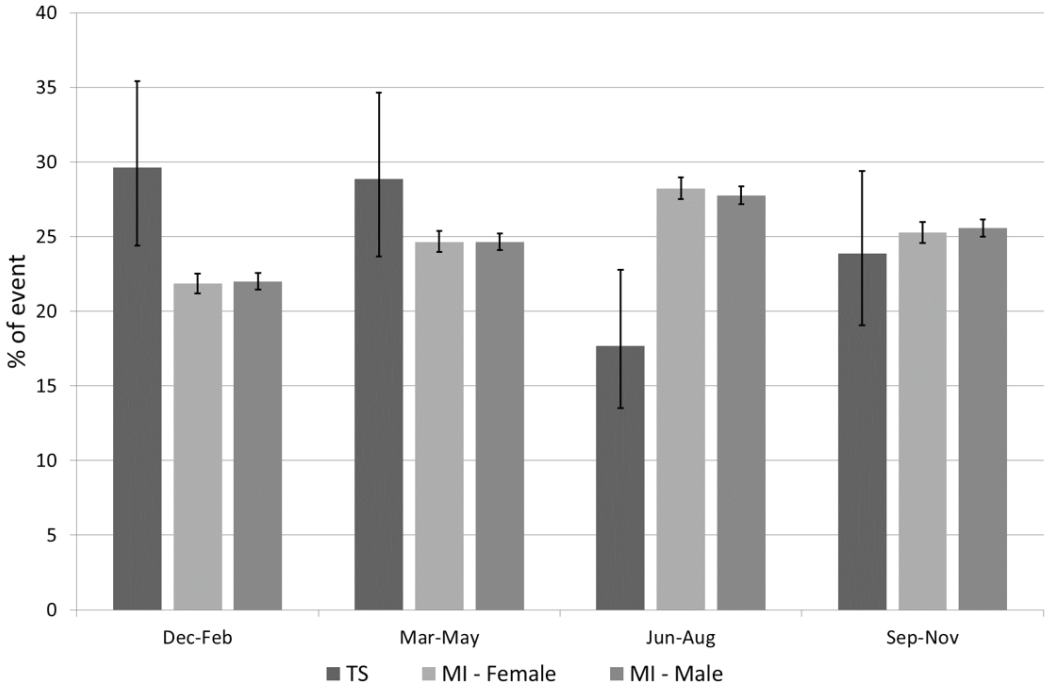
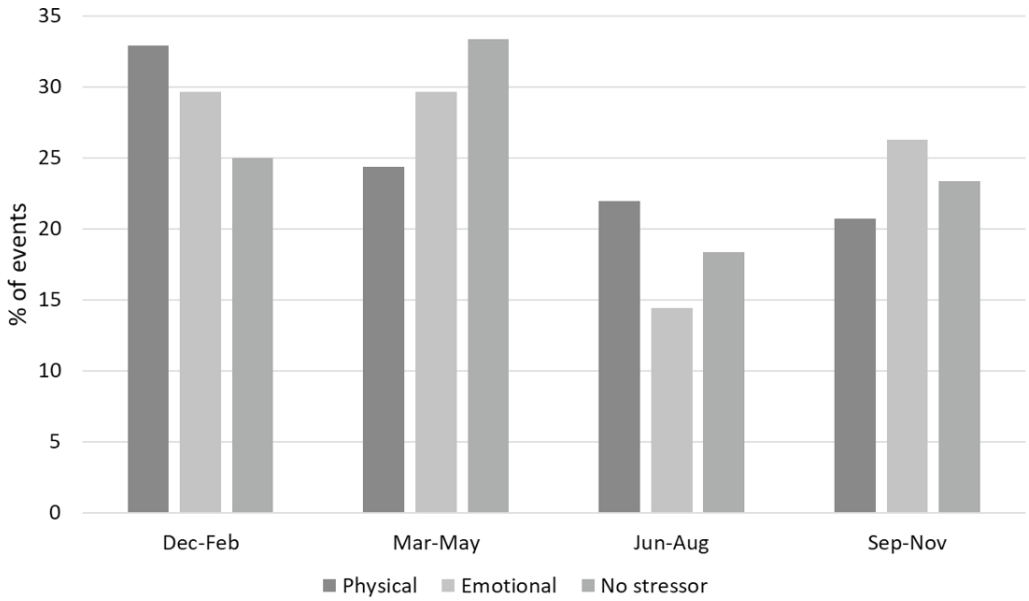
Figure 3: Gender and seasonal variation in the occurrence of myocardial infarction (MI) compared with Takotsubo syndrome.



Discussion

To our knowledge, this is the first study to date investigating the seasonal patterns of presentation of TS and MI in the Southern Hemisphere. The annual variation in TS with the highest incidence in summer is in contrast to the seasonal variation in MI incidence where winter was characterised by the highest frequency of cases in our cohort and is consistent with TS and MI being distinct pathophysiological entities. Overall, the clinical features of TS in our population were similar to the published studies in other areas of the world.[18–21]

Figure 4: Seasonal variations in the incidence of Takotsubo syndrome according to type of stressor.



Prior reports from the Northern Hemisphere regarding seasonal variation in TS incidence are conflicting. While one previous Italian study (n=90) reported a summer preference for TS onset,[12] other studies from the US (n=186), France (n=51), Italy (n=116) and Japan (n=107) did not confirm a consistent seasonal pattern.[13,14,22,23] The major limitation of epidemiological studies on TS derives from the limited size of the populations. In our cohort, we are confident the diagnostic criteria for TS were consistently applied. An alternative case finding approach is to use large administrative datasets where there may be less diagnostic precision. It is, however, reassuring that our finding is similar to Aryal MR et al,[24] who used an administrative dataset to identify 10,989 patients with TS in North America and reported that the peak of TS seems to be during Northern Hemisphere late summer months and early fall.

The reasons underlying this seasonal variation observed in TS are unclear. Various stressors in summer have been evoked.[25] Although little is known regarding the seasonal variation in catecholamines, which are thought to be important in the aetiology of TS, several studies have reported a summer peak for norepinephrine and epinephrine excretion.[26,27] Concentrations of urinary catecholamines have been shown to be higher even in healthy women during summer than in the other months, with a high within- and between-subject variation, not explained by menstrual cycle or behavioural, emotional or cognitive stress reactions.[27] Chen et al previously described a case of heatstroke complicated by TS.[28] Prolonged exposure to high ambient temperature resulting in an excessive high core temperature >40.5°C is a detrimental physical stress. An observational post-mortem study of fatal heatstroke revealed elevated levels of plasma catecholamines[29] suggests that heatstroke and TS may share the same pathophysiology.

Presentation was preceded by a physical or emotional stressor in three quarters of our TS patients, but in the remaining quarter there was no identifiable pre-event stressor despite specific enquiry after the diagnosis was made. Our study found that the temporal variation in TS was similar regardless of the type of precipitating stress. This is consistent with one prior study.[30]

A considerable amount of evidence shows that cardiovascular diseases such as acute myocardial infarction, acute aortic dissection and cerebrovascular accidents do not randomly occur along time, but seem to exhibit specific temporal patterns in their onset, according to time of day, month or season, and day of week, independent of gender.[31–34] Data from the US Second National Registry of Myocardial Infarction reported 53% more cases of MI in the winter than in the summer, and winter was characterised by the highest frequency of fatal cases.[35] Manfredini et al[3,12] also confirmed this temporal pattern where the lowest frequency of MI onset was in the summer and the highest frequency during winter. Our study confirmed this temporal pattern in 34,483 cases of acute MI hospitalised between January 2005 and December 2013, demonstrating the highest frequency of MI cases during winter. Multiple factors might play a role in this seasonal variation in MI. The seasonal change in ambient temperature, with consequences on coagulation, blood pressure and endothelial function has been described as potential factors for the winter peak of MI.[36] In addition, our study demonstrated that gender does not influence the variation in the incidence of MI, which is consistent with previous studies.[31,32]

Study limitations

This was a retrospective study using a prospective analysis, and the results are limited by the relatively small number of TS patients, as we only included patients admitted to the major public hospitals in the Auckland region. However, this is the largest study in Australasia and one of the largest internationally to investigate the seasonal variation in TS onset. We are also the first study to date investigating the seasonal patterns of TS in the Southern Hemisphere demonstrating a reversed pattern in the incidence of TS in comparison to the Northern Hemisphere. We did not record the time of symptom onset in our database and so could not report on diurnal variation in onset. We were unable to assess the association between the onset of this syndrome and climate (ie, temperature, atmospheric pressure and humidity) due to the relatively small number of TS patients. Analyses of meteorological or environmental phenomena potentially associated with TS

such as temperature at the time of onset of TS, however, are difficult to perform, as the exact time of onset of the TS is often difficult to ascertain clinically. We have not assessed the variation in presentation according to the day of the week or by major recurring annual events such as public holidays. We also did not compare the role of gender in the temporal patterns of TS occurrence as there were only 13 men in the TS population.

Conclusion

There is seasonal variation in the incidence of TS with a peak in summer in comparison to the well-known winter peak of acute MI. Stressor patterns do not influence these temporal patterns of occurrence of TS. Further studies are needed to investigate the potential link between seasonal variation in TS onset and its underlying pathophysiologic mechanisms.

Competing interests:
Nil.
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Management of suspected acute coronary syndrome patients admitted to cardiology or non-cardiology services at Auckland City Hospital: implications for future national data collection

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ABSTRACT

AIMS: To review the number, characteristics and clinical management of suspected ACS patients admitted to cardiology and non-cardiology services at Auckland City Hospital, to assess differences between these services and to assess the number who would potentially be enrolled in the All New Zealand Acute Coronary Syndrome (ACS) Quality Improvement Programme (ANZACS-QI) database.

METHODS: Auckland City Hospital patient data was extracted from the Australia and New Zealand ACS 'SNAPSHOT' audit, performed over 14 days in May 2012.

RESULTS: There were 121 suspected ACS admissions to Auckland City hospital during the audit period, with 45 (37%) patients directly managed by the cardiology service, and 76 (63%) patients cared for by non-cardiology services. Based on the subsequent discharge diagnosis, the cardiology service had more patients with definite ACS than the non-cardiology services; 27/45 (60%) compared to 16/76 (21%), difference (95%CI) 39% (22–56), P<0.0001). Cardiology ACS patients were more likely to undergo echocardiography; 15/27 (56%) compared to 2/16 (13%), difference 42% (18–68), P=0.0089), coronary angiography; 21/27 (78%) compared to 3/16 (19%), difference (95%CI) 59% (34–84), P=0.0003), coronary revascularisation; 18/27 (67%) compared to 3/16 (19%), difference (95%CI) 48% (22–74), P=0.004, and be discharged on two antiplatelet agents; 18/26 (69%) compared to 3/15 (20%), difference (95%CI) 49% (22–76), P=0.0036, or an ACEI/ARB; 20/26 (77%) compared to 5/15 (33%), difference (95%CI) 44% (15–72), P=0.0088.

CONCLUSIONS: In patients with a discharge diagnosis of definite ACS, those managed by non-cardiology services were less likely to receive guideline-recommended investigations, and management, in this relatively small cohort study. About one-third of all ACS patients are managed by non-cardiology services and would not be recorded by the ANZACS-QI database.

Cardiovascular disease causes 33% of mortality in New Zealand and is the most common cause of death.[1] Audits of the care of patients with acute coronary syndrome (ACS) are very important to evaluate whether patient diagnosis and management adhere to guidelines.[2–5] The Regional Cardiac Society of New Zealand ACS audit group undertook three comprehensive audits of clinical practice in 2002, 2007 and 2012[6–8] and contributed to the "momentum for change" for the improved management of ACS patients. Significant improvements in service provision have been recorded.[9,10] The All New Zealand ACS Quality Improvement Programme (AN-

ZACS-QI) funded by the Ministry of Health of New Zealand was then implemented in 2013 to prospectively record characteristics of all ACS admissions and is an important step forward in achieving this goal.[11] However, a limitation is that this database does not capture ACS patients who are under the care of non-cardiology services during the admission, which means the data may not be fully representative of all ACS patients admitted to a New Zealand hospital.

We reviewed the Auckland City Hospital subgroup of patients admitted with a suspected ACS during a two-week period as part of the third New Zealand 'SNAPSHOT' ACS audit in 2012, to assess how clinical service admission influenced the management of these patients, and to record the number potentially not enrolled in the ANZACS-QI programme.

Methods

Study population

This study focused on the ACS cohort from Auckland City Hospital that contributed to the New Zealand ACS 2012 audit, which prospectively enrolled all patients admitted with a suspected ACS to a New Zealand Hospital over 14 days in May 2012, with methods previously described in detail.[6–8] This third National New Zealand audit was also the first bi-national 'SNAPSHOT' ACS study, which also included ACS admissions to Australian hospitals over the same period.[12] The two-week audit period was chosen as a compromise between the need to collect sufficient patient numbers for a representative cohort and the ability of unfunded clinicians and nurses to collect patient data, and was undertaken from 00.00 hours on Monday 14 May to 24.00 hours on Sunday 27 May 2012. The study was designed and run by clinicians with support from the Cardiac Society of Australia and New Zealand. Ethics approval was obtained from the National Multicentre Ethics Committee, with a consent waiver being given, as the study was an audit of clinical management.

Data definitions and collection

All sites, including Auckland City Hospital were supplied with written study protocols and definitions for all characteristics, which were prospectively collected; these included patient demographics, comorbidities, investigations, treatment, discharge diagnosis and outcomes. For this current study, patient hospital records were reviewed and patients were categorised into two groups: those admitted for all or some of their hospitalisation under the cardiology service, and those who were managed by non-cardiology services.

A 'discharge diagnosis' was determined by the local clinical team and coded based on the following categories: a) ST-segment elevation myocardial infarction (STEMI) or new left bundle branch block (LBBB), b) non-STEMI (NSTEMI), c) unstable angina pectoris (UAP), d) chest pain, 'unlikely ischaemic' and e) other cause: for those patients who had a clear alternative diagnosis.[6–8,12] Outcomes included in-hospital death and major adverse cardiovascular events (MACE), a composite of death, myocardial infarction, stroke, cardiac arrest or worsening heart failure. Morbid obesity was defined as body mass index >35kg/m^2 or if 'obesity' was recorded in the medical record.

Statistical analysis

Data are presented as mean (standard deviation), median (interquartile range) or frequency (percentage) as indicated. Comparisons between groups for categorical variables were made using Fisher's exact test/Monte Carlo estimation of exact P values where the Cochrane requirements for a chi-square test were not met and between non-normally distributed continuous variables using the Wilcoxon/Kruskall Wallis test. Confidence intervals for rates were calculated using a mid P method (www.openepi.com, accessed 16/06/2017).

Asymptotic 95% confidence intervals were calculated for the pairwise differences in proportions and the Wilson method was used for calculating confidence intervals around median differences. All tests were two tailed, with p value <0.05 considered significant. No adjustment to the overall significance level was made. Unless otherwise stated, analyses were performed using SAS (v9.4, SAS Institute Inc., Cary, NC, USA).

Results

A total of 121 patients were admitted to Auckland City Hospital with a suspected ACS over the 14-day audit period. There were 76 (63%) non-cardiology and 45 (37%) cardiology patients. Of the 45 cardiology patients, 40 were admitted and discharged solely from cardiology, two were admitted by cardiology but later discharged from another specialty, and three were admitted to a non-cardiology service but subsequently transferred to and discharged from cardiology. Of the 76 non-cardiology patients, three underwent a coronary angiogram, but were not directly managed by the cardiology service.

Patients admitted to the cardiology service were of similar mean age (years), 66 (SD16) compared to 67 (SD13), difference (95% CI) 1.1 (-4.3–6.5), but were more likely to have a history of stroke or transient ischaemic attack (20% vs 5.3%), P=0.016, have elevated serum troponins (66% vs 25%, P<0.0001), and be of Māori ethnicity (8.9% vs 0%) (Table 1).

Table 1: Baseline demographic data of all patients with suspected or confirmed ACS admitted to Auckland City Hospital (n=121).

	Non-cardiology	**Cardiology**	**Difference cardiology-Non-cardiology (95% CI)**	**P**
	N/76 (%)	**N/45 (%)**		
Sex (female)	38 (50)	14 (31)	-19 (-36– -1.3)	0.057
Family history of CVD	14 (18)	4 (8.9)	-9.5 (-22–2.5)	0.19
Ethnicity				
Caucasian	50 (66)	33 (73)	7.5 (-9.2–24)	
Māori	0	4 (8.9)	8.9 (0.6–17)	
Pacific Island	7 (9.2)	4 (8.9)	-0.3 (-11–10)	0.038
Asian	9 (12)	1 (2.2)	-9.6 (-18– -1.2)	
Indian	7 (9.2)	3 (6.7)	-2.7 (-12–7.2)	
Tobacco smoking				
Current	9 (12)	11 (24)	13 (-1.9–27)	
Past	26 (34)	14 (31)	-3.1 (-20–14)	0.19
Never	41 (54)	20 (44)	-9.5 (-28–8.8)	
Clinical factors				
Hypertension	49 (65)	29 (64)	-0.03 (-18–18)	0.99
Diabetes mellitus	11 (15)	7 (16)	1.1 (-12–14)	0.99
Dyslipidaemia	40 (53)	29 (64)	12 (-6.1–30)	0.26
Atrial fibrillation	11 (15)	4 (8.9)	-5.6 (-17–5.9)	0.41
Renal impairment	8 (11)	6 (13)	2.8 (-9.3–15)	0.77
Morbid obesity	7 (9.2)	7 (16)	6.4 (-6.1–19)	0.38
Chronic lung disease	2 (2.6)	2 (4.4)	-1.8 (-5.2–8.8)	0.63
Active cancer limiting life	1 (1.3)	1 (2.2)	0.9 (-4.1–5.9)	0.99
Major cognitive impairment	2 (2.6)	1 (2.2)	-0.4 (-6.0–5.2)	0.99
Significant frailty	2 (2.6)	1 (2.2)	-0.4 (-6.0–5.2)	0.99
Prior vascular disease				
Prior myocardial infarction	11 (15)	10 (22)	7.8 (-6.8–22)	0.32
Prior CABG	9 (12)	2 (4.4)	-7.4 (-17–2.0)	0.21
Prior TIA/stroke	4 (5.3)	9 (20)	15 (2.0–27)	0.016
Prior PAD	5 (6.6)	3 (6.7)	0.1 (-9.1–9.3)	0.99
Troponin				
Troponin elevation	19 (25)	30 (66)	42 (25–59)	<0.0001

ACS: Acute coronary syndrome, SD: Standard deviation CVD: Cardiovascular disease, CABG: Coronary artery bypass graft, TIA: Transient ischaemic attack, PAD: Peripheral artery disease.

