



TE MANAWA TAKI
MIDLAND
TRAUMA SYSTEM

ANNUAL REPORT 2020



TE MANAWA TAKI

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OUR VISION

The health and wellbeing of our Midland communities will be improved by reducing the burden of trauma.

OUR MISSION

To improve clinical trauma care, reduce the incidence of injury and enable safer, more efficient systems along the trauma journey.

OUR VALUES

Our work will be guided by our beliefs and commitments to our values.

- Patients first: The needs of the patient and family guide our actions
- Communication: Open, honest, helpful
- Collaboration: Together we achieve more
- Excellence: Quality care and information
- Forward looking: Integrity, diversity, creativity

OUR EQUITY STATEMENT

The Midland Trauma System (MTS) and its staff view variation in trauma incidence and access to care as inequities in healthcare. Our clinical and prevention programmes are focused on identifying and defining these inequities so they can be addressed and resolved by MTS and our partners that are responsible for healthcare delivery and injury prevention.

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Cherry Campbell

Te Manawa Taki-Midland Trauma System acknowledges the contribution made by Trauma Nurse Specialist Cherry Campbell from Lakes DHB. Cherry was with Te Manawa Taki-Midland Trauma System since its inception in 2011 and played an instrumental role in developing the Trauma Nurse Specialist role in Rotorua Hospital. She leaves the world of nursing, after 33 years to follow her new career teaching Pilates and complimentary therapies and is loving seeing clients looking after their own health through physical, emotional and mental wellbeing.

"Linking all care providers and their activities and putting the needs of the trauma patient and whānau first was a great achievement".

Thank you Cherry for your years of service and care for Trauma patients and their whānau.

Acknowledgements

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The journeys of trauma patients and whānau from injury to recovery can be long and complex, involving interactions with many service providers and craft groups. It is essential that services are coordinated and that the language and guidelines we use are contemporary, effective and grounded in the needs of our people and the resources available. The people that ensure this is coordinated and patient-focused are the trauma service staff, supported by their departments, managers and senior executives. The unsung heroes of the trauma services are:

Bay of Plenty: Clare Swanson; Kellianne O'Connor; Janette Caird; Jacques Marnewick

Lakes: Cherry Campbell; Carolyn Duncum; Peter Freeman

Tairāwhiti: Karen MacDonald; Annaleigh Stills; Jaki Boyle; Steven Hudson

Taranaki: Alex Keegan; Lauren Miller; Murray Cox

Waikato: Bronwyn Denize; Gina Marsden; Lisa Ulrich; Victor Kong; Damien Ah Yen; Grant Christey

The members of the MTS Hub group supporting this work are: Alaina Campbell; Alastair Smith; Carol Munt; Grant Christey; Janet Amey; Katrina O'Leary; Kylee Stewart; Mary Jane Pacua; Neerja Singh; Pragya Singhal; Thilini Alwis

We thank Rosemary Clements and Phyllis Tangitu our regional executive leads for their ongoing guidance and support.

To enable all this to happen we acknowledge the solid support from our MTS Strategic Group, Te Manawa Taki, HealthShare and our hospital management and senior executive teams. They understand the complexity and value of our role and continue to support our efforts to reduce the burden of trauma in our communities.



Executive summary

Amidst the many challenges of 2020 there was a shared goal within the Te Manawa Taki-Midland Trauma System to do our job and look after trauma patients. Processes and systems that have been developed since 2012 came into their own in times of need, and allowed us to maintain high levels of service and get patients and whānau the care they needed.

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Our focus on reducing inequities has resulted in support from Ko te Kāwanatanga o Te Manawa Taki (Te Manawa Taki governance group) and Ūpoko Kaimahi (Te Manawa Taki chief executives). Work began with Ngā Toka Hauora Māori (Midland Regional General Managers Māori) to begin addressing the significant inequities affecting Māori in our region and we look forward to the partnership and collaborative projects as plans develop. The Te Manawa Taki Partnership Manual is available at: <https://healthshare.health.nz/sites/default/files/resources/Te%20Manawa%20Taki%20Partnership%20Manual%202021.pdf>

Broad consultation around clinical best practice set the stage for revision of our Trauma Guidelines and work with pre-hospital partners ensured that the referral matrices have been working to get patients to where they need to be.

We still have a number of challenges to strengthen vulnerable services and build essential infrastructure for training, education and trauma quality improvement. This will extend the collective knowledge base toward a common language of best practice and raise the bar for everyone across the region. As an established regional clinical network we are well positioned to adapt and integrate into future health system changes in New Zealand (NZ). As a starting point the Midland Trauma System will start a rebranding process to represent the region now known as Te Manawa Taki. Over the next 12 months we will be transition to be known as the 'Te Manawa Taki Trauma System'.

We acknowledge the hard mahi done every day by the regional clinical teams, backed by their managers and executives, to produce the very best outcomes for patients and their whānau.

Ngā mihi nui
Grant Christey

Key achievements during 2020

- Equity focus: Collaboration with Ngā Toka and the development of the Te Manawa Taki Taskforce
- Delivering high quality trauma care throughout COVID lockdowns
- Standardised trauma reception processes
- Loop Closure and Trauma Quality Assessment Report
- Regional Case reviews
- Trauma Team Training
- Regional data collection and injury audit
- HSQC Quality Improvement Facilitators (QIF) course participation
- Road to Zero for the Waikato region



Future focus areas

- Building frameworks to reduce inequities in trauma incidence in high risk groups
- Adaptation to the new health system changes
- Supporting adequate clinical and data management resources in each DHB to enable work plan sustainability
- Development of frameworks for data use in line with national policy and guidelines
- Development of Trauma Reach clinic with a regional focus
- Development of trauma nursing competency frameworks
- Development of TQIP processes to improve service delivery
- Registry upgrade



Our region –about Te Manawa Taki



TE MANAWA TAKI

Te Manawa Taki (the heart beat) is the name gifted and agreed upon to represent the region encompassing the five DHB regions of Bay of Plenty, Hauora Tairāwhiti, Lakes, Taranaki and Waikato.

The name Te Manawa Taki in the context of the combined region represents: Always ready to go.

21%

Te Manawa Taki covers an area of 56,728 km², or 21 percent of New Zealand's land mass.



Stretches from Cape Egmont in the West to East Cape and is located in the middle of the North Island.

5
DHBs

Five DHBs: Bay of Plenty, Lakes, Hauora Tairāwhiti, Taranaki, and Waikato.



Includes major population centres of Tauranga, Rotorua, Gisborne, New Plymouth and Hamilton.



985,285 people (2020/21 population projections), including 265,360 Māori (27 percent) and 43 local iwi groups.

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Te Manawa Taki iwi

Bay of Plenty DHB

Ngāi Te Rangi, Ngāti Ranginui, Te Whānau ā Te Ēhutu, Ngāti Rangitahi, Te Whānau ā Apanui, Ngāti Awa, Tūhoe, Ngāti Mākino, Ngāti Whakaue ki Maketū, Ngāti Manawa, Ngāti Whare, Waitahā, Tapuika, Whakatōhea, Ngāti Pūkenga, Ngāi Tai, Ngāti Whakahemo, Tūwharetoa ki Kawerau

26%

Hauora Tairāwhiti DHB

Ngāti Porou, Ngāi Tamanuhiri, Rongowhakaata, Te Aitanga-a-Mahaki, Ngāti Kahungunu, Ngā Ariki Kaiputahi, Te Aitanga-a-Hauiti

53%

Taranaki DHB

Ngāti Tama, Ngāti Mutunga, Te Atiawa, Ngāti Maru, Taranaki, Ngāruahine, Ngāti Ruanui, Ngā Rauru Kītahi

20%

Lakes DHB

Te Arawa, Ngāti Tūwharetoa, Ngāti Kahungunu ki Wairarapa

37%

Waikato DHB

Hauraki, Ngāti Maniapoto, Ngāti Raukawa, Waikato, Tūwharetoa, Whanganui, Maata Waka

24%

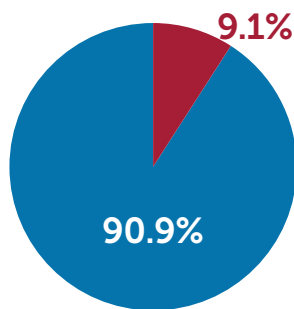
Trauma in Te Manawa Taki region 2020

Patients and admissions



7773
hospital
admissions

6624
events



6019 Non-major events
605 Major events

Major events = ISS >12, non-major events = ISS <13,
ISS: Injury Severity Score

Demography

Ethnicity

Incidence per 100,000

799 Māori

613 Pacific

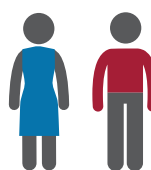
139 Asian

652 Other

Population ethnicity adjusted (Ministry of
Health 2019 projections) Midland resident
events only



Gender
62.1% Male
37.9% Female



Children and older persons (events)

1233 0-14 years

1288 65+ years



7

Causes

Road traffic crashes

169 major trauma events
excluding motorcycle



261 major trauma events
including motorcycle

In hospital

Time in Emergency Department (ED)

(median)

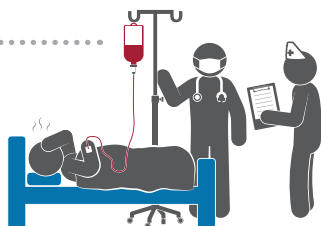
0-14 years **206** mins

15-64 years **255** mins

65+ years **299** mins



29,097
Total hospital
days



Length of stay (mean)

2.1 days 0-14 years

4.4 days 15-64 years

6.5 days 65+ years

Outcomes

Final discharge destination

(top 5)

5830 Home

181 Rehabilitation

131 Hospital for convalescence

114 Residential aged care

105 Left against medical advice



Case Fatality Rate

(all events)