Table 2: Investigations and outcomes. All patients (n=121).

Procedure	Non-cardiology	Cardiology	Difference cardiology-Non-cardiology (95% CI)	P
	N/76 (%)	N/45 (%)		
Chest x-ray	68 (90)	44 (98)	8.3 (0.2–16)	0.15
Echocardiogram	8 (11)	23 (51)	41 (24–57)	<0.0001
Stress echocardiogram	2 (2.6)	1 (2.2)	-0.4 (-6.0–5.2)	0.99
Exercise test	12 (16)	5 (11)	-4.7 (-17–7.6)	0.59
Coronary angiogram	3 (3.9)	25 (56)	52 (36–67)	<0.0001
Length of stay, days mean (SD)	2.1 (3.9)	5.2 (5.4)	3.0 (1.3–4.8)	0.0008
In-hospital death	2 (2.6)	2 (4.4)	1.8 (-5.2–8.8)	0.63

SD: Standard deviation, q1, q3: first quartile, third quartile.

Patients admitted to the cardiology service were more likely to receive an echocardiogram (51% v 11%, P<0.0001), or an invasive coronary angiogram (56% v 3.9%, P<0.0001) as part of inpatient investigations (Table 2).

A definite ACS was diagnosed in 60% of patients under the cardiology service and 21% of patients under non-cardiology services (Table 3). Among those without the diagnosis of ACS at discharge, non-cardiology service patients were more likely to have a diagnosis of 'chest pain, unlikely ischaemic' (64% vs16%).

The baseline characteristics of the patients with definite ACS were similar between cardiology and non-cardiology services, except that cardiology patients were more likely to be female (81% v 37%, P=0.007) and were more likely to have an elevated troponin (93% v 31%, P< 0.0001) (Table 4). The mean age (years) of patients with definite ACS was 69 (SD 13) and 71 (SD 15) (P=0.69), for those admitted to cardiology or non-cardiology services respectively.For patients with a definite ACS, revascularisation procedures by either percutaneous coronary intervention (PCI) or coronary artery bypass graft (CABG) surgery was more common in the cardiology service group (67% v 19%, P=0.004) (Table 5). The hospital stay was longer for the definite ACS patients in the cardiology group compared to the non-cardiology service group (5.1 vs 2.4 days, P=0.04). In-hospital death was not significantly different (3.7% vs 6.3%, P=0.99).

Table 3: Discharge diagnoses for all suspected ACS patients (n=121) following suspected or confirmed ACS admission.

Service	Non-cardiology	Cardiology	Difference cardiology-Non-cardiology (95% CI)	P
	N/76 (%)	N/45 (%)		
Discharge diagnosis				
• STEMI/LBBB	1 (1.3)	10 (22)	21 (8.5–33)	
• NSTEMI	4 (5.3)	12 (27)	21 (7.5–35)	
• Unstable angina	11 (15)	5 (11)	-3.4 (-15–8.8)	<0.0001
• Chest pain, unlikely ischaemic	49 (64)	7 (16)	-49 (-64– -34)	
• Other diagnosis	11 (15)	11 (24)	10 (-4.9–25)	
ACS discharge diagnosis	16 (21)	27 (60)	39 (22 to 56)	<0.0001

STEMI/LBBB: ST segment elevation myocardial infarction/left bundle branch block ACS: Acute coronary syndrome, NSTEMI: Non-ST segment elevation myocardial infarction CI: Confidence interval.

Table 4: Baseline demographic data of patients discharged with a definite diagnosis of ACS to Auckland City Hospital (n=43).

	Non-cardiology	Cardiology	Difference cardiology-Non-cardiology (95% CI)	P
	N/16 (%)	N/27 (%)		
Sex (female)	6 (38)	22 (81)	44 (76–72)	0.007
Family history of CVD	1 (6.3)	3 (11)	4.9 (-12–22)	0.08
Ethnicity				
• Caucasian	11 (69)	20 (74)	5.3 (-23–33)	
• Māori	0	3 (11)	11 (-0.7–23)	
• Pacific Island	3 (19)	2 (7.4)	-11 (-33–10)	0.13
• Asian	2 (13)	0	-13 (-29–3.7)	
• Indian	0	2 (7.4)	7.4 (-2.5–17)	
Tobacco smoking				
• Current	4 (25)	8 (30)	4.6 (-23–32)	
• Past	4 (25)	8 (30)	4.6 (-23–32)	0.85
• Never	8 (50)	11 (41)	-9.3 (-40–21)	
Clinical factors				
Hypertension	12 (75)	16 (59)	-16 (-44–12)	0.34
Diabetes mellitus	3 (19)	4 (15)	-3.9 (-27–19)	0.99
Dyslipidaemia	10 (63)	20 (74)	12 (-17–40)	0.19
Atrial fibrillation	4 (25)	1 (3.7)	-21 (-44–1.1)	0.056
Renal impairment	1 (6)	5 (19)	12 (-6.5–31)	0.39
Morbid obesity	1 (6.3)	0	-6.3 (-18–5.6)	0.37
Chronic lung disease	0	2 (7.4)	7.4 (-2.5–17)	0.52
Active cancer limiting life	1 (6.3)	1 (3.7)	-2.6 (-16–11)	0.99
Major cognitive impairment	1 (6.3)	1 (3.7)	-2.6 (-16–11)	0.99
Significant frailty	0	1 (3.7)	3.7 (-3.4–11)	0.99
Prior vascular disease				
Prior myocardial infarction	6 (38)	6 (22)	-15 (-44–13)	0.31
Prior CABG	4 (25)	1 (3.7)	-21 (-43–1.1)	0.056
Prior TIA/Stroke	2 (13)	6 (22)	9.7 (-13–32)	0.69
Prior PAD	1 (6.3)	3 (11)	4.9 (-12–22)	0.99
Troponin				
Troponin elevation	5 (31)	25 (93)	61 (37–86)	<0.0001
GRACE risk score				
GRACE risk score mean (SD)	146 (45)	164 (32)	17 (-7.4–41)	0.17
GRACE Score ≥140	4 (25)	5 (19)	-6.5 (-32–19)	0.71

ACS: Acute coronary syndrome, SD: Standard deviation, CVD: Cardiovascular disease, TIA: Transient ischaemic attack, CABG: Coronary artery bypass grafts, PAD: Peripheral artery disease.

Table 5: Investigations, revascularisations and outcomes. ACS Patients (n=43).

Procedure	Non-cardiology	Cardiology	Difference cardiology-Non-cardiology (95% CI)	P
	N/16 (%)	N/27 (%)		
Chest x-ray	16 (100)	26 (96)	-3.7 (-11–3.4)	0.99
Echocardiogram	2 (13)	15 (56)	43 (18–68)	0.0089
Stress echocardiogram	0	0	-	-
Exercise test	4 (25)	5 (19)	-6.5 (-32, 19)	0.71
Coronary angiogram	3 (19)	21(78)	59 (34–84)	0.0003
PCI	3 (19)	16 (59)	41 (14–67)	0.01
CABG	0	2 (7.4)	7.4 (-2.5–17)	0.52
PCI or CABG	3 (19)	18 (67)	48 (22–74)	0.004
In hospital death	1 (6.3)	1 (3.7)	-2.6 (-16–11)	0.99
Length of stay, days mean (SD)	2.4 (2.8)	5.1 (5.2)	2.7 (0.1–5.3)	0.04

ACS: Acute coronary syndrome, PCI: percutaneous coronary intervention, CABG: Coronary artery bypass graft, SD: Standard deviation, q1, q3: first quartile third quartile.

Among patients who had a definite ACS and survived to discharge, patients under the cardiology service were more likely to be prescribed a second antiplatelet agent (73% vs 27%, P=0.008) and an angiotensin converting enzyme (ACE) inhibitor or angiotensin receptor blocking (ARB) agent (77% vs 33%, P=0.0088) while prescription of other medications was similar (Table 6).

Discussion

This study has several important findings. The majority of patients, 63%, admitted to a large New Zealand hospital with a diagnosis of *suspected* ACS were not primarily managed by the cardiology service, and these patients were less likely to undergo cardiac investigations to determine the diagnosis. Further, about one-third of patients, 37% of the *confirmed* ACS cases were treated by a non-cardiology service, and potentially would not have been captured by the ANZACS-QI database. These observations have important implications for the overall management, data collection and auditing methods for ACS in New Zealand.

Perhaps not surprisingly, patients under the care of the cardiology service had received more cardiac investigations, as these patients would have a greater overall pre-test probability of an ACS and be more likely to have an elevated troponin level. Hence, a higher proportion of patients under the care of the cardiology service with a *suspected* ACS had a final diagnosis of ACS. In addition, it might be speculated that patients in the cardiology department might have an easier access to cardiology investigations.

Table 6: Discharge medications in ACS patients discharged alive (n=41).

Procedure	Non-cardiology	Cardiology	Difference cardiology-Non-cardiology (95% CI)	P
Number (%)	N/15 (%)	N/26 (%)		
Aspirin (1)	12 (80)	22 (85)	4.6 (-20–29)	0.69
Other anti-platelet (2)	4 (27)	19 (73)	46 (18–75)	0.0080
Dual antiplatelet (1 & 2)	3 (20)	18 (69)	49 (22–76)	0.0036
Beta blocker	13 (87)	21 (81)	-5.9 (-29–17)	0.99
ACE-I/ARB	5 (33)	20 (77)	44 (15–72)	0.0088
Statin	11 (73)	23 (89)	15 (-10–41)	0.39

ACE-I: Angiotensin converting enzyme inhibitor, ARB: Angiotensin receptor blocker.

Hospital services are working with significant pressure to discharge patients, and optimal assessment, while an inpatient, is not always possible. Patients under the care of non-cardiology services were more likely to be discharged without further investigations, and were more often given the less satisfactory diagnosis of 'unlikely ischaemia'. It is notable that the majority (64%) of *suspected* ACS patients in the non-cardiology service were discharged without a definite diagnosis. Limited access to important cardiac investigations such as echocardiography, computed tomographic (CT) coronary angiography and invasive coronary angiography is a significant barrier to making a definite diagnosis.

It is also notable that *suspected* ACS patients had a significantly shorter length of stay when managed by non-cardiology services (two days) compared to those managed by the cardiology service (five days); the reasons for the shorter stay are not known. It might be speculated that access to investigations requires an in-hospital wait, and if the pressure to discharge patients becomes overwhelming, then the test may not be undertaken or even requested. Unfortunately, we were not able to examine these aspects of management with these observational data. However, whatever the reason, the 'unlikely ischaemia' cohort is an important patient group as they have an increased risk of cardiovascular events for at least five years after discharge,[13] and the suspicion remains that some may actually have been ACS patients.

There were few statistically significant differences between the clinical characteristics of the two groups. In addition, there were relatively few differences between groups that might be clinically or scientifically important but missed because of lack of precision (eg, non-statistically significant differences of about 7% in prior myocardial infarction/CABG). Nevertheless it is possible that unknown factors will have influenced the clinical decision to admit a patient under a cardiology or a non-cardiology service. For example, some patients may have been frailer and it was felt more appropriate for conservative management in the first instance, and hence they were not admitted to the cardiology service. However, it is also possible that a relative lack of cardiology or coronary care unit (CCU) beds has resulted in non-cardiology management. Unfortunately, we were not able to examine these aspects of management with these observational data. Patients presenting with a 'low risk' NSTEMI should be monitored for up to 24 hours, or until revascularisation occurs, or, if at 'high risk', should be monitored for more than 24 hours.[5] However, cardiac monitoring cannot be given to most patients outside of the cardiology service.

In a busy, large hospital, there are no clearly defined criteria to guide the decision to admit a patient with a suspected ACS to a cardiology or non-cardiology service. We might speculate that the pivotal factor is the number of beds available in the cardiology department or CCU. If these beds are already full, the admitting clinical team needs to access a non-cardiology bed. Other influences to this decision may be subtle variations in practice of many junior and senior medical staff, as well as additional influences from the patients and their relatives. Although not "arbitrary", there is no consistent approach, and with the complexities of medical presentation and hospital patient loads, where a patient is actually admitted may never be a decision which is able to be strictly 'guideline managed'. Nonetheless, the suspicion remains that limited funding of the more expensive CCU beds leads to some of the patients not being able to access this facility. Patients with a diagnosis of a *definite* ACS were more likely to receive coronary revascularisation if they were under the care of the cardiology service than under the care of a non-cardiology service. Revascularisation of ACS patients has significantly changed the prognosis of ACS patients.[5] It would be of concern if appropriate ACS patients admitted to a non-cardiology service were not managed with this revascularisation strategy.

Another important finding is the discrepancy in the discharge medications prescribed between cardiology and non-cardiology ACS patients. Guidelines recommend one year of dual antiplatelet therapy in all patients with ACS, whether UAP, NSTEMI or STEMI, and regardless of treatment strategy: with or without revascularisation.[2–5,14,15] Despite this, only 69% of cardiology patients and 20% of non-cardiology patients received dual anti-platelet therapy on discharge.

Although a small number of ACS patients would have an elevated bleeding risk or adverse effects to these medications, or were planned for palliative management, these reasons are unlikely to account for all of the patients not receiving dual anti-platelet therapy on discharge. Similarly, ACE inhibitors and ARBs play an important role in ACS patient management, particularly in those with hypertension and an impaired left ventricular function, but were prescribed in only 33% of non-cardiology service ACS patients compared to 77% of cardiology service ACS patients in this audit.

These findings have important implications for the management of ACS patients in New Zealand. Significant differences may exist between the investigations and interventions offered to ACS patients presenting to large metropolitan hospitals depending on their admission to a cardiology or a non-cardiology service. It is certainly possible that these issues are less (or more) prominent in smaller New Zealand centres, but data are not available. Hence our study may not translate to all hospitals across New Zealand.

We have highlighted the potential benefits for a patient receiving cardiology service care. The potential benefits of a patient receiving non-cardiology care may include more attention to non-cardiology pathologies when in hospital, and a shorter hospital stay. Unfortunately we were not able to examine these aspects of management with these observational data.

The ANZACS-QI programme is funded by the New Zealand Ministry of Health and has made significant advances in prospective recording of data on ACS patients under inpatient cardiology services. However, if a significant number of ACS patients managed by non-cardiology services are not included in the ANZACS-QI audit, their omission could potentially bias both the performance indicators of management (non-invasive and invasive) and the reported outcomes of ACS patients in New Zealand. To address this issue, patients with an ACS diagnosis under non-cardiology services would also need to be enrolled to the ANZACS-QI database to increase the robustness of the programme.

Study limitations

A significant limitation of this study is that these are observational data (albeit prospectively collected) from a single-centre, with a small sample size and therefore potentially low statistical power, originally from a two-week bi-national audit. Multiple statistical comparisons between the groups have the potential for the introduction of type 1 errors (findings from chance alone), and a relatively small sample size can mean that small, but potentially clinically important differences could be missed (type 2 error). Nonetheless, the patients admitted to the non-cardiology services did have some clinical differences to those admitted to the cardiology service, and observed rates of investigation and management may result from this. These findings may not be generalisable to smaller and/or rural hospitals, and those without a 24 hour cardiac catheterisation laboratory service. Follow-up data after hospital discharge for patients was also limited.

Conclusions

Our study found that two-thirds of *suspected* ACS patients admitted to Auckland City Hospital were not directly managed by the cardiology service. These patients were found to be less likely to undergo both non-invasive and invasive cardiac imaging. In addition, for those patients admitted to a non-cardiology service with a *confirmed* ACS, they were less likely to receive guideline-directed ACS medical therapy and revascularisation. Furthermore, approximately one-third of all patients with a *confirmed* ACS as their discharge diagnosis who were admitted to a non-cardiology service would potentially not be enrolled in the ANZACS-QI database. ACS audit is an appropriate tool for improving service delivery through identifying deviations from best practice, but it should be applied equally across all ACS patients and so should also include those who are admitted to non-cardiology services.

Competing interests:
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Renal function monitoring in patients prescribed dabigatran in the Compass Health Primary Health Organisation: a quality improvement audit

Lynn McBain, Anna Kyle

ABSTRACT

AIM: To assess annual renal function monitoring and clinical indications for use in patients prescribed dabigatran.

METHOD: A quality improvement activity included all patients in the Compass Health Primary Health Organisation (PHO) prescribed dabigatran. Information recorded: demographics; indication for use; daily dose; height; weight; serum creatinine; and estimated glomerular filtration rate (eGFR).

The first audit occurred during July 2013 – May 2014, the second during May 2014 – October 2016.

RESULTS: Across the PHO, all patients prescribed dabigatran were reviewed: 941 patients and 1,564 respectively. At the time of the second pass audit, renal function monitoring improved from 88% to 90%, and 96% were prescribed dabigatran for an approved indication.

CONCLUSION: Results showed a continuing high level of renal function monitoring across the PHO in 90% of patients prescribed dabigatran. Practitioners were reminded to use creatinine clearance as a marker of renal function. Dabigatran was prescribed for an approved indication in 96% of patients. Our results are in line with recommended best practice and clinical guidelines.

Dabigatran, a reversible thrombin inhibitor and novel oral anticoagulant (NOAC) became fully funded in New Zealand in 2011. The Best Practice Advocacy Centre New Zealand (bpac^{nz}) published prescriber information on the use of dabigatran at that time.[1] It was indicated for the prevention of stroke/embolism in patients with non-valvular atrial fibrillation, and prevention of venothrombotic embolism (VTE) after major orthopaedic surgery. This widened to include the prevention/treatment of deep vein thrombosis and/or pulmonary embolism in 2014.[2,3]

Renal impairment increases plasma dabigatran levels and risk of adverse effects, particularly bleeding and gastrointestinal problems.[1,4–11] Renal function monitoring is always recommended when starting, and at least annually while taking dabigatran.[1,2,4–6,9,11,12]

Dabigatran is dosed twice daily at 150mg. A reduced dose of 110mg is recommended in patients 80 years or older and in renal impairment with creatinine clearance (CrCl) of 30–50ml/min to reduce risk of adverse effects.[1,2,4–6,9,13] Dabigatran is contraindicated if creatinine clearance is <30ml/min.[1–6,8,12,13]

The Clinical Quality Board (CQB) of Compass Health PHO wanted to demonstrate dabigatran was being prescribed/monitored in line with best practice guidance to ensure patient safety.[1,4,11,12]

In July 2013, the CQB asked every PHO practice to participate in an accredited clinical audit to review all patients prescribed dabigatran in the previous five months to check if:

a) renal function had been recorded at least once in the previous 12 months
b) dabigatran was used for one of the two approved indications.[12,14]

Practices and individual general practitioners were given feedback reports on completion of the audit. A cardiologist-led education session on NOACs was held in September 2014, encouraging appropriate prescribing and monitoring and included an update on expanded indications for dabigatran use.

A 2015 study by Thorne et al showed only 67% of 70 patients taking dabigatran for at least 12 months had an annual renal function check.[14]

A second-cycle quality improvement activity in 2014–2016 re-audited renal function monitoring and indications for use in all patients prescribed dabigatran across the PHO.

Method

Audit 1

The first cycle accredited quality improvement audit occurred during July 2013–May 2014. This audit was based on the Best Practice Advocacy Centre (bpac^{nz}) audit "Renal function testing in people taking dabigatran". It was modified with permission.[12]

Every practice in the Compass Health PHO was invited to participate in the audit to review all patients prescribed dabigatran in the previous five months.

Eligible patients were identified via prescribing information from the electronic practice management system (PMS). PHO clinical pharmacists assisted practices when requested.

Individual patient records were reviewed and the following data was collected:

- age
- gender
- ethnicity
- daily dabigatran dose*
- height (cm)
- weight (kg) recorded in the previous 12 months
- serum creatinine (mmol/L) recorded in the previous 12 months. Renal function was calculated using the Cockcroft-Gault equation to determine creatinine clearance (CrCl) in millilitres/minute (ml/ min). This required valid height and weight recordings.
- indication for use (Table 1).

*A dose was considered "appropriate" if correct for patient age and renal function (creatinine clearance ml/min) and/or if it had been reduced due to adverse effects.

Data was recorded in a template (see Appendix) by either a PHO pharmacist or the practice via individual clinicians, including general practitioners, practice nurses, PHO pharmacists and other clinical officers. Some practices submitted aggregated data only so there was incomplete demographic/clinical data at an individual patient level.

Table 1: Approved indications for use.[1,2,11,12]

Approved indication	Audit 1	Audit 2
Prevention of stroke/embolism in patients with non-valvular atrial fibrillation	Yes	Yes
Prevention of venothrombotic embolism (VTE) after major orthopaedic surgery	Yes	Yes
Prevention/and treatment of deep vein thrombosis (DVT) and/or pulmonary embolism (PE)	No	Yes
Prevention and treatment of pulmonary embolism (PE)	No	Yes

Data was collated by the PHO pharmacists. Aggregated anonymised results were reported to all GPs, every practice, the Compass Health CQB and the Capital and Coast District Health Board.

Any anomalous issues regarding dose, adverse effects or potential interactions were noted by the auditors in the written reports/comments provided in the feedback to GPs.

Audit 2

The second cycle accredited quality improvement audit was completed during May 2014–Oct 2016 following the methods for the first-cycle audit, including the expanded indications for dabigatran use.[2,12,13]

Both audits were protected continuous quality assurance activities (PQAA) under the Health Practitioners Competency Assurance Act within the Compass Health PHO. Specific ethical approval was not required.

GPs could claim continuous quality improvement-professional development credits on completion of each cycle of this audit.

Results

All practices in the PHO participated. There were 941 patients prescribed dabigatran in the first audit, increasing to 1,564 patients in the second audit.

Patient demographics (Table 2) show a wide age range and a higher proportion of male patients compared to the PHO enrolled population data. More ethnicity data was recorded in the second audit with proportionately more European patients prescribed dabigatran than either Māori, Pacific or Asian patients in both audits.

The clinical audit results from both cycles are presented in Table 3.

In the first cycle, 826 patients (87.8%) had an annual renal function recorded, just below the recommended best practice standard of 90%.[12]

Table 2: Patient demographics.

		Audit 1 no. patients (%)	**Audit 2 no. patients (%)**	**PHO no. patients (%)**
	Total	**941**	**1,564**	**288,078**
Gender	**N**	886	1,343	
	Male	535 (60.4)	775 (57.7)	137,125 (47.6)
	Female	351 (39.6)	568 (42.3)	150,953 (52.4)
Age in years	**N**	893	1,342	
	Youngest–oldest	22–94	35–98	0–107
	Range	72	63	107
	Mean	72 (10.73 SD)	73.3 (10.21 SD)	Not applicable
	Median	74	74	Not applicable
	25th Centile	66	67	Not applicable
	75th Centile	81	81	Not applicable
Ethnicity	**N**	891	1,343	288,078
	European	682 (76.5)	1,134 (84.4)	205,976 (71.5)
	Māori	65 (7.6)	99 (7.4)	27,367 (9.5)
	Pacific	16 (2.0)	32 (2.4)	14,116 (4.9)
	Asian	16 (2.0)	28 (2.1)	25,351 (8.8)
	Other	12 (1.5)	13 (1.0)	13,540 (4.7)

N.B. auditors collected different information making data sets variable).

Table 3: Results of audits of patients prescribed dabigatran in the Compass Health PHO.

	All patients		**Aged >75 years**	
Audit cycle	1st audit no. patients (%)	2nd audit no. patients (%)	1st audit no. patients (%)	2nd audit no. patients (%)
Total number of patients	**941**	**1,564**	**417**	**657**
Indication for use				
N	**894**	**1,508**	**417**	**657**
Non-valvular atrial fibrillation or post-orthopaedic surgery	852 (95.3)	1,400 (92.8)	402 (96.4)	640 (97.4)
Treatment or prevention of DVT	Not applicable	95 (6.3)	Not applicable	12 (1.8)
Unapproved indication	9 (1.0)	3 (0.2)	1 (0.2)	2 (0.3)
Indication not recorded	33 (3.5)	10 (0.7)	12 (2.9)	3 (0.5)
Annual serum creatinine test (mmol/L) recorded	**826 (87.8)**	**1,408 (90.0)**	**389 (93.3)**	**637 (97.0)**
Contraindicated (renal function <30 ml/min)	16 (1.8)	27 (0.02)	10 (2.4)	24 (3.7)

(N.B. data sets varied due to variation in auditor and information collection).

Table 4: Annual renal function checked in patients prescribed dabigatran.

Patients prescribed dabigatran	**Audit 1**	**Audit 2**
	Practices (%)	**Practices (%)**
N	57	56
Checked ≥90% of patients	32 (56.1)	33 (58.9)
Checked 80–89% of patients	11 (19.3)	14 (25.0)
Checked 70–79% of patients	4 (7.0)	7 (12.5)
Checked 50–69% of patients	8 (14.0)	2 (3.6)
Checked <50% of patients	1 (1.8)	1 (1.8)

N.B. In Audit 1 there were 2 practices and in Audit 2 there were 3 practices with no patients prescribed dabigatran.

Table 5: Specific comments or anomalies noted during the audit.

Potential interactions	• Amiodarone—may increase dabigatran level—monitor. • Verapamil—may increase dabigatran level—monitor. • Concomitant antiplatelet, eg, aspirin, clopidogrel: usually accidental, ie, not stopped when dabigatran started and/or authorised by specialist. • SSRI antidepressants—increased risk of abnormal bleeding. • NSAIDs—increased risk of abnormal/gastrointestinal bleeding and decreased renal function.
Unapproved dose/use	• Specialist recommendation/initiation. • 75mg BD for prevention of stroke in atrial fibrillation. • Once daily use—often due to transcription error. • 75mg OD in patients with CrCl <30ml/min and/or adverse effects at 110mg BD dose. • DVT prophylaxis on long-haul flight in first audit (unapproved indication).

Overall, 852 of 941 patients (90.5%) were prescribed dabigatran for an approved indication in Audit 1. Sixteen patients (1.8%) had a calculated renal function below 30ml/min, making dabigatran contraindicated.

In Audit 2, 1,408 patients (90.0%) had an annual renal function check. A total of 1,508 patients (96%) were prescribed dabigatran for an approved indication. Dabigatran was contraindicated in 27 patients (0.02%) with a calculated renal function below 30 ml/min.

Most patients prescribed dabigatran had an annual renal function check (see Table 4).

In Audit 1, 32 practices (56% of the PHO) had checked renal function annually in 90% or more of their patients. A cumulative total of 43 practices (75% of the PHO) had completed an annual renal function check in 80% or more of patients prescribed dabigatran.

In Audit 2 results improved with 33 practices (59% of the PHO) checking renal function annually in 90% or more of their patients. A cumulative total of 47 practices (84% of the PHO) completed an annual renal function check in 80% or more of patients prescribed dabigatran.

In each audit, only one small practice had checked renal function annually in less than 50% of their patients.

Discussion

Our results showed there was a high level of renal function monitoring across the PHO in both audits, 88% and 90% respectively for all patients prescribed dabigatran.

In both audits, patients >75 years had high levels of renal function monitoring, 93% and 97% respectively.

Renal function monitoring across practices ranged from 100% to 43% of patients prescribed dabigatran. Results reported as percentages impacted smaller practices disproportionately if one or two patients had not had an annual serum creatinine test.

Setup and implementation of effective practice protocols via alerts and/or a recall process was encouraged if not already in place.

There was a 66% increase in the number of patients prescribed dabigatran in the second audit. It is reassuring that after five years, 90% of all patients received an annual renal function check in line with clinical recommendations and best practice guidelines.

Ongoing high levels of renal function monitoring may be due to:

- feedback/encouragement from the first audit or
- improved clinical practice and processes for management and/or screening of long-term conditions, eg, diabetes or cardiovascular risk assessment.

The Cockcroft Gault Creatinine Clearance (CrCl) equation remains the gold standard for calculating renal function and making medication dose adjustments, but is not always calculated for patients.[11,13,15,16]

eGFR is not validated in the New Zealand population for medication dose adjustments, as it can overestimate renal function particularly in the elderly and/or patients with reduced muscle mass.[15,17]

Several patients had an estimated renal function of eGFR >30ml/min/1.73m^2 or >50ml/min/1.73m^2. Calculation using the Cockcroft Gault equation showed significant renal impairment, where a lower dose of dabigatran was indicated or contraindicated its use, particularly in females or where renal function had declined since initial prescribing.

Feedback from the audits encouraged GPs to record height and annual weight to allow calculation of CrCl (ml/min), to provide a more accurate measure of renal function. This allows dose adjustments of renally excreted medication, eg, dabigatran, metformin, bezafibrate, nitrofurantoin and gabapentin, and avoids overdosing and reduces potential adverse effects.[16,17]

Most patients were prescribed dabigatran for approved indications in the audits; 95% and 96% respectively, usually for atrial fibrillation.

Only 33 patients (3.5%) did not have an indication for use recorded in Audit 1, where dabigatran had usually been started by specialists/secondary care. This number reduced to 10 patients (0.7%) in Audit 2 after prevention and treatment of DVT/ PE became approved indications.

A few patients were given 75mg doses of dabigatran due to reduced renal function or adverse effects/intolerance of higher doses.

The efficacy of these doses in atrial fibrillation is unknown.

There were cases of concomitant aspirin and/or clopidogrel use with dabigatran due to an acute cardiovascular event and started by secondary care/specialists or when the patient's long-term medication list had not been updated after aspirin was stopped.

Some patients were prescribed concomitant NSAID analgesics or venlafaxine or SSRI antidepressants causing an increased risk of abnormal bleeding and reduced renal function with concomitant NSAIDs.

Concomitant amiodarone and verapamil can increase bleeding risk, but our audits found dabigatran doses were not decreased (in line with clinical guidelines).

GPs were advised of potential interactions, the need for more/closer monitoring and to update long-term medications in feedback reports.

Limitations and strengths of the study

This is the first reported quality audit of an entire primary health organisation. The results are very reassuring for patient safety across the Compass Health PHO.

The audits only recorded the renal function monitoring in patients taking dabigatran in the previous 12 months and did not show trends/variations over a longer period.

We did not investigate the incidence of adverse effects requiring dose reduction or the reasons for a 110mg BD dose in those with renal function >50 ml/min and younger than 80 years.

This was a pragmatic audit using different data collectors, eg, general practitioners, practice nurses, PHO pharmacists and other clinical officers, who recorded different data.

The strength of these audits was the participation of every practice, and a high level of practice engagement with quality improvement across the PHO. Within practices, the data collectors improved their audit and quality improvement processes and capability.

Conclusion

Our results showed a continuing high level of renal function monitoring across the PHO in 90% of patients prescribed dabigatran. Dabigatran was prescribed for approved indications in 96% of patients. These results are in line with recommended best practice and clinical guidelines.

A calculated renal function (ml/min) is more accurate than an estimated GFR (eGFR ml/min/1.73m^2) and allows dose adjustment to be made for renally excreted medications, but it requires height and annual weight recordings.

The CQB continues to encourage prescribers and general practices to set up and maintain good recall/alert protocols for drug monitoring and management of long-term conditions as part of best practice.

Appendix

Data collection template

Clinical audit: DABIGATRAN—renal function testing and dose adjustment date (Medical Centre Name):

- Creatinine clearance (CrCl) should be checked in all patients before commencing treatment with dabigatran
- Renal function should be assessed annually especially in those aged over 75 years or with moderate renal impairment (CrCl 30–50ml/min)
- If CrCl >50ml/min no dose adjustment is required
- If CrCl 30–50ml/min or aged ≥80 years—use 110mg BD in atrial fibrillation
- If CrCl <30ml/min—dabigatran is contraindicated
- Calculated CrCl has been estimated using the Cockcroft-Gault equation, which is the recommended method for drug dose adjustments
- eGFR has been included in the table for comparison purposes

Key	Review indication/dose/check S Creatinine and/or eGFR/record height or weight													
NHI	Age (years)	Gender	Ethnicity	Registered to	Strength (mg)	SIGs	Indication for use	Height (cm)	Weight (kg)	Calculated CrCl (ml/min)	eGFR (ml/min/1.73m^2)	Creatinine (mmol/ L)	Renal fxn check in last 12 months (yes/ no)	Comment

Competing interests:
AK and LM are employed at Compass Health PHO; Dr McBain is a practicing general practitioner, there are patients included in the audit who are enrolled at Dr McBain's practice.

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Smoking prevalence among doctors and nurses—2013 New Zealand census data

Richard Edwards, Danny Tu, James Stanley, Greg Martin, Heather Gifford, Rhiannon Newcombe

ABSTRACT

AIMS: To examine recent smoking trends among doctors and nurses in New Zealand.

METHODS: Analysis of smoking prevalence in the 2013 New Zealand Census and comparison with previous census data.

RESULTS: The 2013 census included 7,065 male and 5,619 female doctors, and 2,988 male and 36,138 female nurses. Non-response to smoking questions was less than 3%. In 2013, 2% of male and female doctors and 9% of male and 8% of female nurses were regular cigarette smokers. This compared with 4% male and 3% female doctors, and 20% male and 13% female nurses in 2006. Psychiatric nurses had the highest smoking prevalence (15% male, 18% female). More Māori doctors (6.8%) and nurses (19.3%) smoked. Around 96% of young (<25 years) doctors and 87% of young nurses had never been regular smokers.

CONCLUSIONS: By 2013, New Zealand doctors had achieved the Smokefree 2025 goal of minimal (<5%) smoking prevalence and all nurses except psychiatric nurses were on track to do so. This suggests smokefree cultures can be established among substantial occupational groups. However, smoking among Māori nurses was relatively high. Targeted workplace smoking cessation support may be an efficient means to reduce smoking among key occupational groups, and may help reduce population smoking prevalence.

New Zealand has an explicit "Smokefree 2025" goal often interpreted as reducing the prevalence of smoking to under 5% by 2025 including among all major population groups.[1] Monitoring smoking among healthcare workers is important as they are potential societal role models for health-related behaviours, are frequently required to provide advice and support to smokers to quit, and could be exemplars for achieving very low smoking prevalence. As a result, smoking prevalence is often assessed among these workers. For example, systematic reviews published in 2006–2007 included 81, 73 and 35 English language papers describing smoking among doctors, nurses and dentists respectively.[2–4]

In New Zealand, surveys of smoking among doctors on the medical register were reported in 1963 and 1972.[5,6] Several analyses of smoking among doctors and nurses were conducted subsequently using data from the 1976, 1981, 1996 and 2006 censuses,[7–12] and a broader analysis of smoking among healthcare workers from the 2006 census.[13] These studies showed a steady decline in smoking, particularly among doctors, with only 4% of male and 3% of female doctors regular smokers in 2006. Smoking among nurses was more common: 13% among female and 20% among male nurses, and as high as 26% for male and 30% for female psychiatric nurses.[7]

The purpose of this paper is to provide an update on smoking prevalence among New Zealand doctors and nurses using data from the 2013 census, and make comparisons with previous census data. We also set out to examine smoking among doctors and nurses by ethnicity as this has not previously been reported.

Methods

Analyses were based on responses to two questions on smoking in the 2013 New Zealand Census.[14,15] Responses to the questions were used to categorise individuals as current regular smokers, ex-regular smokers or never-regular smokers. We excluded from the denominator all subjects who did not have valid data for either or both of the smoking questions (either did not respond to question or made an invalid response).