Non-major **0.19%**

Major **5.78%**

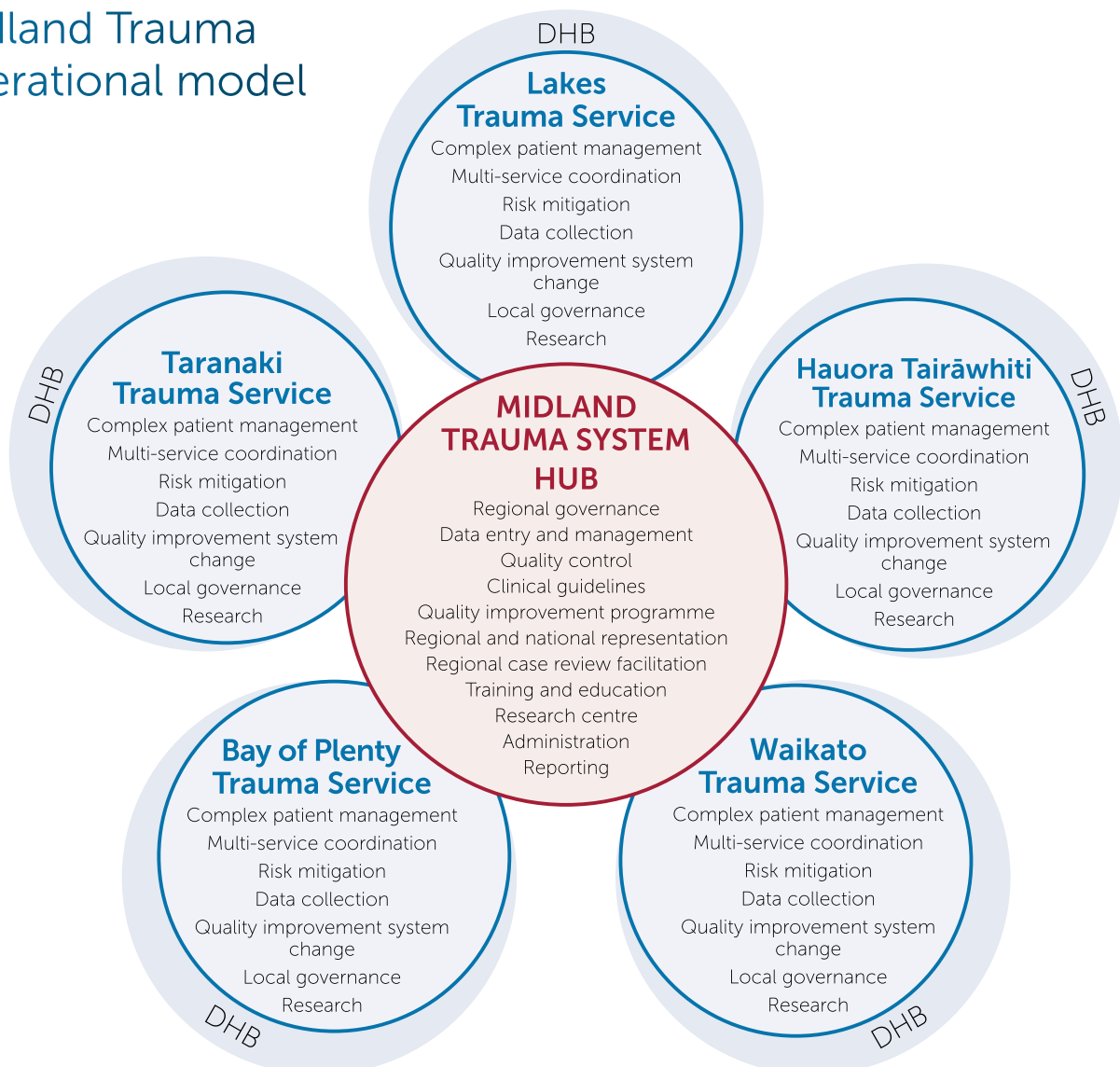
Our trauma system

Established in 2010, Te Manawa Taki-Midland Trauma System is a network consisting of skilled clinical personnel in each of the five Te Manawa Taki-Midland DHBs who work with trauma patients and their whānau to achieve optimal outcomes and the best experience of quality care. Our clinicians are supported by an experienced committed central hub service dedicated to helping trauma patients, their whānau and the wider Te Manawa Taki-Midland community. This model is used to ensure that evidence-based change can be directly and appropriately translated to the care setting by staff and partners that live in, and understand the needs of their communities.

The Te Manawa Taki-Midland Trauma System has the following aims:

1. Ensure that injured patients and their whānau in our region receive equitable, highest quality trauma care.
2. Develop and maintain an integrated regional trauma system infrastructure including workforce and information systems.
3. Support targeted injury prevention and awareness to address inequities and groups at risk.
4. Inform evidenced-based change by focused trauma research and the TQIP.
5. Ensure the appropriate use of Midland trauma data.

Midland Trauma operational model



"It is a privilege to be with patients and their families from what can be the worst day of their lives and support them through all the ups and downs through their recovery. Some of the best moments are when they come back to visit and we take them through Critical Care where they can meet and thank some of the amazing team that helped save their life"

– Bronwyn Denize, Trauma CNS, Waikato DHB

Te Manawa Taki-Midland Trauma Registry (MTR)

The MTR has been operating continuously since 2012, and captures comprehensive patient data across all age groups and injury severities; this includes time and date stamping of transfer of patients to and between hospital facilities. This data set is unique in New Zealand. It captures interventions to allow detailed clinical outcome and process evaluation. The MTR now holds over 67,000 Te Manawa Taki-Midland trauma patient event journeys. This data provides an excellent platform for evidenced based system analysis and population based studies that form the mainstay of our Trauma Quality Improvement Programme (TQIP)/Midland Trauma Research Centre (MTRC) activities. Continuous monitoring and performance feedback enables improvements to service delivery and patient outcomes.

Te Manawa Taki-Midland Trauma Research Centre (MTRC)

The MTRC is embedded in Te Manawa Taki-Midland Trauma System and was established to translate data into meaningful information. The focus of the MTRC is to identify and monitor trauma issues which can then be addressed by the appropriate people in the wider team – whether the issues are clinical, systems infrastructure, injury awareness or prevention in nature. The ethos of the MTRC aligns with that of Te Manawa Taki-Midland Trauma System as a whole, in which research will be focussed primarily on the needs of patients, their whānau and their communities. The MTRC is actively producing high quality information across a range of focused initiatives.

Trauma Quality Improvement Programme (TQIP)

Continuous measurement and performance feedback is important to raise awareness of service delivery gaps and opportunities to improve care for patients and whānau.

In 2018, Te Manawa Taki-Midland Trauma System formalised its TQIP programme to facilitate continuous monitoring and improvement of trauma clinical care and system efficiencies in the Te Manawa Taki-Midland region. TQIP uses agreed guidelines and measures to benchmark system and process performance around our patient first philosophy. It utilises data directly from the MTR; information collected through clinical quality improvement processes and safety partners; and experience of care by patients and their whānau. The TQIP ensures issues are reported, actions are applied and that those actions are reviewed for resolution – often referred to as 'loop closure'.

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Trauma admissions and incidence

During 2020, there were a total of 7773 trauma patient admissions to Te Manawa Taki-Midland region facilities (figure 1). These admissions involved 6624 events, with 5733 of these patients being resident within the Te Manawa Taki-Midland region. Incidence ranged from relatively low in Waikato 563/100,000 to very high in Hauora Tairāwhiti (907/100,000). There is a need to focus on high risk groups across the region.

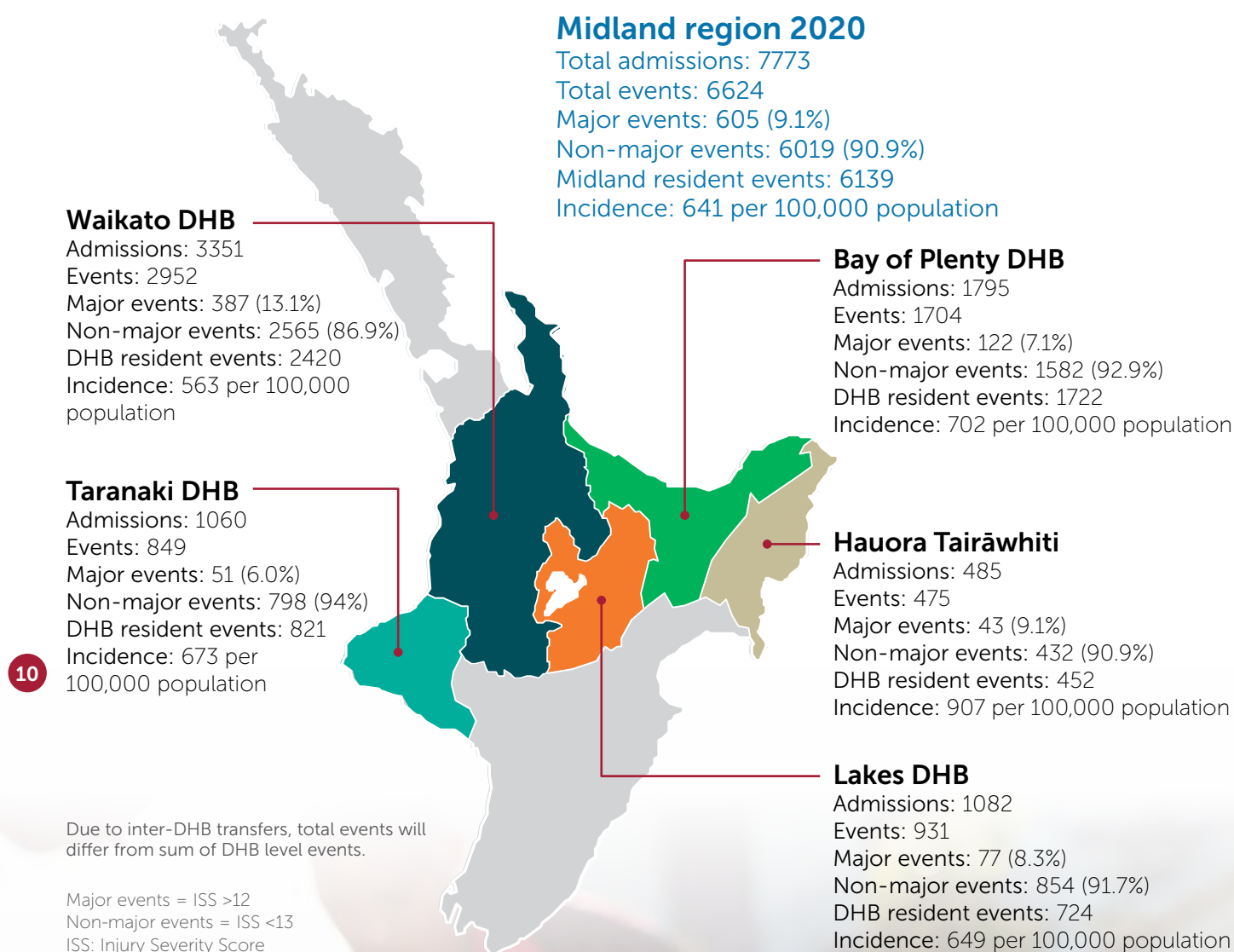


Figure 1: Te Manawa Taki-Midland region admissions and incidence 2020 by DHB

Annual admissions of trauma patients (all ISS) to individual Te Manawa Taki-Midland DHBs have risen gradually since 2012, however the greatest increase has been to Waikato DHB facilities, increasing by 23.4% since 2012 (figure 2). This increase is most marked in the major trauma subgroup that has increased by 64% since 2012, now numbering over 400 admissions per year to Waikato Hospital.