1. Do you smoke cigarettes regularly (that is, one or more a day)? Count only tobacco cigarettes. Don't count pipes, cigars or cigarillos. (Yes/No)
2. Have you ever been a regular smoker of one or more cigarettes a day? (Yes/No)

Responses to the smoking questions were analysed by age in four groups (15–24 years, 25–44 years, 45–64 years, 65+ years), by sex and by occupation using levels 4 and 5 of the Australian and New Zealand Standard Classification of Occupations.[16] Student nurses and medical students were not coded separately from other students in the census analyses, and are not included in the data presented.

Self-identified ethnicity was assigned according to the prioritised method used by Statistics New Zealand, each person was allocated to one of two prioritised ethnic groups. 'Māori' included persons who indicated New Zealand Māori as their only ethnic group or one of their ethnic groups (11.7% of those aged 15 plus in 2013 and 5.9% of doctors and nurses), while

Table 1: Smoking prevalence among doctors in the 2013 New Zealand census.*

	Doctors				**Total employed population**	
Gender	**N**	**Regular smokers %**	**Ex-smokers %**	**Never smokers %**	**N**	**Regular smokers %**
Male						
15–24 years	324	2.8	3.7	92.6	136,518	19.8
25–44 years	2,787	2.2	10.1	87.7	399,738	19.2
45–64 years	3,375	2.6	17.0	80.4	398,445	14.0
65 years and over	585	1.5	33.8	64.6	74,142	7.2
Total 15 years and over	**7,065**	**2.3**	**15.1**	**82.6**	**1,008,843**	**16.3**
Female						
15–24 years	477	1.9	1.9	96.9	124,674	14.2
25–44 years	3,036	1.6	7.0	91.3	365,556	14.9
45–64 years	1,995	2.0	11.6	86.3	382,896	13.4
65 years and over	111	5.4	18.9	75.7	49,704	7.7
Total 15 years and over	**5,619**	**1.8**	**8.4**	**89.7**	**922,827**	**13.8**
Total						
15–24 years	801	2.2	2.6	95.5	261,189	17.1
25–44 years	5,817	1.8	8.5	89.7	765,297	17.1
45–64 years	5,367	2.3	15.0	82.6	781,335	13.7
65 years and over	696	1.7	31.5	65.9	123,846	7.4
Total 15 years and over	**12,684**	**2.1**	**12.1**	**85.8**	**1,931,670**	**15.1**

*There may be minor discrepancies in the totals within this table (and between other tables) as the numbers were random rounded to a multiple of three as per Statistics New Zealand protocol.[17]

non-Māori includes all persons not prioritised to the Māori ethnic group.

For examining trends we considered data from surveys of doctors in 1963 and 1972,[5,6] and from censuses that included questions on smoking (in 1976, 1981, 1996, 2006 and 2013).[7–11]

There are minor discrepancies in the totals between and within the tables as frequencies were random rounded to a multiple of three as per Statistics New Zealand protocol.[17]

Results

Number of respondents and response

There were 7,065 male and 5,619 female doctors, and 2,988 male and 36,138 female nurses included in the 2013 census. Non-response to the smoking status questions was 2.4% in male doctors, 2.1% for female doctors, 2.6% for male nurses and 2.9% among female nurses. This compared with a non-response for the smoking questions of 3.5% across all census respondents.[13]

Table 2: Smoking prevalence among doctors by specialty in the 2013 New Zealand census.*

Gender	N	Regular smokers %	Ex-smokers %	Never smokers %
Male				
General practitioner	2,685	2.2	17.3	80.6
Resident medical officer	1,935	2.3	10.5	87.1
Surgeon	717	1.7	17.2	81.6
Physician	1,143	3.4	15.7	80.6
Gynaecologist and obstetrician	45	6.7	20.0	66.7
Radiologist, radiation oncologist	201	1.5	14.9	83.6
Anaesthetist	339	0.9	15.9	83.2
Female				
General practitioner	2,358	1.4	7.3	91.5
Resident medical officer	2,007	1.5	6.3	92.1
Surgeon	105	5.7	5.7	85.7
Physician	801	3.4	15.4	80.9
Gynaecologist and obstetrician	54	0.0	16.7	83.3
Radiologist, radiation oncologist	132	2.3	15.9	81.8
Anaesthetist	165	1.8	9.1	90.9
Total				
General practitioner	5,049	1.8	12.5	85.6
Resident medical officer	3,942	1.9	8.4	89.6
Surgeon	825	2.2	15.6	82.2
Physician	1,947	3.5	15.7	80.6
Gynaecologist and obstetrician	99	3.0	18.2	75.8
Radiologist, radiation oncologist	330	1.8	15.5	83.6
Anaesthetist	501	1.2	13.8	85.6

*There may be minor discrepancies in the totals within this table (and between other tables) as the numbers were random rounded to a multiple of three as per Statistics New Zealand protocol.[17]

Table 3: Smoking prevalence among nurses in the 2013 New Zealand census.*

	Nurses				Total employed population	
Gender	**N**	**Regular smokers %**	**Ex-smokers %**	**Never smokers %**	**N**	**Regular smokers %**
15–24 years	90	10.0	3.3	90.0	136,518	19.8
25–44 years	1,473	7.5	21.0	71.3	399,738	19.2
45–64 years	1,332	10.8	39.2	50.0	398,445	14.0
65 years and over	84	10.7	50.0	46.4	74,142	7.2
Total 15 years and over	**2,988**	**9.2**	**29.3**	**61.4**	**1,008,843**	**16.3**
Female						
15–24 years	1,554	6.2	6.6	87.3	124,674	14.2
25–44 years	14,094	7.9	21.4	70.7	365,556	14.9
45–64 years	18,774	8.2	30.4	61.5	382,896	13.4
65 years and over	1,719	6.5	37.0	56.7	49,704	7.7
Total 15 years and over	**36,138**	**7.9**	**26.2**	**65.9**	**922,827**	**13.8**
Total						
15–24 years	1,644	6.6	6.2	87.4	261,189	17.1
25–44 years	15,570	7.9	21.3	70.8	765,297	17.1
45–64 years	20,106	8.3	31.0	60.7	781,335	13.7
65 years and over	1,809	6.6	37.3	55.9	123,846	7.4
Total 15 years and over	**39,129**	**8.0**	**26.4**	**65.6**	**1,931,670**	**15.1**

*There may be minor discrepancies in the totals within this tables (and between other tables) as the numbers were random rounded to a multiple of three as per Statistics New Zealand protocol.[17]

Smoking among doctors in 2013

The prevalence of smoking among all doctors and all adults with an occupational classification stratified by age and sex is shown in Table 1. Only 2.3% of male and 1.8% of female doctors were regular smokers, with minor variations by age group. Smoking prevalence among doctors was substantially less than among the total employed population for males (16.3%) and females (13.8%) in all age groups. Around 90% of doctors aged 25–44 years had never been regular smokers. Smoking among Māori doctors (data not shown) was 6.8% (7.4% male and 6.5% female Māori doctors) compared to 2.2% among non-Māori doctors (2.2% male and 1.6% female non-Māori doctors). Over 85% of doctors had never smoked, including over 95% of doctors aged <25 years.

Table 2 shows smoking among doctors by speciality. Among male doctors, the highest smoking prevalence was among gynaecologists and obstetricians (6.7%) and the lowest among anaesthetists (0.9%). Among female doctors the highest smoking prevalence was among surgeons (5.7%) and the lowest among gynaecologists and obstetricians (0.0%).

Smoking among nurses in 2013

The prevalence of smoking among all nurses stratified by age and sex is shown in Table 3.

Only 7.9% of female nurses and 9.2% of male nurses were smokers. This compares with 13.8% of females and 16.3% of males among the total employed population. Smoking among nurses was lower than in the total employed population for all age groups of female nurses and for all age groups of male nurses, except those aged 65 years and over. Around two-thirds of nurses had never smoked, including 87% of nurses aged <25 years.

Smoking among Māori nurses (data not shown) was 19.3% (18.8% male and 19.4% female Māori nurses) compared to 7.2% among non-Māori nurses (8.6% male and 7.1% female non-Māori nurses).

Table 4: Smoking prevalence among nurses by specialty* in the 2013 New Zealand census.*#

Gender	N	Regular smokers %	Ex-smokers %	Never smokers %
Male				
Principal nurse	153	11.8	33.3	54.9
Registered nurse	2,469	8.6	27.7	63.8
Psychiatric nurse	303	14.9	37.6	48.5
Other nurse**	60	5.0	36.7	58.3
Female				
Principal nurse	1,518	8.9	32.8	58.3
Registered nurse	29,661	7.8	25.0	67.3
Psychiatric nurse	699	17.6	42.1	40.3
Plunket nurse	507	7.1	24.3	68.6
Public health and district nurse	1,185	6.3	30.4	63.5
Occupational health nurse	156	5.8	34.6	61.5
Midwife	2,409	7.2	29.8	62.9
Total				
Principal nurse	1,674	9.3	32.6	57.9
Registered nurse	32,130	7.8	25.2	67.0
Psychiatric nurse	1,002	16.8	41.0	42.5
Plunket nurse	507	7.1	24.3	69.2
Public health and district nurse	1,230	6.3	30.7	63.2
Occupational health nurse	159	3.8	35.8	60.4
Midwife	2,415	7.2	29.8	63.0

*Principal nurses are senior nurses including charge nurses. Registered nurses are general staff nurses working mainly in a hospital setting.
#There may be minor discrepancies in the totals within this table (and between other tables) as all the numbers were random rounded to a multiple of three as per Statistics New Zealand protocol.[17]
**Pooled due to small numbers—includes Plunket nurses, public health and district nurses, occupational health nurses and midwives.

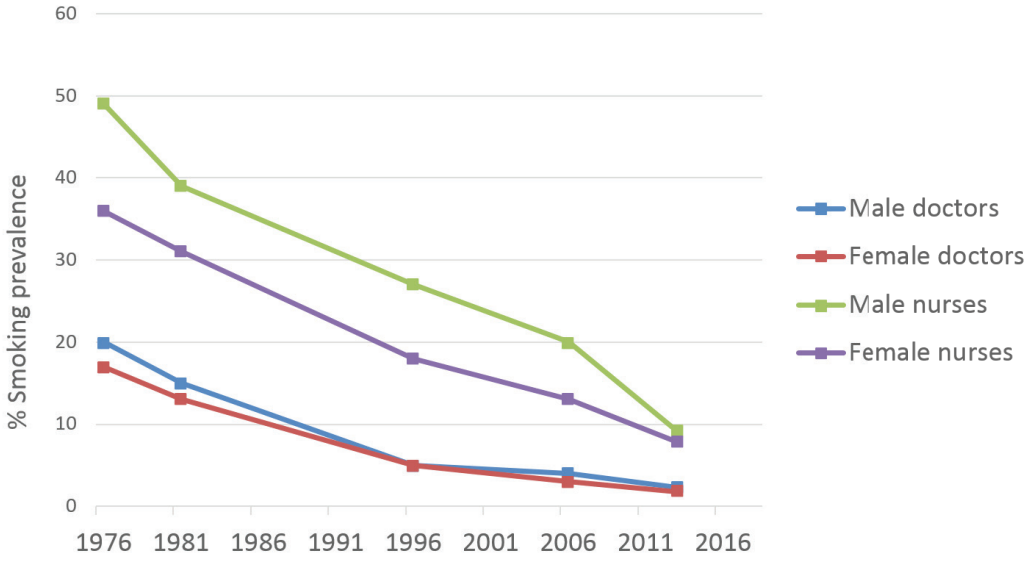
Table 4 shows smoking among nurses by speciality. Smoking prevalence was higher among psychiatric nurses of both genders (males 14.9%; females 17.6%) and among male principal nurses (11.8%). Prevalence was below 9% in all other types of nurses among males and females.

Trends in smoking prevalence among doctors and nurses

Census data show that regular cigarette smoking among doctors has declined steadily since 1976 (Figure 1). Smoking prevalence was only 5% by the 1996 census for male and female doctors, and declined further from 3.6% in 2006 to 2.1% in 2013. Smoking among nurses has also decreased dramatically since first assessed in 1976, and declined further between 2006 and 2013 from 13.6% to 8.0% (Figure 1). Among psychiatric nurses, smoking reduced from 26% to 14.9% among males and 30% to 17.6% among females during the same period.

Smoking prevalence among Māori doctors declined from 9.4% for males and 10.7% for females in 2006 to 7.4% males and 6.5% females in 2013 and for Māori nurses from 33.8% to 18.8% among males and from 30.6% to 19.4% among females.

Figure 1: Trends in regular cigarette smoking prevalence among doctors and nurses in New Zealand from census data.



Sources: 1976, 1981, 1996, 2006 and 2013 censuses.[7,8,10,11]

Discussion

Smoking prevalence in the 2013 census was extremely low among doctors of all specialties, and over 90% of doctors aged under 45 years had never smoked. Smoking was also only 8% among nurses, a substantial reduction from around 14% in 2006. Smoking among nurses was almost half the prevalence found among the general employed population in New Zealand. These data are from 2013, so further declines in prevalence are likely to have occurred in the interim.

These findings suggest that doctors are now a virtually smokefree population and nurses are well on the way to being the same, and to meet the 2025 Smokefree target. Smoking prevalence was higher among Māori doctors and nurses, and while these figures have declined, which is encouraging, they remained substantially elevated compared with non-Māori. This suggests that specific interventions to support cessation targeting these groups may be warranted.

The findings add to the international literature on smoking prevalence among doctors. The 2% prevalence among New Zealand doctors adds to an increasing number of countries with very low smoking prevalence in this occupational group. A 2007 review of studies between 1974 and 2004 found highly variable prevalence, with the lowest (<5%) in the US, UK and Australia.[3] As the studies in this review are now quite dated, it is likely that there are now many more countries with very low prevalence of smoking among doctors. Studies of trends in smoking among doctors generally show rapidly declining prevalence over time, for example in recent studies from China and Japan.[18,19] However, a more recent review mostly found much higher smoking prevalence among doctors in many developing countries.[20]

A 2007 review of studies among nurses found great variation in smoking prevalence, with the lowest prevalence in east Asian countries such as Japan and China, as well as the US, UK and Australia. Studies of trends in smoking prevalence showed evidence of large reductions in prevalence over time in some countries such as Australia and Canada. Among studies of nurses' smoking published between 1996 and 2006, the mean prevalence was 20%, so the overall smoking prevalence of 8% found in this study may be one of the lower smoking prevalence estimates among nurses internationally. The smoking prevalence of around 19% among Māori nurses in the 2013 census are similar to those of a 2012 national survey of smoking among New Zealand Māori nurses, which found a daily smoking prevalence of 16.6%.[21]

A strength of this study is that it is based on a census rather than a sample of healthcare workers and hence has large numbers of participants and is not susceptible to sampling variation. It updates and advances on previous studies of smoking among doctors and nurses in New Zealand by including data on smoking among Māori and non-Māori. Investigating smoking by ethnicity is particularly important given the evidence that smoking is much higher among Māori and that the current rate of decline in smoking prevalence is far too slow to meet the Smokefree 2025 goal for Māori peoples in New Zealand.[22]

A potential limitation of the study is that a small proportion did not complete the smoking status question, though this was less than 3% in the nurse and doctor occupational groups included in this study. It is plausible that these individuals may be more likely to be smokers (and not report this due to social desirability bias) and hence the smoking prevalence figures may be a slight underestimate. However, given the low non-response rate this is unlikely to greatly affect the findings.

The low and declining smoking prevalence among doctors and nurses is encouraging. The existence of rapid declines in prevalence among occupational groups, and that there are substantial occupations like doctors where smoking prevalence is well below 5%, provides encouragement that the Smokefree 2025 goal is achievable. However, doctors are a highly educated, high status, high-income group and such a low smoking prevalence may not be achievable in more marginalised groups without much more substantial tobacco control and smoking cessation interventions.

Low smoking prevalence among health professionals, particularly doctors and nurses, may be particularly important as these groups are potential role models to the rest of the community for health-related behaviours.[23] These health workers are also important for delivering smoking cessation services, and the credibility of this service delivery may be undermined if the provider is known to be a smoker. Furthermore, systematic reviews[24,25] and research with Māori nurses[26] have found some evidence that doctors and nurses who don't smoke are more likely to provide smoking cessation advice and support than their smoking colleagues. A possible mechanism for this is that nurses and other para-professionals who smoke experience cognitive dissonance. This dissonance may be generated by their belief that, as health professionals, they should be role modelling health-promoting behaviours, a belief that contrasts with their actual behaviour as smokers. Such dissonance may impact on practice by inhibiting nurses who smoke from providing smoking cessation advice to patients and potentially to wider family members.[26,27]

The substantial decline in prevalence among psychiatric nurses since 2006 is also a positive sign, though they remain the group of nurses with the highest rates of smoking. Since the study based on the 2006 census, there has been a greater focus on understanding smoking among psychiatric patients and the contribution of psychiatric health service settings to promoting smoking. For example, New Zealand studies have found high rates of mental illness among smokers,[28] and higher smoking prevalence among people with mental illness.[29] A qualitative study found that there was a 'permissive culture' towards smoking in some New Zealand mental healthcare facilities.[30]

The potential positive impacts of low smoking prevalence among doctors and nurses and persisting high smoking prevalence among psychiatric nurses and Māori nurses suggests that there is a case for targeted smoking cessation support among these key groups, including programmes designed specifically for Māori. Interventions targeted at Māori nurses will need to recognise the broader social environment and needs of this specific population.[26] Workplace smoking cessation interventions have been shown to have a similar degree of effectiveness to cessation interventions in other settings.[31] They have some potential advantages such as providing efficient access to priority groups, and potentially having higher participation rates than interventions in non-workplace environments.[31] However, delivering workplace interventions to healthcare professionals in healthcare settings may also have some additional challenges that may need to be addressed. For example, enrolment may be inhibited by the perceived stigma of

being identified as a smoker and shift-work patterns may create logistical difficulties for programme delivery.