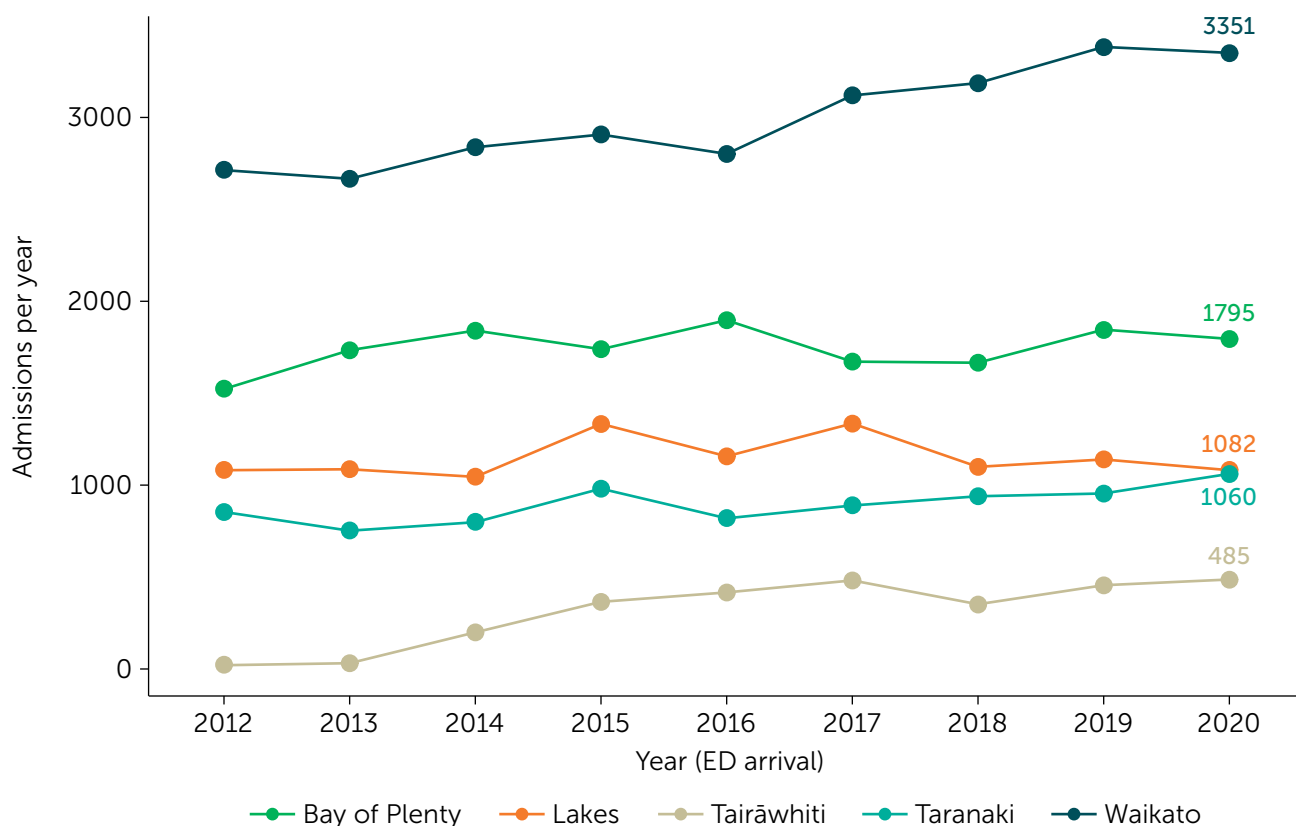


Figure 2: Annual trauma patient admissions (all ISS) 2012-2020 by DHB

Inward transfers of Major trauma patients to Waikato DHB facilities from other DHBs have increased 48.9% since 2015 (2015 inward transfers = 49, 2020 inward transfers = 73). Non-major trauma admissions to Waikato DHB have increased 10.6% since 2015 from 2656 to 2938.

Another significant rise in trauma admissions is seen in Taranaki DHB facilities; increased by 29.3% since 2016 (2016 n = 820, 2020 n = 1060),