Cessation interventions for selected groups of health professionals could be part of a comprehensive programme of workplace-based cessation interventions for occupational groups with a high smoking prevalence and/or where reductions in smoking prevalence may have additional positive effects on smoking and smoking cessation in the wider population; for example, among occupational groups who are potential role-models, such as teachers. There is also a strong case for implementing interventions to ensure healthcare settings are smokefree with a strong smokefree culture and norms. For example, in a qualitative study with Māori nurses, smokefree workplace policies were reported to reduce smoking in the workplace.[26] This is particularly important in mental healthcare settings where smoking prevalence among staff and patients is often high, and cultures that support smoking—such as staff offering patients cigarettes and beliefs that smoking can be useful because it helps facilitate dialogue with patients—still persist in some settings.[30]

The results from the 2013 Census demonstrate that as an occupational group, New Zealand doctors had achieved the Smokefree 2025 goal of minimal smoking prevalence and all nurses except psychiatric nurses appeared to be on track to do so well before 2025. However, despite encouraging recent trends, smoking prevalence remained relatively high among Māori nurses. The results support the feasibility of the Smokefree 2025 goal by demonstrating that very rapid decreases in smoking prevalence and close to zero smoking prevalence can be achieved among some substantial occupational groups, albeit health professionals who may be among the group most likely to not smoke. Providing targeted smoking cessation support in healthcare workplaces may be an efficient means of reducing smoking among occupational groups with persisting high rates of smoking, and may assist with reducing smoking prevalence among the wider population.

Competing interests:
Nil.

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What do doctors know about assessing decision-making capacity?

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ABSTRACT

AIMS: To survey hospital doctors (HDs) and general practitioners (GPs) on what they know about assessing capacity, and to determine their educational needs.

METHOD: A mixed-methods, cross-sectional survey was administered to a convenience sample of HDs and GPs. Respondents were asked about their roles, the prevalence of older patients they had seen, specific questions about capacity assessment, difficulties encountered and their preferred format for further education.

RESULTS: 152/980 (15%) HDs and 74/4,000 (2%) GPs responded. Most had been concerned about a patient's capacity in the past year, but had not received training in assessing capacity since graduation. The average responder scored below 70% on knowledge questions. Lack of legal knowledge and time pressures were among difficulties encountered. One-third of respondents lacked confidence to assess capacity to a standard high enough to present in court. Many doctors were willing to improve their skills, requesting tutorials or short courses.

CONCLUSION: Respondents demonstrated gaps in their knowledge on assessing capacity, and a lack of confidence in their opinions. The findings of this survey suggest that further clinical and legal education of doctors in performing capacity assessments would be valuable.

Assessing decision-making capacity ('capacity') is an essential skill for all doctors in clinical practice, not least because it is integral to obtaining informed consent to treatment.[1] Capacity is the legal threshold or 'bright line' for determining whether the law permits intervention in people's lives, and to what extent.[2] As capacity is decision- and time-specific, a patient's capacity is assessed in relation to a particular task or decision, taking into account that incapacity may be temporary or fluctuate. In general, the outcomes of the assessment include: the patient has capacity to decide; they need support to make the decision; they are unable to make a particular decision; or they are unable to make any decision.

The essential components of informed consent involve a triad of adequate information, capacity to decide and voluntariness.[3] Any doctor seeking consent to healthcare from a patient needs to be able to assess the patient's capacity to give or refuse consent. Doctors may also be asked to assess a patient's capacity to decide about their care and living arrangements, to make a will, to make or activate an enduring power of attorney (EPOA) or to make financial decisions.

Although capacity is a legal construct, the assessment of capacity is clinical. A capacity assessment may have significant implications for a patient's ability to exercise their personal autonomy. It is important evidence for the legal processes that may follow and may be used in support of applications to the court for orders affecting a person's care and welfare. The clinical assessment also aims to determine the extent, cause and possible reversibility of the patient's incapacity.

Anecdotally, many doctors report a lack of confidence and skill in how to assess capacity. Young,[4] and more recently Astell,[5] have described approaches to capacity assessment for doctors within the New

Zealand context, but there has been limited research into what doctors know about assessing capacity. [6,7]

The prevalence of incapacity among people in New Zealand hospitals and elder care facilities is unknown. A review of 58 international studies of capacity reported that 45% of patients in psychiatric settings and 34% of patients in general medical settings lacked decision-making capacity.[8] Dementia is a leading cause of incapacity and is expected to affect over 78,000 New Zealanders by 2026.[9] In view of the growing prevalence of dementia, along with many other brain conditions that can affect capacity, it is likely that doctors will need to assess capacity more frequently in the future.

This survey was part of a wider comparative analysis of relevant New Zealand law and the legislative framework provided by the Mental Capacity Act 2005 (England and Wales) and its associated Code of Practice.[10] The aims of this survey were to assess doctors' knowledge about capacity assessment and to investigate their educational needs and preferences. It was partly based on a previous US survey.[11]

Method

The survey was of a mixed-method, cross-sectional design comprising five parts:

1. Information about the respondents: seniority, specialty and frequency of experience with patients who may lack capacity;
2. Questions about a single, unidentified patient encountered in the previous year, who lacked capacity;
3. Technical questions about assessing capacity;
4. Questions about the respondent's postgraduate training in capacity assessment, confidence in conducting the assessments, whether they considered it to be within their scope of practice and how they might like to receive educational material in the future; and
5. A free text box asking the respondents to describe the main difficulties they experienced when assessing capacity.

The questions were refined following an initial pilot survey at Hawkes Bay DHB (data not included). A modified survey was distributed via internal email to all hospital doctors (HDs) working at Capital and Coast and Hutt Valley DHBs and to general practitioners (GPs) throughout New Zealand via three different email lists (New Zealand Doctor, Vital Signs and e-Pulse). The number of GPs was extrapolated from the 2014 National Workforce Survey: In 2014 there were 3,770 GPs and 160 other doctors in primary care. The increases from 2013 to 2014 were 2.5% and 6.1%; using these figures, a total of 4,034 was calculated for 2015. The number was an approximation only and therefore rounded to 4,000. The number of hospital doctors was provided by offices of the chief medical officers. These denominators indicate the size of the groups targeted in the survey. The email explained the purpose of the survey, invited participation and noted that ethics approval had been obtained, that responses were anonymous and that responding would be taken as consent to participate. The University of Otago Human Research Ethics Committee gave ethical approval for the survey (D15/213).

The data for HDs and GPs were analysed separately to understand the differences between the groups' experience, knowledge and educational needs. Data description is by simple tabulation.

The scores for the responses to 13 multiple-choice questions about technical aspects of capacity assessments were aggregated for each respondent. Respondents were given a score of 2, where the response reflected good knowledge; 1, reflecting some knowledge; and 0, reflecting poor or no knowledge. The total score could range from 0 to 26, with a higher score reflecting better knowledge.

The free text comments were categorised into common themes, which were cross checked and refined by the authors until a consistent set of themes was identified.

Table 1: Respondents exposed to capacity assessments in previous year and main reason for suspecting incapacity.

	HDs	GPs
	n/152 (%)	n/74 (%)
Exposure in previous year		
>20% of patients over 65 years	109 (72)	45 (61)
Concern about capacity on a few occasions	141 (93)	72 (97)
At least one capacity assessment	141 (93)	67 (91)
At least one legal document completed	99 (65)	44 (60)
Reason		
Cognitive impairment or dementia	87 (57)	52 (70)
Patient had a mental illness	13 (9)	0 (0)
Concern of nurses, colleagues or family	8 (5)	11 (15)
Clinical intuition	12 (8)	5 (7)
Patient could not communicate	12 (8)	0 (0)
Patient could not explain his or her reasons for the decision	9 (6)	2 (3)
Previously found to lack capacity	3 (2)	1 (1)
Patient was making a bad decision	2 (1)	1 (1)
Serious potential consequences of decision	1 (1)	0 (0)
No answer	6 (4)	2 (3)

Results

The response rate for hospital doctors was 152/980 (15%) and for GPs 74/4,000 (2%). For hospital doctors, 112 (74%) were senior medical officers (SMOs), and 40 (26%) were resident medical officers (RMOs). Departments represented were Medicine n=48 (32%) (including a range of subspecialties); Anaesthetics/ICU n=30 (20%); Psychiatry n=26 (17%); Surgery n=12 (8%); Emergency Medicine n=9 (6%); Obstetrics & Gynaecology n=6 (4%); Paediatrics n=4 (3%); Radiology n=3(2%); and Clinical Genetics n=1 (<1%).

House surgeons, who have not yet specialised, totalled n=10 (7%); the remaining three (2%) participants did not state their specialty. Among GP respondents, 64 (87%) were vocationally registered, four (5%) were GP registrars and six (8%) identified as 'GP other'.

Table 1 shows a description of the characteristics of the practices of the respondents, the experience of completing capacity assessments and the reasons for capacity assessments.

Table 2 describes the methods reported by respondents for assessing capacity.

Table 2: Assessment tools used to assess capacity in each case.

	HDs	GPs
Assessment tool used	n/152 (%)	n/74 (%)
By asking particular questions that were specific to assessing capacity	41 (27)	14 (19)
Didn't specifically assess capacity in this instance	4 (3)	1 (1)
Informal, based on general discussion and clinical intuition	13 (9)	3 (4)
Informal, but also based on information from team members and family	58 (38)	27 (37)
Referred the patient to a colleague for a formal capacity assessment	16 (11)	12 (16)
The issue resolved itself because the patient accepted medical advice	6 (4)	3 (4)
Using a capacity assessment protocol or questionnaire	9 (6)	12 (16)
No answer	6 (4)	2 (3)

For the aggregate score reflecting knowledge of the technical aspects of capacity assessment, the median (interquartile range) score for HDs was 19 (16 to 21) and for GPs 18 (16 to 21). For HDs who reported extra training about capacity assessment, the median (interquartile range) score was 21 (19 to 23) and for GPs 21 (19 to 22).

Both groups performed well on questions 6 and 7 (see appendix) regarding informed consent. Question 6 asked whether the doctor knows about the risks and benefits involved, and question 7 whether the doctor doing the capacity assessment should ensure the patient has all the relevant information for the decision. For question 6, 127 (84%) of HDs and 65 (88%) of GPs gave the correct answer of 'Essential'. Likewise, for question 7, 132 (87%) of HDs and 54 (73%) of GPs gave this correct response.

Both groups performed poorly on some questions (numbers 1 and 2 in the appendix) regarding the approach to capacity assessment in non-urgent treatment situations, and the generalisability of one capacity assessment to another, different decision. For question 1, 27 (18%) of HDs and 14 (19%) of GPs incorrectly nominated that the next of kin can give consent. For question 2, 50 (33%) of HDs and 40 (54%) of GPs were either incorrect or didn't know that a capacity assessment for a particular decision does not generalise to other decisions.

Cultural competence was considered essential or desirable by 142 (93%) of HDs and 71 (96%) of GPs.

Table 3 shows the extent to which the doctors lacked confidence in undertaking capacity assessments.

Both groups showed equal preference for a short course, an online protocol or a tutorial or teaching session on how to assess capacity.

The themes that emerged from both the HD and GP responses were: lack of time; lack of knowledge and skill; uncertainty regarding legal aspects; difficulty with grey-area or high-stakes cases; lack of confidence and difficulty with family dynamics.

Several of the HDs' responses indicated difficulties that were possibly more common in hospital, such as fluctuating capacity and ambiguity about whose job it was to assess capacity. Some respondents also reported indecision regarding the threshold for intervention, and a difficulty in assessing capacity when the patient may have a psychiatric disorder.

Emergency medicine doctors reported time pressures, competing priorities and that a lack of collateral information hampered their assessments. Intensive care doctors noted that the majority of their patients were under general anaesthetic, thus raising issues of surrogate decision-making. Anaesthetists commented upon lack of time, one-off interviews and a lack of knowledge of the patient's prior functioning as difficulties.

Far fewer RMOs (n=40) completed the survey compared to SMOs (n=112). Of the comments received from resident doctors, there was acknowledgement of lack of confidence and skill, and uncertainty as to whether resident doctors were permitted to assess capacity. Table 4 shows themes and comments from hospital doctor respondents.

Some GP responses included: not knowing a patient well enough, difficulties with family dynamics and whether

Table 3: Confidence of GPs and hospital doctors to assess a patient's capacity to make a treatment decision, to the standard that they would be prepared to have their opinion presented in court.

	HDs	**GPs**
	n/152 (%)	**n/74 (%)**
Not confident	50 (33)	23 (31)
Confident for straightforward cases only	60 (39)	40 (54)
Confident for most cases	42 (28)	11 (15)
No answer	1 (<1)	0 (0)

Table 4: Themes arising from hospital doctor respondents.

Theme	Example comments
Time	*"Time pressures"*
Knowledge/skill	*"Knowing what to ask"; "Lack of knowledge and experience"*
Grey-area cases	*"..important but non life threats in a pt with grey area issues—eg, mild cognitive/ psychiatric or intoxication issue…"*
Fluctuating capacity	*"As I deal frequently with patients with brain tumours their status is in a constant state of flux…"*
Legal aspects	*"The confusing and often contradictory web of legislation."* *"Lack of knowledge of NZ law."*
Confidence	*"Being sure I have accurately assessed their capacity."*
Roles	*"Not having psychiatrist, psychologist or other trained people readily available to do a formal capacity assessment."* *"Fitting it into a busy outpatient clinic setting where it is not 'core business'."*
Family dynamics	*"Influence of family." "Can be difficult when the family is quarrelling over the patient's money." "Complex family dynamics."*
Psychiatric disorder	*"Where religious 'beliefs' morph into delusions compromising competence…"*
Inter-professional dynamics	*"The challenge of engaging colleagues in different disciplines to contribute their expertise to the capacity assessments."* *"To get every health care staff involved in the care of the 'index person' to agree on the assessment decision."*
Threshold for intervention	*"Depth of ability to understand risk associated with surgical (anaesthetic) procedures."* *"I frequently encounter patients who make decisions incompetently, so it would be impracticable and harmful to the therapeutic relationship to intervene in every case. It is therefore difficult to determine the threshold at which intervention is justified."*

Table 5: Themes arising from GP respondents.

Theme	Example comments
Time	*"Time is often a factor, I can be hurrying."*
Knowledge/skill	*"Knowing how to do the assessment and what factors to consider."*
Grey-area cases	*"Assessing borderline cases where the patient may have partial capacity."*
Family Dynamics	*"Sometimes the next of kin are in disagreement with each other…sometimes there are major family rifts where the family are at opposite poles…"*
Legal aspects	*"Lack of knowledge of legal issues."* *"Not knowing full legal requirements."*
Confidence	*"Shouldering the responsibility of being the one to make this decision, plus concern at the possibility of being challenged, eg, by family, court system, lawyers…"*
High stakes	*"Testamentary capacity in a person with mild dementia"*
Familiarity with patient	*"Who do you believe? Especially when family members vocal about things and pressuring GP, and do not know patient or family well."*

another doctor should carry out capacity assessments in case an adverse finding compromised their relationship with the patient and their family. There were also comments about not knowing how to charge for capacity assessment. Some GPs were daunted at taking sole responsibility for capacity decisions, and some feared litigation. Table 5 shows examples of themes and comments by GPs.

Discussion

In general, the respondents' knowledge about the principles of capacity assessment was adequate and there was some evidence of better knowledge among those who had had training in capacity assessment. However, the majority of doctors were either not confident or confident only for straightforward cases, in being able to do capacity assessments to a medico-legally acceptable standard, that is, to a standard high enough to have their opinion presented in a court. The majority of respondents did not use a structured method of assessment. These findings suggest the respondents were aware of a need to improve their capacity assessments and that any teaching should focus on providing a structure for doing so.

A majority of respondents regularly encountered older patients and could recall concern about a patient's capacity on at least a few occasions in the previous year. Cognitive impairment or dementia were the most frequently reported reasons for the suspected incapacity. These findings highlight the importance of the skill of assessing capacity.

It is of some concern that one-third of responding HDs and over half of responding GPs did not appear to know that a capacity assessment applies to a specific decision. Many respondents incorrectly believed that a patient's next of kin, without having an enduring power of attorney (EPOA), could give legal consent on the patient's behalf.

A significant number of respondents (HDs: 30%; GPs: 24%) did not consider capacity assessment to be within their scope of practice. This response is surprising considering the assessment of a patient's capacity is integral to obtaining informed consent.[1] The Medical Council of New Zealand has advised that all doctors should be able to assess capacity.[12] Education efforts could include an emphasis that capacity assessment falls within every doctor's scope of practice.

A limitation of this survey was the low response rate, particularly for GPs. The low response rate by the GP group in particular may be useful information for future research. The non-random selection of the sample prevents both quantitative and qualitative inferences being made.

Free text answers gave insight into difficulties doctors encountered in assessing capacity. Grey-area or high-stakes cases, and those associated with family conflict caused particular unease. Respondents reported varying capacity assessment problems that related to their particular specialties.

Deciding whether a person has decision-making capacity is a legal determination informed by medical and other evidence. Capacity can be difficult to assess, may not be clear-cut and involves value judgments about people's preferences and beliefs. The Code of Health and Disability Services Consumers' Rights (HDC Code)[13] has no definition of incapacity, and no clear legal standards against which capacity is to be assessed. Where a patient lacks capacity to consent to medical treatment and healthcare, and there is no authorised decision-maker, Right 7(4) of the HDC Code sets out the legal position for giving treatment to a patient if it is considered to be in their best interests. Doctors may find themselves in a position where they need to justify progressing treatment without the patient's consent.

New Zealand's adult guardianship law, the Protection of Personal and Property Rights Act 1988 (PPPR Act) is complicated and has multiple tests for incapacity. Underlying both the PPPR Act and the HDC Code is the principle of presumption of capacity. The burden of proving incapacity to make decision(s) always lies with the person who considers that it may be necessary to take a decision on the person's behalf. The presumption of capacity does not, however, diminish the duty of care owed to patients or displace the duty to assess capacity as part of the provision of care.[14]

The United Nations Convention on the Rights of Persons with Disabilities (CRPD)

has added new impetus towards understanding the presumption of capacity and ways within clinical practice patients can be supported, where possible, to make decisions for themselves in the exercise of their legal capacity.[15] The United Nations committee has cast doubt on New Zealand's compliance with the CRPD and the Government is yet to progress integration of modern concepts of legal capacity into domestic law and practice.[16] Moreover, carrying out capacity assessments requires doctors to be culturally competent and to recognise cultural diversity, especially if the person is from a different culture than the doctor. A capacity assessment may inform what measures can be implemented to support someone to make their own decisions, even where they may be impaired.