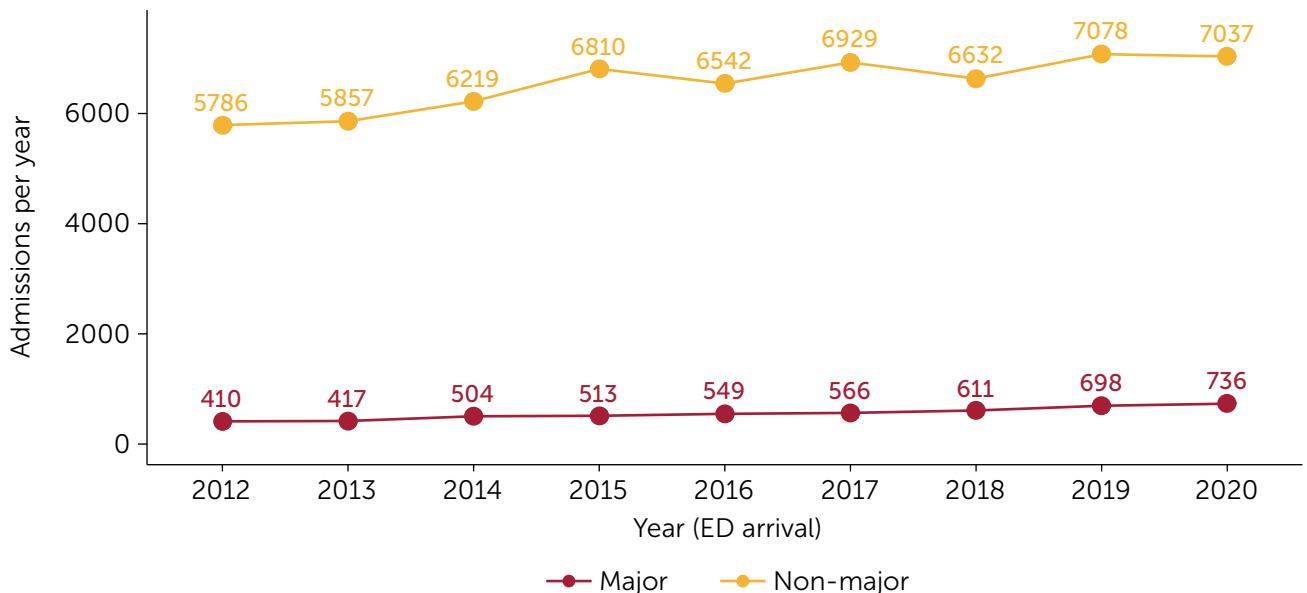


Severity

The MTR is unique in New Zealand, collecting comprehensive data for both major and non-major trauma patients. Major trauma includes patients whose ISS (Injury Severity Score) is greater than 12, non-major trauma patients are those with an ISS less than or equal to 12.

Major trauma admissions to Te Manawa Taki-Midland facilities increased by 5.4% during 2019 to 2020, while non-major trauma admissions declined by 0.6% during the same period.

Longer term, there continues to be an upward trend with major trauma admission volumes up 34% over the five years since 2016, and non-major trauma admissions up 7.6% over the same period.



12 Figure 3. Te Manawa Taki-Midland region annual trauma admissions 2012-2020 by severity

Figure 3 above shows that the effect of COVID-19 lockdowns during 2020 had a minimal effect on overall admission volumes among both major and non-major trauma compared to the previous year.

Incidence by severity

During 2020, the incidence of major trauma ranged from 47/100,000 population (Taranaki DHB) to 76/100,000 population (Hauora Tairāwhiti).

The incidence of non-major trauma ranged from 508/100,000 population (Waikato DHB) to 831/100,000 population (Hauora Tairāwhiti) (figure 4).

Non-major trauma incidence (585 per 100,000) is approximately 10.4 times higher than for major trauma (56 per 100,000).

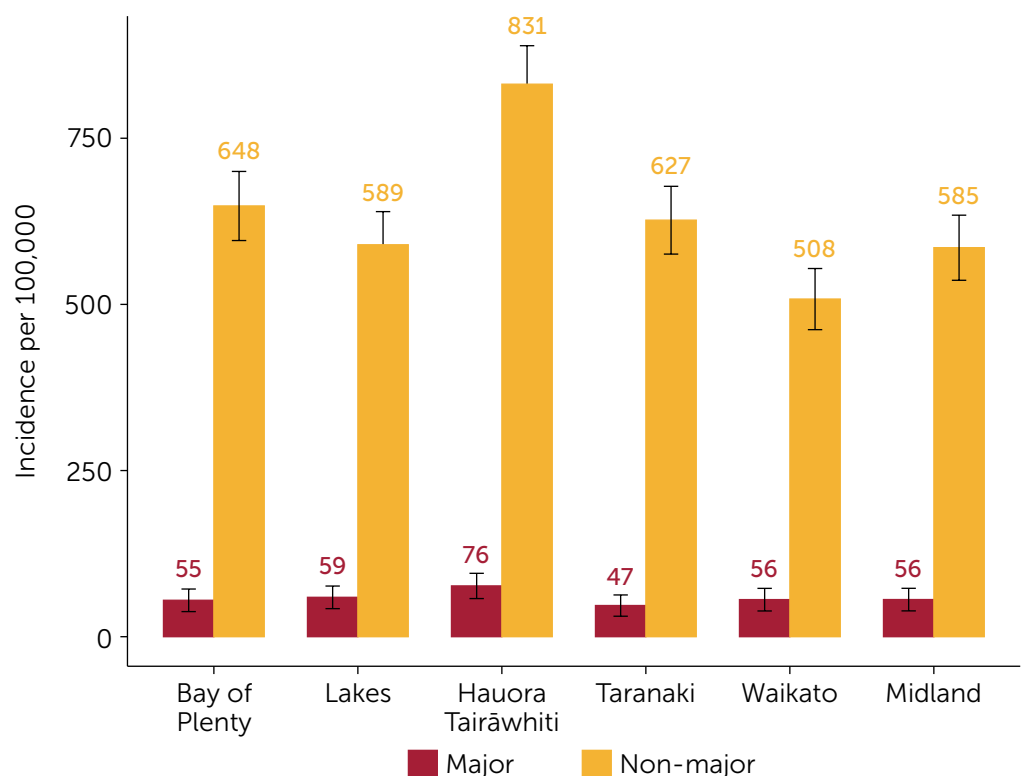


Figure 4. Incidence of trauma per 100,000 population 2020 by DHB and severity (bars = 95% CI) (incidence calculated using DHB resident events only).

Age adjusted incidence shows major trauma is low among 0 to 14 year olds but increases rapidly from age 15 years with a peak at 20-24 years before declining and a second peak forming in the 50-60 year age band (figure 5). Non-major trauma shows two more distinct peaks at age 15-29 and those aged 75 years and older.

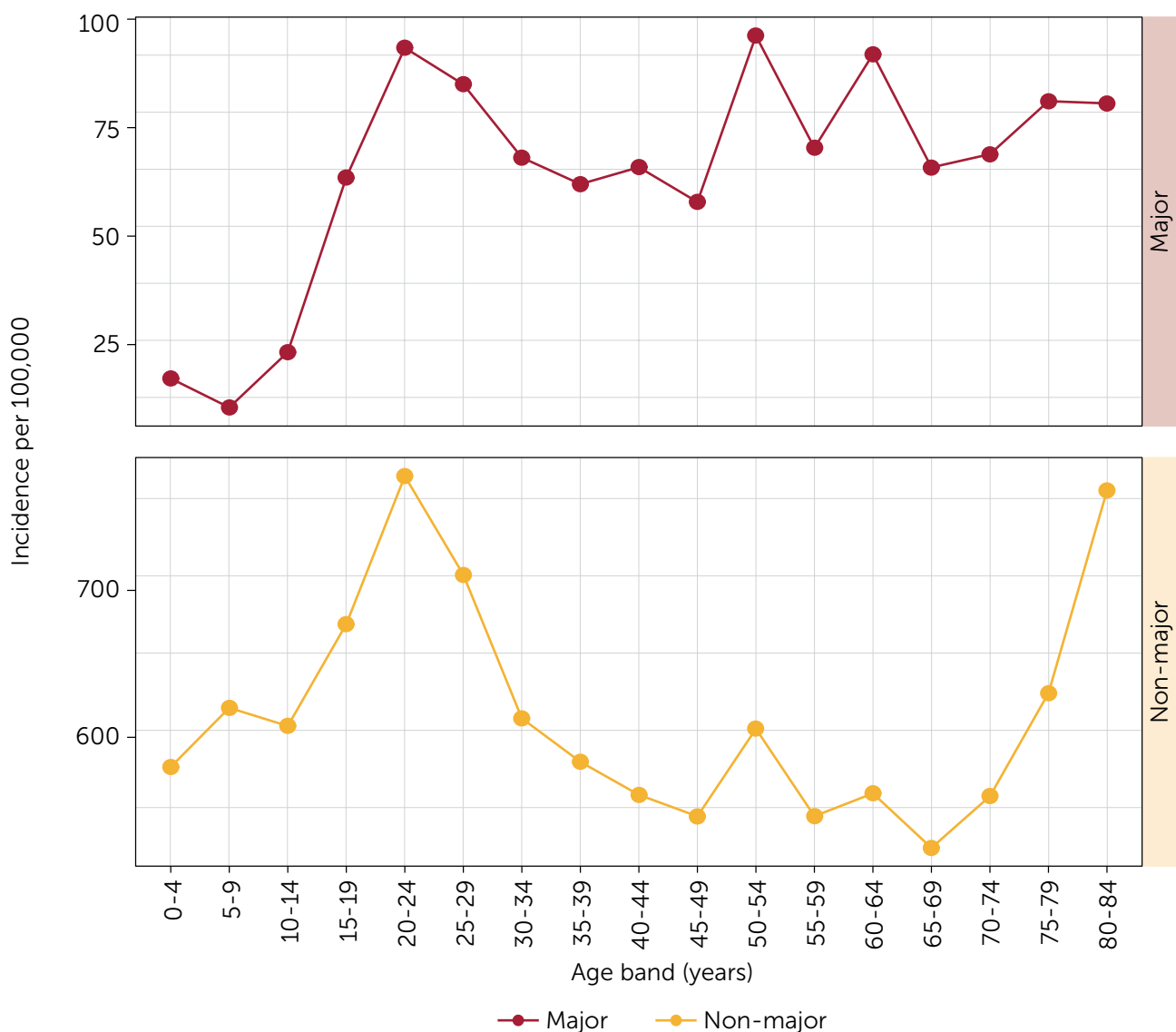


Figure 5. Age adjusted incidence per 100,000 population by injury severity 2020
 (Population source – Ministry of Health DHB population projections 2018 update)



Photo: Waikato Westpac Rescue Helicopter

Age, gender and severity

Age and gender are major factors affecting trauma admissions to Te Manawa Taki-Midland region facilities. Among major trauma patients there are two peaks among patients in their mid-twenties and early sixties (figure 6). Non-major trauma admissions exhibit a distinct peak among males aged 20-30 years while females show two distinct peaks, one during their teenage years, and one during their mid-to-late sixties.