The survey suggested that medical education in this area is particularly urgent, given that the majority of respondents regularly encounter older patients and could recall concerns about a patient's capacity on at least a few occasions in the previous year.

The results of the survey have informed the development of a guidance, a Toolkit for Assessing Capacity,[17] which aims to provide a consistent and systematic approach to assessing capacity within the New Zealand healthcare setting.

Conclusion

This research suggests that many of the doctors surveyed had deficiencies in their clinical and legal knowledge on assessing capacity, and lacked confidence in their opinions. Efforts to educate doctors on the importance of, and how to perform, a capacity assessment would be beneficial and well-received. Education needs to be offered in all modalities (tutorial, workshop, online) as no single method was preferred. Opportunities to discuss difficulties encountered with assessments may encourage doctors to do assessments that they may otherwise have referred on. This would augment training and could form part of continued professional development. Attention needs to be given at a higher level to the question of reimbursement of general practitioners as capacity assessments require more time than that available in an ordinary consultation. The role of other clinicians on the multidisciplinary team in assessing capacity could be developed further, possibly reducing costs and saving valuable GP time.

Appendix 1: The survey

What do you know about assessing capacity and what would help you do it better?

Impaired capacity to make decisions about treatment or other matters is becoming an increasing issue of concern in contemporary medical practice, and yet not all doctors are familiar with how to assess a patient's capacity. As doctors we routinely ask patients to make decisions about their treatment and other issues, but many older patients have complex medical comorbidities and cognitive impairment or dementia and may not have the capacity to make these decisions. Being unsure of what to do in situations like this can cause delays in decisions being made, increased length of stay, frustration for clinical teams and may result in poorer outcomes for patients.

However, doctors vary in how much they know and how much they need to know about capacity assessment. Medical education time is precious and it is important that sufficient but not excessive information is made available to doctors, in a variety of ways to suit the individual needs of the doctors.

Drs Greg Young and Crawford Duncan, psychiatrists at Capital and Coast DHB have been involved in doing, teaching and helping others with capacity assessments and are working with Alison Douglass, a lawyer, researching how we might update New Zealand's mental capacity law. We have prepared this survey to help us understand better what our medical colleagues know, and need to know, about assessing capacity. We plan to use the information from the survey to help us design teaching and information resources.

Please could you help us by spending no more than ten minutes completing this survey?

The survey is anonymous, but we are interested in your area of work and level of training. The survey has been approved by Otago University Human Research Ethics Committee (number D15/213).

Your completion of the survey will be regarded as your consent to participate.

In this survey, a 'formal' assessment of capacity means an assessment that is based on a procedure that has been described in a book or article; an 'informal' assessment is based on intuition or clinical experience, but does not follow a protocol or structure.

Are you a (please circle one)

House Surgeon / Registrar / Medical Officer / Consultant / Vocationally trained GP

Which of the following best describes your medical specialty (please circle one)

Medicine / Geriatrics / Palliative Care / Surgery / Anesthetics / Emergency Medicine

Psychiatry / Paediatrics / General Practice / Other (including house surgeon)

Approximately how many of your patients are older than 65 years:

- None
- 1% to 20%
- More than 20%
- All
- Don't know

In the past 12 months, how many times have you been concerned that a patient may not have had the mental capacity to consent to or refuse treatment?

- Never
- A few times (<6)
- Quite often (6 to 12 times)
- Many times (more than 12 times)

In the past 12 months, how many times have you assessed, either formally or informally, a patient's capacity to make a treatment decision?

- Never
- A few times (<6)
- Quite often (6 to 12 times)
- Many times (more than 12 times)

In the past 12 months, how many times have you had to complete a legal document or medical certificate relating to a patient's capacity to make a decision or decisions (eg, an application to the court for a personal order, or activate EPOA).

- Never
- A few times (<6)
- Quite often (6 to 12 times)
- Many times (more than 12 times)

For the next five questions, please think about one occasion when you thought a patient might not have had the capacity to make a decision about treatment or discharge arrangements.

What was the main reason for you thinking that the patient might not have had capacity in this case? (Please select one response only)

- Patient was making a bad decision
- Patient was cognitively impaired or had dementia
- Clinical intuition
- Nursing staff, other colleagues or family expressed concern
- Patient could not communicate
- Patient could not explain his/her reasons for the decision
- Patient had previously been found to lack capacity
- Patient had a mental illness
- The decision had very serious potential consequences

Did the patient have any of the following conditions? (Circle as many as appropriate)

- Moderate to severe dementia
- Mild dementia
- Delirium
- Problems with communication (eg, CVA with aphasia)
- Psychiatric disorder
- Patient needing emergency, life-saving treatment
- Patient required an anaesthetic
- Patient was intoxicated and needing medical treatment

What was the decision?

- To consent to an investigation or treatment
- To refuse an investigation or treatment
- A decision about discharge arrangements
- Other

Which of the following ways of assessing capacity did you use in this case?

- Informal, based on general discussion and clinical intuition
- Informal but also based on information from team members and family
- By asking particular questions that were specific to assessing capacity
- Using a capacity assessment protocol or questionnaire
- Referred the patient to a colleague (within or outside of the MDT) for a formal capacity assessment
- Didn't specifically assess capacity in this instance
- The issue resolved itself because the patient accepted medical advice

Did this patient lack capacity to make a particular decision, or did they lack capacity to make all decisions, or didn't you know?

- A particular decision
- All decisions
- Didn't know

The following questions are about capacity assessment more generally.

If an adult patient appears not to have capacity to make an important, non-emergency treatment decision and there is no Enduring Power of Attorney or Welfare Guardian, would you: (please select one)

- Make a treatment decision based on what is in the patient's best interests
- Get consent from the next of kin
- Refer the patient to a colleague for a capacity assessment
- Do a formal assessment of capacity yourself and decide what to do after the assessment
- Don't know

Once a patient has been formally assessed as lacking capacity to make a decision about medical treatment, s/he can be safely assumed to lack capacity for all future decisions about medical treatment:

Always true / Mostly true / False Don't know

Once a patient has been formally assessed as lacking capacity to make one decision about medical treatment, s/he can be safely assumed to lack capacity any other decision about medical treatment:

Always true / Mostly true / False Don't know

When formally assessing a patient's capacity to make decisions about medical treatment, how important are the following?

The patient is able to give logical reasons for his/her decision

Essential / Desirable / Irrelevant Don't know

The patient knows the benefits and risks involved:

Essential / Desirable / Irrelevant Don't know

The patient follows medical advice

Essential / Desirable / Irrelevant Don't know

The doctor doing the assessment knows about the risks and benefits involved:

Essential / Desirable / Irrelevant Don't know

The doctor doing the capacity assessment ensures that the patient has all the information relevant to the decision:

Essential / Desirable / Irrelevant Don't know

The doctor doing the capacity assessment ensures that any reversible condition that could impair the patient's capacity has been treated:

Essential / Desirable / Irrelevant Don't know

The doctor doing the assessment considers other information about the patient's functioning as well as what the patient says at the assessment:

Essential / Desirable / Irrelevant Don't know

How important do you consider cultural competence to be for capacity assessment?

Essential / Desirable / Irrelevant Don't know

The patient is able to "pass" a cognitive test, such as the MMSE?

Essential / Desirable / Irrelevant Don't know

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In deciding if a patient has capacity to make a decision, which is the more important:

- The outcome of the decision, ie, what the patient decides
- The process by which the patient makes the decision
- They are equally important
- Don't know

In general, would you expect a patient with a severe psychiatric illness such as schizophrenia to have capacity to make decisions about non-psychiatric treatment?

- Yes
- Approximately 50% of the time
- No
- Don't know

Have you received any extra training in doing capacity assessments since you graduated?

- Yes
- No

How confident are you that you could assess a patient's capacity to make a treatment decision, to the standard that you would be prepared to have your opinion presented in court?

- Confident for most cases
- Confident for straightforward cases only
- Not confident

Do you consider capacity assessment to be within your scope of practice?

- Yes, in most cases
- No
- Don't know

How would you prefer to get information about how to conduct a formal capacity assessment?

- None, this is not in my scope of practice
- A tutorial or teaching session (1 to 2 hours)
- A short course (1/2 to 1 day)
- A webinar (online lecture or tutorial)
- An online protocol

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New atrial fibrillation diagnosed perioperatively—anticoagulation practices in a secondary hospital

Alyssa Kirby, Sisira Jayathissa

ABSTRACT

BACKGROUND: Atrial fibrillation (AF) is a common arrhythmia encountered perioperatively in patients undergoing non-cardiac surgery. There is emerging evidence suggesting high risk of ischaemic stroke. There are no clear guidelines surrounding initiation of anticoagulation in this setting. This study evaluates current practice in anticoagulant management of new perioperative AF at Hutt Hospital.

METHODS: We have undertaken a retrospective study of 3,558 patients aged 60 years and over admitted for non-cardiac surgery at Hutt Hospital in 2014, to assess incidence of new AF/flutter and review how they were managed in regards to anticoagulation.

RESULTS: We identified 28 patients as having "new AF/flutter" with CHA_2DS_2-VASc scores between 1 and 8. Anticoagulation management was inconsistent, with only some patients receiving anticoagulation if using CHA_2DS_2-VASc score as a marker of indication for treatment.

CONCLUSIONS: There is insufficient evidence and lack of clear guidelines in this area to enable consistent and evidence-based management of patients with new AF identified perioperatively. Until such guidelines are available we suggest all such patients are individually assessed and treated depending on their individual risk/benefit analysis. Multiple factors such as bleeding risk, CHA_2DS_2-VASc score and perhaps duration of AF need to be considered.

Atrial fibrillation (AF) is a common arrhythmia affecting hospitalised patients, and associated with increased mortality and morbidity.[1] It is the most common sustained tachyarrhythmia post-operatively.[2] The global incidence of AF is estimated to be almost five million cases per year.[3] It is uncommon before the age of 60 years, but the incidence increases with age, affecting almost 18% of patients older than 85 years.[4] In addition to potentially troublesome symptoms, it also significantly increases an individual's risk of ischaemic stroke.[5] Atrial fibrillation-associated strokes have greater morbidity and mortality than other ischaemic strokes.[6]

Clinicians are familiar with the increased risk of stroke in patients with known non-valvular AF and assess the need for anticoagulation with warfarin or a direct oral anticoagulant (DOAC) appropriately using risk stratification tools such as the CHA_2DS_2-VASc score.[7] This calculates a risk score by allocating points for congestive heart failure, hypertension, age, diabetes mellitus, stroke/TIA/thromboembolism, vascular disease and sex. A score greater than 1 is considered high risk with an adjusted stroke rate between 2.2–15.2% per year.[2] Anticoagulation is recommended for these patients, providing the individual risk/benefit analysis is favourable. Therapeutic anticoagulation significantly reduces the risk of ischaemic stroke in AF,[2] but also increases the bleeding risk with associated morbidity and mortality. It is therefore very important to treat these patients appropriately, as there are significant risks associated with anticoagulation.

The indication for anticoagulation does not differ between patients with paroxysmal (pAF), persistent and permanent AF.[2] However, the exact duration of AF required to increase stroke risk is unknown and literature on this is inconclusive. Most recent studies, mainly post hoc analysis of randomised controlled trials, suggests lesser risk of strokes in pAF compared to persistent or permanent AF, but the increased risk remains.[8] A number of episodes of AF may also be subclinical, which clouds the picture and limits diagnosis or assessment of AF burden. What is also unknown is the risk related to an isolated episode of AF in the perioperative period of non-cardiac surgery. Previously this was considered a temporary event precipitated by multifactorial physiological stress such as catecholamine release, electrolyte disturbances, hypoxia or fluid shifts.[9] Precipitating factors in non-cardiac surgical patients are similar to acutely unwell medical patients developing AF associated with acute illnesses. These patients are treated as any other patients with AF, but there is very limited literature in this area. A recent study by Gialdini et al (2014) revealed these patients may have a significantly increased stroke risk both long-term and short-term.[10,11] In these patients undergoing non-cardiac surgery, the hazard ratio for stroke or thromboembolism at 12 months was 2.0 (95% CI 1.7–2.3) compared to those with no AF. This raises the question as to whether routine anticoagulation should be initiated as for patients with AF outside of the perioperative period. There may be significant bleeding risk with anticoagulation around the time of surgery, which is an additional consideration for these patients.

There are no clear or consistent guidelines from the expert bodies regarding management of new perioperative AF in non-cardiac surgery. The American College of Cardiology/American Heart Association/Heart Rhythm Society (ACC/AHA/HRS) guidelines released in 2014 state the "role of anticoagulation is less clear and likely disease specific and needs to be addressed on the basis of risk profile and duration of AF",[2] however, the guideline does not specify what duration is considered significant. They specifically note an evidence gap regarding perioperative AF. The National Institute for Health and Care Excellence (NICE) guidelines (2014), endorsed by the British Cardiac Society, state "Unless contraindicated, manage post-operative AF following non-cardiac surgery as for new-onset AF with any other precipitant" and anticoagulation should be used as appropriate in this setting.[12] The European Society of Cardiology (ESC) do not specifically discuss perioperative AF in non-cardiac surgery, but do highlight the stroke risk and silent nature of AF, which may benefit from screening.[13] The Cardiac Society of Australia and New Zealand (CSANZ)[14] have no specific guidelines for these patients. A literature search failed to find any studies looking at anticoagulation practices of new perioperative AF in Australia or New Zealand.

As more and more elderly and high-risk patients are undergoing surgical procedures, the appropriate management of these patients is important to prevent future morbidity and mortality. Our aim was to assess how these patients are being managed currently, to see if there was consistent practice locally. Therefore, we undertook a retrospective study of surgical patients admitted to Hutt Hospital during a 12-month period between January and December 2014 to review the management of patients with new AF in regards to anticoagulation.

Methods

Hutt Hospital is a secondary hospital covering a population of 145,000 people in the greater Wellington region. There are 270 inpatient beds with surgical subspecialties in general, orthopaedic, plastic (tertiary level), gynaecological, ear nose and throat (ENT) and maxillofacial surgery. General medical, cardiology, intensive care and geriatric inpatient services are also on site. There is 24-hour acute cardiology and medical cover for the hospital. Hutt Hospital has a limited but dedicated perioperative medical and orthogeriatric service.

We identified all patients aged 60 years or greater admitted both acutely and electively under the surgical specialties between 1 January and 31 December 2014 using our electronic patient management system. We excluded any patients who did not undergo an operation or procedure in theatre.

We then screened eligible admissions using the ICD-10 diagnostic code I48 as a primary or secondary diagnosis for evidence of AF or atrial flutter at any time throughout the admission. Although atrial flutter is a different arrhythmia, we included it in the study as it can result in the same complications and is managed the same as AF in terms of anticoagulation. We ascertained if this was a new event or established condition by reviewing the electronic and paper medical records. If patients had multiple admissions during this time, we included the first admission documenting the presence of AF/flutter only.

We calculated the incidence of new and chronic AF/flutter and analysed patients with new AF/flutter further. We obtained demographic data and calculated their CHA_2DS_2-VASc score, although use of this risk stratifier has not been validated in perioperative patients. Our medical record system is not completely in electronic format and because of this we reviewed the hospital electronic and paper medical records, electronic discharge summary as well as the electronic record of primary care information pertaining to the time of admission and following 12 months to determine if these patients started anticoagulation. We reviewed any documented consultations or telephone advice between a medical and surgical team regarding management of the AF/flutter. We categorised patients into four groups in regards to anticoagulation; Not indicated, Contraindicated, Indicated and initiated or Indicated but not initiated. We did not consider the acute perioperative bleeding risk, as it was assumed initiation of anticoagulation would be delayed until discharge or until it was considered safe to prescribe.

We used descriptive statistics to present our results. Formal statistical analysis was not possible due to the small sample size.

According to National Ethics Committee guidelines, this study was considered a quality improvement activity and therefore formal ethics approval was not required or requested. Clinical director of medicine authorised conduct of this study as an advanced trainee project for the Royal Australasian College of Physicians.

Results

Three thousand five hundred and fifty-eight surgical patients 60 years of age or above were admitted in 2014. Seventy-four were identified as having AF/flutter during their admission. One was excluded due to repeat admissions and one due to incorrect coding of ventricular tachycardia as AF. The 72 patients (2.02%) were included. Of these, 28 patients (39%) had 'new AF/flutter'. We did not analyse those with known AF/flutter further.

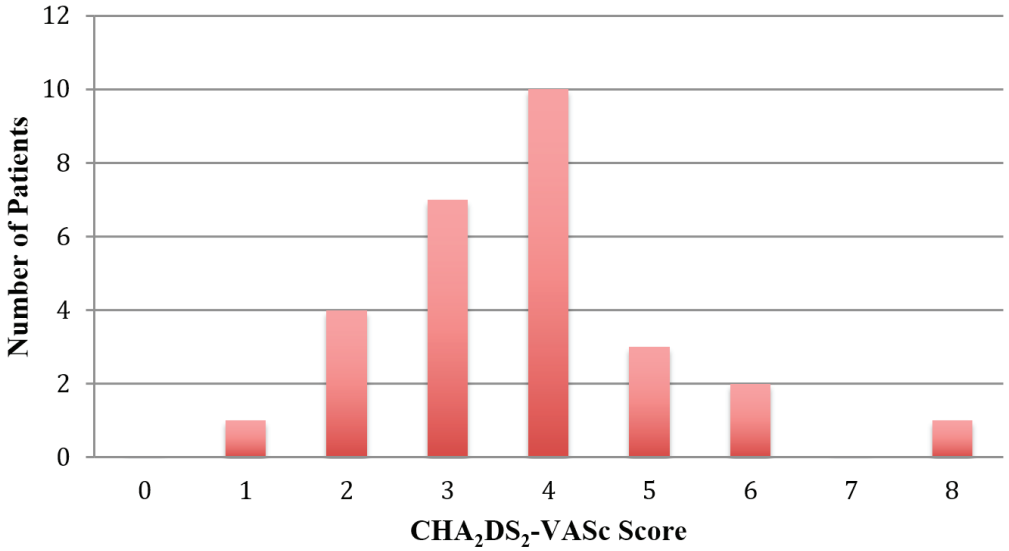
The majority of patients who developed perioperative AF/flutter were admitted under general (11), followed by orthopaedic (9) and plastic surgery (8) services. None of the patients who underwent gynaecology, ENT or maxillofacial surgery developed perioperative AF/flutter. The mean age was 78 years, ranging from 64 to 93 years. No patients had pre-existing anticoagulation for alternative indications. Fifty-seven percent were admitted acutely. Fifty-seven percent of patients were female. The average length of stay was 10.9 days, ranging from one to 42 days. We were unable to determine the duration of AF/flutter due to inconsistent monitoring or documentation. It was generally detected on routine nursing observation or electrocardiogram, rather than continuous cardiac monitoring. It was not clearly documented if the AF persisted on discharge from hospital.

The average CHA_2DS_2-VASc score was 3.75, ranging from 1 to 8 (Figure 1). Fourteen patients (50%) had no score documented and four of the documented scores were incorrect.

Two patients had no absolute indication for anticoagulation. One was due to a CHA_2DS_2-VASc score of 1 (intermediate risk) and the other died as an inpatient before this could be assessed. Possible contraindications were identified for eight patients, including metastatic cancer (4), high falls risk with multiple comorbidities (2), acute upper gastrointestinal bleed (1) and acute subdural haematoma (1).

Of those with an indication for anticoagulation, seven patients (39%) were anticoagulated. Three patients started anticoagulation while they were in hospital and four in the community within the following 12

Figure 1: The CHA_2DS_2-VASc score of patients with new AF/flutter.



months. The remaining 11 patients (61%) had no anticoagulation initiated, despite an indication according to their CHA_2DS_2-VASc score and without clear contraindications. The age of this patient group ranged from 66 to 81 years. The documented advice from medical specialties to the surgical teams admitting these patients is included in Table 1.

There was very inconsistent documentation on the electronic discharge summary regarding AF/flutter. Only 14 patients (50%) had AF/flutter as a diagnosis. However, all except three did mention AF/flutter in the body of text. Only 13 summaries (46%) clearly identified this as a new diagnosis.

Table 1: Advice given to patients in whom anticoagulation was indicated but not initiated.

CHA_2DS_2-VASc score	Service	Advice regarding anticoagulation
2	C	GP to start in the future
2	M	For aspirin as CHA_2DS_2-VASc score = 2
	C	No need for anticoagulation as just started digoxin, but GP to reconsider if further episodes
3	U	For anticoagulation further down the line
6	M	GP to watch rhythm in the future
4	C	Start warfarin
6	M	Start anticoagulation
	C	Only anticoagulate if further episodes
5	M	Not a candidate for warfarin (no justification). Discharge summary states see GP regarding anticoagulation
5	M & C	Anticoagulate when surgeons happy. Patient wishes to talk to GP first
3	C	As triggered by hernia, anticoagulation not required unless further episodes
3	M	If further AF, needs holter monitor to determine need for anticoagulation
3	O	Review anticoagulation in future, but likely aspirin only due to falls risk. CHA_2DS_2-VASc score not calculated, but incorrectly documented as "low"

C=Cardiology, M=General Medicine, O=Orthogeriatrics, U=Unclear who provided the advice.

Discussion

In this small study we have found no clear pattern in regards to anticoagulation management of new perioperative AF/flutter among patients undergoing non-cardiac surgery. The advice provided was varied, often vague and contradictory. This reflects the absence of clear guideline in this setting and poor adherence to guidance based on CHA_2DS_2-VASc score and bleeding risk.

There is limited but emerging evidence that apparently isolated episodes of perioperative AF following non-cardiac surgery may increase the risk of ischaemic stroke and should possibly be managed as patients with chronic AF. According to our study we may potentially be undertreating these patients with 61% of patients not receiving anticoagulation despite an indication according to their CHA_2DS_2-VASc score. This assumes that anticoagulation would reduce their risk of ischaemic stroke, as it does for other patients with AF. Different doctors and medical teams also offered mixed advice for the same patient. Until there is strong evidence, recommendation from cardiac societies or consensus-based guidelines, practice in this area is likely to remain varied. Due to varying opinions and approaches, it is challenging to formulate local protocols or guidelines to assist in management of these patients. However, current management of medical patients who develop AF while an inpatient could be considered as a way forward.

Documentation of consultations or telephone advice was often limited, with no mention of discussions with patients or risk/benefit analyses. The diagnosis of AF/flutter was only clear in 50% of discharge summaries, despite this being used as the main communication with the general practitioner (GP) who will be responsible for ongoing care. Despite the accepted validity and importance of the CHA_2DS_2-VASc score as a risk stratifier for ischaemic stroke in AF, it was only recorded in 50% of cases. Again, this may reflect a lack of understanding of risks associated with AF among most junior medical staff completing discharge summaries, lesser attention to such problems from surgeons and lack of ownership of patients among physicians.

Adding to the confusion in the area is the current practice of bridging anticoagulation in patients with pre-existing AF. Recent guidelines for patients who are treated with warfarin and who are at low risk of thrombo-emboli or those who are back in normal sinus rhythm and are undergoing surgical or diagnostic procedures that carry a risk of bleeding, stopping warfarin for up to one week and allowing the INR to normalise without substituting unfractionated heparin is a recognised approach.[2] It is probable that this thinking also may influence the use of anti-coagulation therapy in patients with new AF/flutter in the absence of clear guidance in this area. Even though new AF/flutter may carry a long-term thromboembolic risk, familial situation of 'anticoagulation free' perioperative period may distract prescribers, often junior house officers from taking a long-term view.

This study had a number of limitations, including the small sample size and retrospective nature. The relatively low incidence of AF/flutter (2.02%) in our cohort is likely an underestimation of the true incidence, as the majority of our patients did not receive routine cardiac monitoring. Detection of AF/flutter was primarily based on standard nursing observations only with further evaluation if an abnormal pulse was detected. Continuous cardiac monitoring or remote telemetry was occasionally utilised. We also relied on ICD-10 coding to identify these patients, which means any omissions by the coders would result in missed cases and a lower than expected incidence of new AF/flutter. This significantly limited our ability to assess this topic in detail or perform any statistical analysis. The lack of monitoring also limited information on the duration of AF/flutter. This was a major limitation, as many clinicians consider the duration of arrhythmia to be an important consideration when determining need for anticoagulation.

There were other limitations in that conversations regarding anticoagulation may have been had and appropriate decisions made, but not clearly documented in the notes or discharge summary. There may also have been contraindications that were not communicated on discharge. At times, patient management decisions

were based on an experienced clinician's "gestalt", which is difficult to ascertain from written notes. With regards to future anticoagulation plans, we relied on availability and accuracy of information on our electronic system. We did not access prescription records. This study also has some strengths. It confirms the confusion around management of patients with new perioperative AF/flutter with subsequent inconsistent practice and the need for more decision support tools. It also adds to the very limited literature in this area.

There is a need for larger studies to look into the thromboembolic risk associated with new perioperative AF/flutter and outcomes associated with anticoagulation so more robust evidence-based guidelines could be developed. In the absence of Australasian guidelines, we suggest patients with episodes of AF/flutter need to be assessed for stroke and bleeding risk. An individualised decision then needs to be made in regards to anticoagulation. This includes consideration of current bleeding risk in the perioperative period and possibly delaying initiation of anticoagulation. If there is uncertainty, the patient could be referred to the cardiology service for further evaluation and investigations to assist in risk stratification and decision making.

Conclusion

This study shows our current practice of managing new perioperative atrial fibrillation or flutter in non-cardiac surgery patients is inconsistent. This could have implications for the patients as they may have increased ischaemic stroke risk, as well as a potential financial burden from such an event. Until further evidence becomes available and formal guidelines are updated, we suggest all such patients are individually assessed and treated by balancing their individual risk and benefit of anticoagulation based on current treatment standards. Consideration of other factors such as the bleeding risk and duration of AF may also need to be considered.

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Mahi a Atua: a pathway forward for Māori mental health?

Diana Rangihuna, Mark Kopua, David Tipene-Leach

ABSTRACT

Māori demand on New Zealand mental health services is out of proportion to the size of the Māori population, and the psychiatric service response is limited by lack of capacity. But there is also an inherent lack of capability, that is, the ability of a Western paradigm psychiatric service to meet the needs of an indigenous community. The *Mahi a Atua* narratives-based programme established in the primary mental healthcare services of the Tairāwhiti/Gisborne area has created a new approach to psychiatric assessment, diagnosis and therapy that is appropriate, but not confined, to the Māori community.

Mahi a Atua: a pathway forward for Māori mental health

Mental health service provision in New Zealand has been controversial in the 2017 year, with the release of the ActionStation *People's Mental Health Report*[1] in April, the Office of the Auditor-General's *Mental Health: Effectiveness of the planning to discharge people from hospital*[2] report in May and the New Zealand Herald series on death by suicide called *Break the Silence*[3] in June. In short, these reports and article indicate a mental health service under stress. Indeed, a year ago the Australian Psychology Society apologised to indigenous Australians for the "inappropriate use of assessment techniques and procedures" and treatments that "both implicitly and explicitly, dismissed the importance of culture in understanding and promoting social and emotional wellbeing".[4] This article takes the opportunity presented at this time of challenge and reflection to discuss a kaupapa Māori approach to mental health in primary care that will provide options for both struggling services and for Māori with mental health problems.

Although mental health disorders in New Zealand are reported to be equally prevalent across ethnic groups,[5] a larger proportion of Māori present to general practice mentally unwell.[6] The literature shows that anxiety, substance abuse and depression are the main problems, particularly for women, who are said to have up to twice the consultation rate of their non-Māori counterparts.[7] Furthermore, general practitioners are reported to underdiagnose mental health problems among Māori, particularly depression, and they describe their own communication difficulties alongside feelings of stigma by patients as the reason for this.[8] With regard to secondary care, Māori have more acute admissions to mental health facilities than others,[9] are readmitted more often after discharge,[10] are more likely to be secluded in hospital[11] and those with psychotic illness are overly incarcerated in prison foresic units.[12] Finally, of those in forensic units with pyschotic illnesses, far fewer Māori have any form of treatment.[13]

The evidence of a larger burden of illness, underdiagnosis, more frequent admission and readmission to secondary and forensic care indicates that Māori do less well than other New Zealanders with mental health issues. The impact of mental health disorders in the Māori community may relate to the 'psycho-social adversity' experienced by those with psychotic illness,[14] and where that author discusses this as an effect of migration, I posit it as an effect of colonisation. In addition, it is proposed by

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some that the very expression of mental distress in Māori is different. For example, schizotypy, a gradation of personality characteristics that range from being rather odd through to psychosis, is far more common in Māori adolescents,[15] and in frank psychosis, overactivity and aggression are particularly marked features of Māori patients.[16,17]

But the capacity and capability of the Mental Health Service in New Zealand is what ActionStation, the Auditor General and the New Zealand Herald have questioned recently, and we all know that deprived minorities do less well in mainstream health service outcomes, more so perhaps where the system is strained. The use of 'the psychiatric format', that is, a medical paradigm employing one-on-one interviewing, a DSM-5 diagnosis, a biomedical cause of disease, and a treatment regime involving psychotherapeutics, medication and seclusion eschews any consideration of the relationships, meaning, values, beliefs and cultural practices that are important to Māori. The lack of adequate treatment services and dearth of culturally appropriate options available to *whaiora* (mentally distressed persons) has been duly noted,[18,19] as has the need for appropriate training of, and support for mental health professionals working with Māori.[20] Although there has been some promotion of the inclusion of Māori perspectives, and the creation of a cultural base in the provision of the mental health care process,[21–23] and even a paradigm-challenging example of a traditional healer-psychiatrist collaboration,[24] there is little evidence of systematic change. The "approach to family wellbeing that avoids fragmentation and focuses on positive strength" promoted by Durie[25] seems far off. That is, until you get to the East Coast, where a Māori approach to primary mental health care called *Mahi a Atua* (tracing the ancestral footsteps of the Gods) is being offered under the Ministry of Health's Mental Health and Addictions Project, *"Fit for the Future—a Systems Approach"*.

Mahi a Atua is an engagement, an assessment and an intervention based on *pūrākau* (Maori creation and custom narratives). Creation narratives have for centuries provided a framework on which individuals and communities worldwide can consider ancestral footsteps to better understand and interpret their experience(s) according to their particular cultural mores. The stories help individuals to understand the context in which they find themselves and illustrate acceptable pathways forward. They provide snapshots of 'mental states of being' and 'responses to distress and dis-ease', which are illustrated by the archetypal characters of the Atua (Gods) who personify the spectrum of family and social dysfunction as well as resilience, resolution and well-being.

Mahi a Atua involves the recitation, by the whaiora, their *whānau* (family group) and the therapeutic team, of these creation stories. The narratives cover generational conflict, fratricidal struggle, gender adversity, incest, bullying, withdrawal and cold-hearted calculating behaviour. But the Atua also demonstrate a range of responses that include love and nurturing, facing uncertainty with courage, empathy and rage, unbridled curiosity and creativity, and endless endurance alongside, forgiveness, devotion, selflessness and remorse. Eventually the creation stories lead to a re-balancing and a resolution of those problems and they articulate for the whaiora and the whānau, the possibility that they too have a healthy future trajectory.

The recitation of these narratives are guided by *Mataora* who are psychiatric, social, mental health support, education workers and artists, and who are trained as "change agents specialising in Mahi a Atua". The whaiora and the whānau also contribute to the pūrākau, as they so often can, in a *wānanga* (a seeking of knowledge) scenario that includes the Mahi a Atua team and the whaiora and all those who come in support of them. This establishes a whānau-like relationship providing a secure, culturally safe base from which the whaiora might embrace exploration of their situation. It also facilitates a multi-disciplinary lens upon the plight of the whaiora and their whānau. The 'diagnosis' and the psychiatric format become somewhat secondary to a process of finding culturally relevant meaning and privileging the Te Ao Māori (the Māori world view) voice. The whānau are introduced to particular Atua within the pūrakau, for example Uru-te-ngārara, the oldest brother who became reclusive (and depressed) after he couldn't cope with the bullying challenges of his younger brother

Whiro. Whaiora and whānau are able to contextualise the pūrakau and its characteristics to their own situation and are able to reflect on feelings (in this case of depression) in a manner that can create a shift in awareness. The participation of the whaiora and their whānau, alongside the health professional team of Mataora, in the assessment of the 'presenting problem' and development of an 'empowering resolution' embeds the ongoing therapeutic process in the context of the wider community.

Advocates point to the rapid development of therapeutic relationships, identification of the 'problem' with a Māori lens, the injection of meaning into the pathway ahead, and the sharing of a common set of understood values, beliefs and practices. The process appears to facilitate whaiora to be 'on board' rather than in opposition, therapies that are agreed on rather than enforced, a likely increase in 'talk therapy' and decrease in medication, involvement of whānau members, and an appreciation of the complex nexus of relationships that make up real life for the whaiora. It frameworks the 'road to wellness from a difficult place' rather than a 'road to recovery from illness.

Narrative therapy is not new. A Western therapist taking a narrative stance is interested in the stories that shape peoples' lives in their varied cultural worlds and in the ideas, beliefs, social structures and norms that people live by. Techniques include "collaborative positioning of the therapist, externalising the problem, excavating unique outcomes, thickening the new plot and linking the new plot to the past and the future"[26] and these can all be recognised in Mahi a Atua. For mentally distressed Māori, Mahi a Atua stimulates or recreates the trusted cultural narrative, which, standing outside of the profound alienation often experienced by them, provides a 'way forward' that is not based on the prevailing psycho-medical model. Rather than seeking to identify internal deficit or dysfunction, a 'narrative therapist' will be interested in working with people in defining and then exploring the effects of socio-cultural practices on their lives and relationships and how the person became unwell because problems, as well as answers, are understood to be produced within socio-cultural contexts, rather than to reside within the individual, their family or community.

On the East Coast, Mahi a Atua is now part of the front door to mental health services. A new 'single point of entry' for those who are struggling with mental distress and who don't meet the criteria for specialist services has been established. This new *Te Kūwatawata* service is supported by local primary mental health care providers, the District Health Board and the Ministry of Health. It is named after the particular Atua who provides guidance to those seeking entrance into the Māori spirit world, granting or refusing entrance based on his assessment of the particular presenting situation. Mataora, including psychiatrists, psychiatric nurses, social workers, general practitioners, service managers, artists and researchers meet weekly in a fashion redolent of a Journal Club or a Continuing Professional Development group called the *Kurahuna* (search for the 'gems' within). This group facilitates an active learning of the pūrakau of the Atua Māori, a sharing of stories and an incorporation of Mahi a Atua into their own lives as well their clinical life with whaiora and whānau in distress. The larger goal is efficacy, improving clinical outcomes within a constrained resource.

The Te Kūwatawata service is not restricted to Māori, nor is it imposed upon those feeling uncomfortable within its parameters. Neither is Mahi a Atua practice and training restricted to Māori. It is supported across the Hauora Tairāwhiti District Health Board and is being taken up by social, educational, psychological and psychiatric services searching for a new way of engaging with the seemingly intractable mental health problems that present themselves from within the Māori community. This is an approach whose development will be carefully watched by regional health and other service executives, Ministry of Health policy makers and political leaders as an example of how to provide culturally appropriate (mental health) services to the least fortunate and most alienated part of our modern New Zealand community.

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Cannabis—don't smoke it! Four cannabis-related pathologies in one radiograph

Kate Grant, Vivienne Campbell, Lutz Beckert

A 34-year-old man presented with two weeks of cough, unrelenting rib pain and shortness of breath. He has smoked three joints per day for seven years and also has a 12-pack year history of cigarette smoking.

His CT-chest revealed four distinct pathologies relating to his cannabis and cigarette smoke exposure: a) pneumothorax, b) emphysematous bulla, c) primary bronchogenic carcinoma and d) a rib metastasis.

The medicinal properties of cannabis are currently being re-evaluated and the clinical evidence is still evolving. However, cannabis smoking has been linked to an increased risk of lung cancer. One joint of cannabis has a similar toxic effect to one packet of cigarettes.[1] Heavy cannabis smoking is also associated with lung bullae[2] and an increased risk of pneumothoraces.[3]

Figure 1:

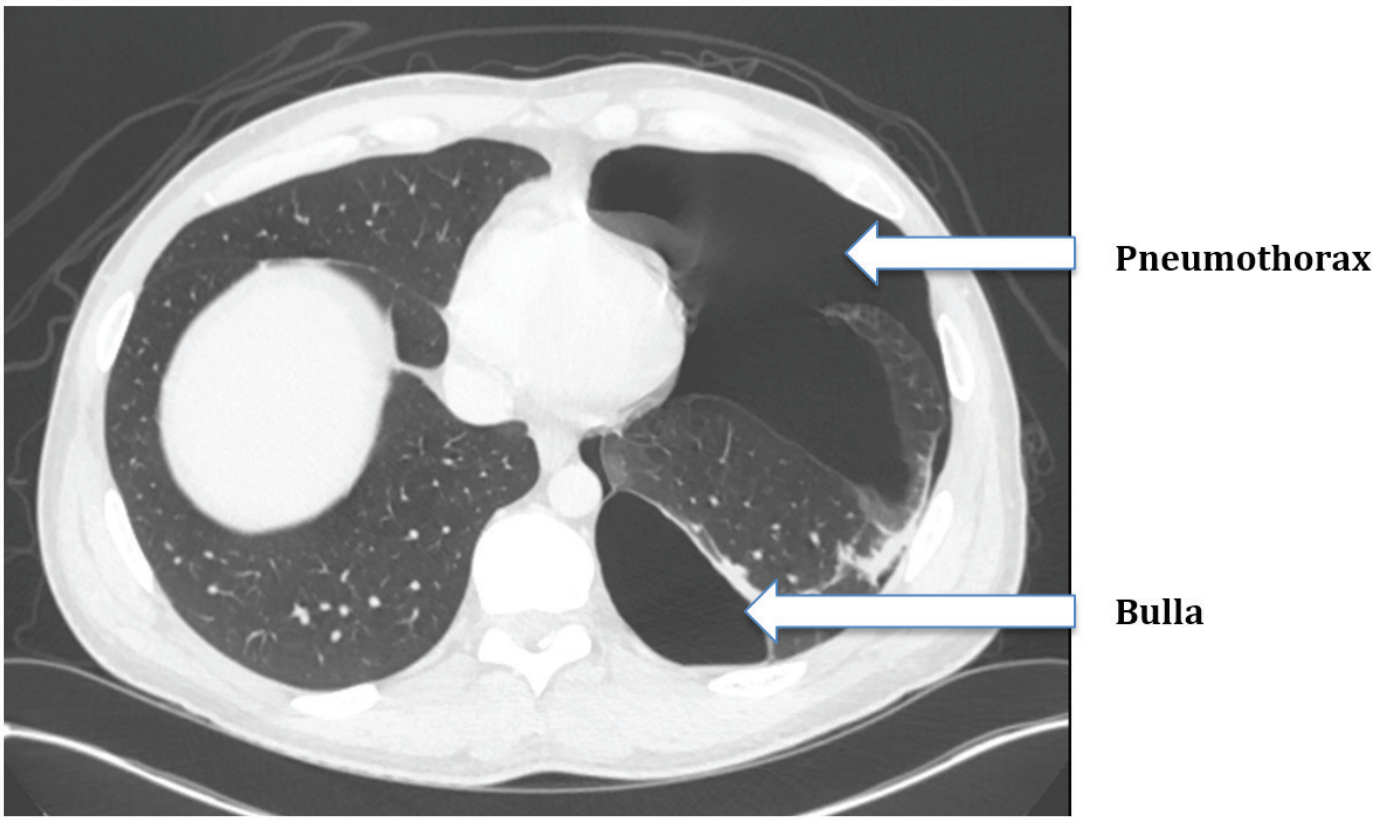
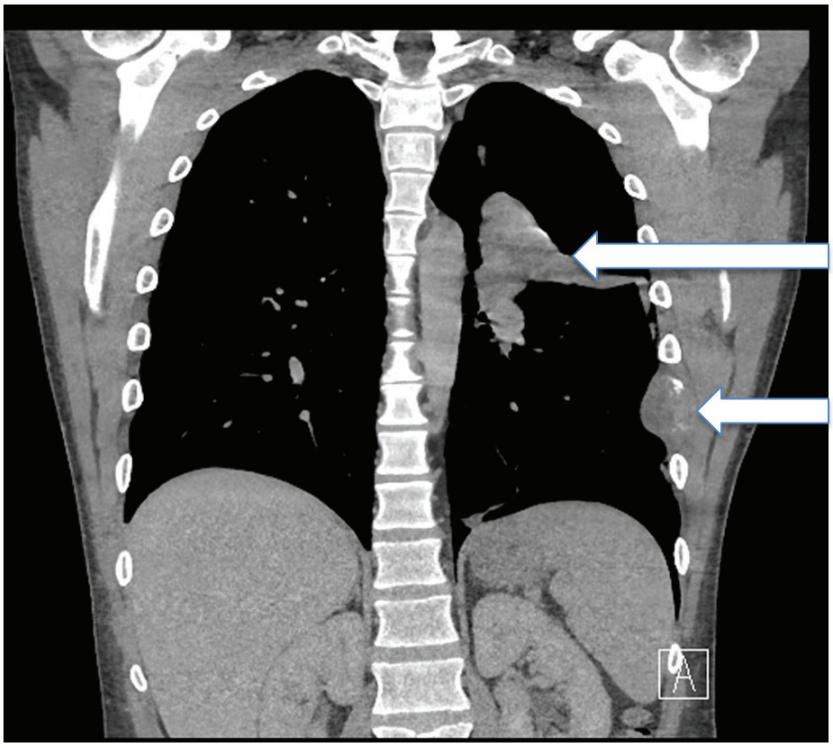


Figure 2:



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Children cycling on footpaths

Edward Randal, Romane Baland, Michael Keall

Encouraging cycling is important for health, societal and environmental reasons.[1] Cycling has been shown to have clear benefits for cardiorespiratory health and can reduce risk of certain cancers and rates of all-cause mortality.[2] Over the past 30 years there has been a dramatic decline in children cycling to school along with a substantial reduction in adults cycling for transport.[3] During this time, New Zealand has invested heavily in roads that encourage private motor vehicle travel with very little investment in infrastructure to facilitate cycling.[4]

New Zealand law currently states that bicycles (with wheels larger than 355mm diameter) are not to be ridden on footpaths, except for mail delivery. It is, however, legal to ride a scooter on the footpath, so long as this is done safely.[5] There is currently no legal minimum age to cycle on the road, although the New Zealand Police recommend that children under the age of 10 should not ride on the road unsupervised, while the New Zealand Transport Agency (NZTA) state that children may be ready to ride on the road unsupervised from age 11.[6,7] Due to the lack of dedicated cycling infrastructure, young cyclists are left with a choice of breaking the law by cycling on the footpath or risk sharing the road with often high-volume motor traffic.[8]

In 2014, a petition to legalise footpath cycling by children was considered by the Transport and Industrial Relations Committee. It argued that children are not generally ready to cycle on the road safely and need the opportunity to learn to cycle in a safe environment that is easily accessible.[9]

The NZTA commissioned a review of footpath cycling rule options.[8] In this report the authors reviewed the academic literature on cycling and footpath safety, and noted that the safety implications of children cycling on the footpath were not clear. There is conflicting evidence on the frequency of crashes and severity of injuries from cycling on footpaths, with numerous limitations in the data and study designs used.[8,10–12] It is also unknown what the impact will be on the very young, elderly and disabled footpath users in terms of their safety and comfort of using the footpaths with children cycling.[8] Analysis using New Zealand crash data found that cyclist crashes on footpaths were less severe than on-road crashes and pedestrians were involved in less than 2% of cyclist crashes on footpaths (although these crashes are likely under-reported).[8] The NZTA report concluded that ideally pedestrians, cyclists and motor vehicles should be separated, but as this is currently unfeasible on most roads, providing particularly vulnerable cyclists the option of riding on the footpath when necessary and allowing organisations to legally train children to ride safely on footpaths would improve cycle safety overall. The final recommendation was to allow children 12 years and under (and any accompanying adults) to cycle on the footpath.[8] On considering this report and other evidence, the Select Committee Review agreed with this recommendation.[9]

A further limitation in the evidence presented was that there were no studies on the speeds of children cycling on the footpath. Higher speeds increase the risk and severity of collisions, and harm, both in terms of injury and reductions in perceived safety, to pedestrians is a legitimate concern for policy makers. The aim of the research presented here is to provide speed measurements of children currently cycling on footpaths in Wellington, along with speed measurements of children legally riding scooters on the footpath as a comparison.

Methods

Children 12 years and under were observed cycling or riding scooters on their way to or from four schools in Wellington City—two contributing primary schools

Table 1: All observations over 20km/h (out of 105 total observations).

Travel mode	Footpath/Road	Slope	Speed (km/h)
Scooter	Footpath	Downhill	20
Scooter	Footpath	Downhill	21.0
Bike	Footpath	Downhill	21.3
Scooter	Footpath	Downhill	21.6
Scooter	Footpath	Downhill	21.6
Scooter	Footpath	Downhill	22.2
Bike	Footpath	Downhill	22.5
Scooter	Footpath	Downhill	22.8
Scooter	Footpath	Downhill	23.1
Bike	Road	Downhill	23.6
Scooter	Footpath	Downhill	25.3
Bike	Road	Downhill	26.1

(years 1 to 6), one full primary school (years 1 to 8) and one intermediate school (years 6 to 8)—during July and August 2017. These schools were chosen to ensure children observed were not older than 12 years of age. Observation sites near the schools were selected to observe behaviour on both flat and sloped roads (to get a fairer measure of speeds).

Observers timed children travelling between two points of known distance (measured beforehand by the observers), and speeds were calculated accordingly. Observers also noted whether the children were riding on the road or footpath, whether they were travelling uphill, downhill or on the flat, whether they were alone or with other children or an accompanying adult, and whether they were on a scooter or bicycle.

Results were then collated and the difference in mean speeds between scooter-riders and children on bicycles was then assessed for statistical significance using Student's t-test.

Results

A total of 105 children were observed riding a bicycle or scooter on the road or footpath. Of these, 77 were riding scooters on the footpath, 25 were riding bicycles on the footpath and three were riding bicycles on the road. The maximum speed observed was 26.1km/h, by a child riding a bicycle on the road. The maximum speed observed on the footpath was 25.3km/h, by a scooter rider. The fastest speed of a bicycle on the footpath was 22.5 km/h. Table 1 shows the mode, location and speed of all observations over 20 km/h.

Overall, there was no significant difference (p=0.569) between the average speed of scooter riders and cyclists on the footpath, with average speeds of 10.9km/h and 10.2km/h respectively. Children cycling on the road appeared to travel the fastest, with an average speed of 16.6 km/h, although the estimated average is imprecise because of the very small sample size. Mean and median speeds of observed scooter riders and cyclists on the road and footpath are shown in Table 2.

Table 2: Average speeds of scooter riders and cyclists.

Travel mode	Footpath/Road	Observations	Mean speed (km/h)	Median speed (km/h)
Scooter	Footpath	77	10.9	9.6
Bike	Footpath	25	10.2	9.3
Bike	Road	3	16.6	23.6

Discussion

Children observed in this study cycling on the footpath were not travelling faster than those riding scooters.

While this study was carried out at a small number of locations around Wellington during winter, when cycling numbers are low because of the cold weather, 102 footpath users were still observed. The lack of statistical significance for the difference in speed was not particularly surprising given the relatively small sample size. From a policy perspective the difference in mean speed between scooter riders and children on bicycles was very small (less than 1km/h). As this was an observational study on public roads the observers did not need to identify themselves to passers-by or notify parents or children that the observations were taking place. Therefore, the behaviour of the observed children was unlikely to have been altered by the presence of the observers, thus giving a fair representation of the speeds children travel on the footpath at these locations. Safety considerations for children cycling on footpaths need to be examined carefully. A child cycling on a footpath will still encounter motor vehicles when crossing driveways and roads. Some drivers may be caught by surprise by a rapidly moving child crossing their path. Although children riding scooters or skateboards on footpaths already present such challenges to drivers' attention, some environmental modification of footpaths, intersections and drives may be justified to reduce this risk. In terms of risk to pedestrians, it has been estimated that the risk of sustaining a severe injury (Abbreviated Injury Scale 4 or greater) reaches 10% when a person is hit by a vehicle at an impact speed of around 28km/h,[13] but the risk will be a fraction of this when the impact speeds are as low as the means estimated in our study and the "vehicle" has a vastly smaller mass.

In conclusion, based on the observations of speeds made in this study, allowing a given child 12 years of age and under to cycle on the footpath in New Zealand would be unlikely to impose increased injury risk on pedestrians beyond that already imposed by that child riding a scooter. There are, of course, other factors that influence injury risk of footpath users, including the sheer number of scooters and bicycles on the footpath, the way collisions occur, the handling and stopping performance of bicycles and scooters and other mobility devices, the design of footpath environments and social attitudes and norms around the use of shared spaces. These unknowns provide ample scope for future research. By legalising a practice that is already occurring, schools and other providers will be able to train children to cycle safely and courteously on footpaths, improving the safety and experience of cyclists and other footpath users. If the law is changed, future work is merited monitoring the impact of this change on cycle skills, cyclist and pedestrian injuries, footpath user experiences and satisfaction, and long-term cycling trends.

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Aspirin versus placebo in pregnancies at high risk for preterm preeclampsia

Preterm preeclampsia is an important cause of maternal and perinatal death and complications. It is uncertain whether the intake of low-dose aspirin during pregnancy reduces the risk of preterm preeclampsia.

In this multicentre, double-blind, placebo-controlled trial, 1,620 women with singleton pregnancies who were at high risk for preterm preeclampsia were assigned to receive aspirin, at a dose of 150mg per day, or placebo from 11 to 14 weeks of gestation until 36 weeks of gestation. The primary outcome was delivery with preeclampsia before 37 weeks of gestation. Preterm preeclampsia occurred in 13 participants (1.6%) in the aspirin group, as compared with 35 (4.3%) in the placebo group (odds ratio in the aspirin group, 0.38; P=0.004). There was no difference in the incidence of adverse neonatal events between the two groups.

Treatment with low-dose aspirin in women at high risk for preterm preeclampsia resulted in a lower incidence of this diagnosis than placebo.

N Engl J Med 2017; 377:613–22

Association between coffee consumption and risk of renal cell carcinoma?

Apparently, several studies have raised the possibility that regular consumption of coffee may increase the risk for the development of renal cell carcinoma (RCC).

This report concerns a meta-analysis relevant to this issue. The researchers review data from 22 appropriate studies. Comparison is made on the incidence of RCC in those subjects who have consumed at least one cup of coffee per day and those who have not drunk coffee.

The results of the meta-analysis were that the relative risk of RCC in individuals consuming coffee was 0.99. It was concluded that there is no significant association between coffee consumption and RCC.

Internal Medicine Journal 2017; 47:1422–1432

Efficacy and safety of adalimumab every other week versus methotrexate once weekly in children and adolescents with severe chronic plaque psoriasis

Adalimumab is indicated for the treatment of moderate to severe psoriasis in adults. This report concerns a randomised trial which reviews the efficacy and safety of adalimumab in children and adolescents with severe plaque psoriasis.

One hundred and fourteen patients were randomly assigned to receive subcutaneous injections of adalimumab at week 0, then every other week starting at week 1, or oral methotrexate once weekly for 16 weeks. The primary endpoint was a 75% improvement in the lesions at 16 weeks. This was achieved in 58% of the adalimumab group and 32% of the methotrexate group. Adverse events were similar between the groups with infections being the most common.

It was concluded that adalimumab seems to be efficacious and well tolerated for the treatment of severe plaque psoriasis in children and adolescents.

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Status of Dentists in New Zealand

February 1918

At its last meeting the University Senate amended the statuses for the examination which a dentist must pass before he can be licensed for the practice of his profession. Previously the requirements were that a man wishing to enter the profession had to take a four years' course at the Dental School at the University of Otago, to which is attached the only Medical School in the country. For two years the Minister of Public Health (the Hon. G. W. Russell) has had this matter under consideration, and in consequence of representations made to him from Auckland and other places he addressed a letter to the Senate, of which the decision of the Senate to amend the statuses is probably the outcome.

The Minister pointed out in his letter that no man under the Dentists Act of 1908 could be registered unless he held a degree in dentistry granted by the University of New Zealand. He had come reluctantly to the conclusion that under present conditions the necessities of the population in the matter of dentistry were not being met.

The following were the registrations in the last ten years:

1907	54
1908	41
1909	45
1910	32
1911	29
1912	8
1913	3
1914	1
1915	2
1916	3

In the last five of the years of this period the new statuses had been in force.

The Minister suggested to the Senate that the requirements of the examination should not compel attendance at the Otago Medical School for four years, but that students be allowed to take part of the course either at technical schools in the other large centres or at the other University Colleges, gaining experience of the surgical part of their work at the dental clinics at the hospitals. If it was desired that the degree should be retained, he suggested that a less qualification in the shape of a diploma should be accepted as entitling a dentist to practise. This, he submitted, would not, perhaps, be equal to a degree, but it would be evidence that the applicant for registration had reached efficiency in the practical work of dentistry.

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