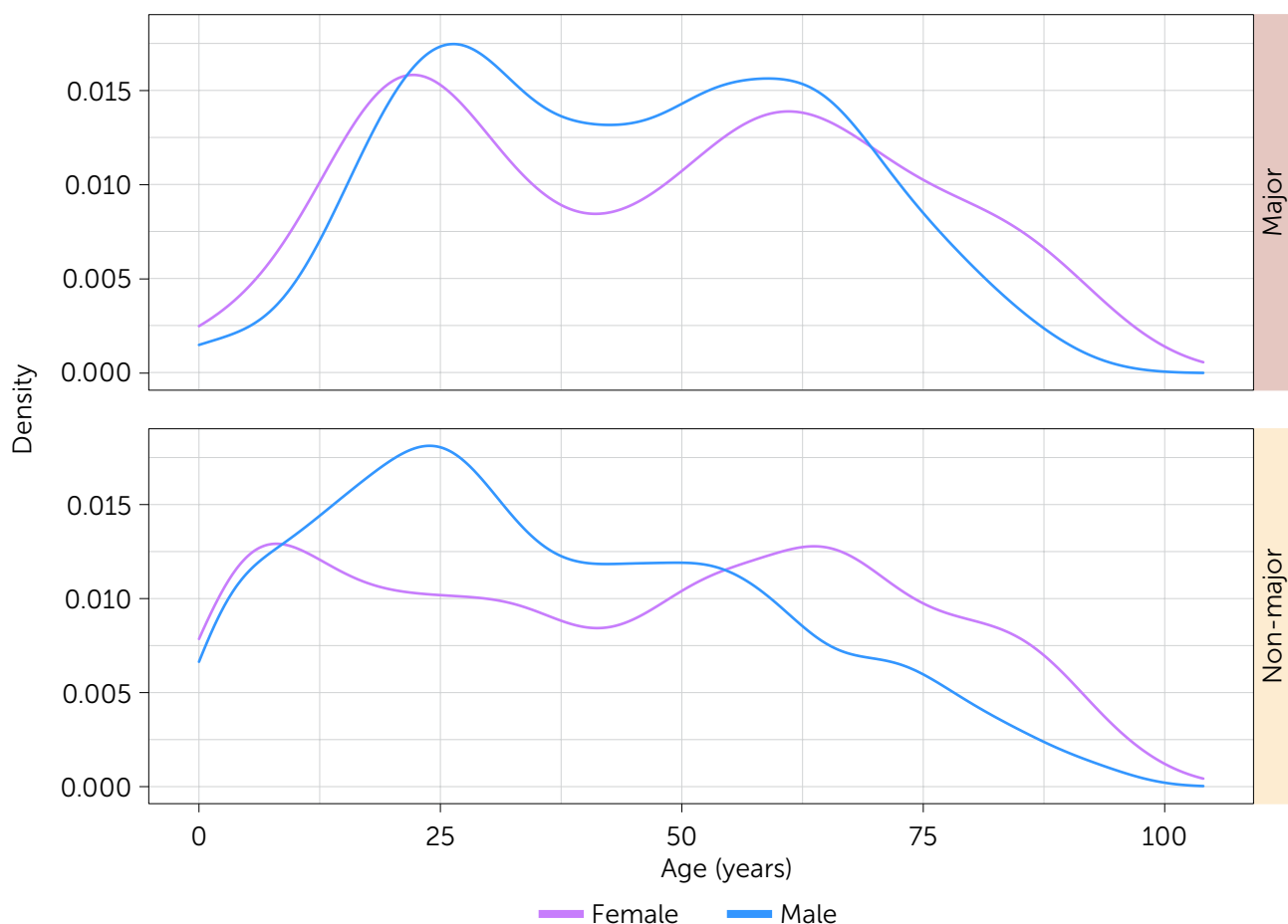


Figure 6. Density plot of trauma admissions to Te Manawa Taki-Midland facilities 2020 by age, gender, and severity, n = 6624 events *N.B. Density plots represent a variation of histograms to show the distribution shape without being affected by the number/width of bins.*

Major trauma

Among males admitted with major trauma (ISS > 12), road traffic crashes (RTC) predominate between the ages of 15 to 70 years. RTC among males increases significantly during their mid-teens, creating a large but tapering wedge of major trauma volumes through to later life. Assault also accounts for a significant additional volume and proportion of major trauma among males aged 20-34 years not seen in other age groups. Falls add additional volumes of major trauma among males ages 20-29, although proportionately injury due to falls increase markedly among males 65 years and older. Motorcycles crashes contribute to a second peak among middle aged males 50-64 years.

Non-major trauma

Falls are the predominant cause of injury across all ages, with particularly large volumes in younger males aged 15 years and under, however, proportionately falls are highest in the elderly.

RTC contributes to a peak among males aged 15-29 years with similar patterns for motorcycle crashes.

Females aged 15-34 years contribute a peak from RTC and motorcycle crashes, often as pillion passengers. Equestrian related injuries add to a second peak among females aged 50-60 years.

Falls predominate among females under 15 years, increasing with advancing years over age 50. RTC and assault are less prominent than in males.

Focus on equity

Te Manawa Taki-Midland trauma registry has revealed major inequities in the incidence of trauma affecting Māori. Our region has a population of 957,645*, including 247,040 (25.7%) Māori from 43 local iwi. During 2020, Māori continued to be at greater risk of trauma with a relative risk across the region for Māori of 1.36 compared to non-Māori (figure 7). i.e Māori are approximately 36% more likely to be admitted after injury than non-Māori. This trend is strongest in Tairāwhiti where Māori are 50% more likely to be injured than non-Māori. We have developed an equity statement to guide our approach to addressing inequities in line with the requirements of the DHBs through the Regional Equity Plan.

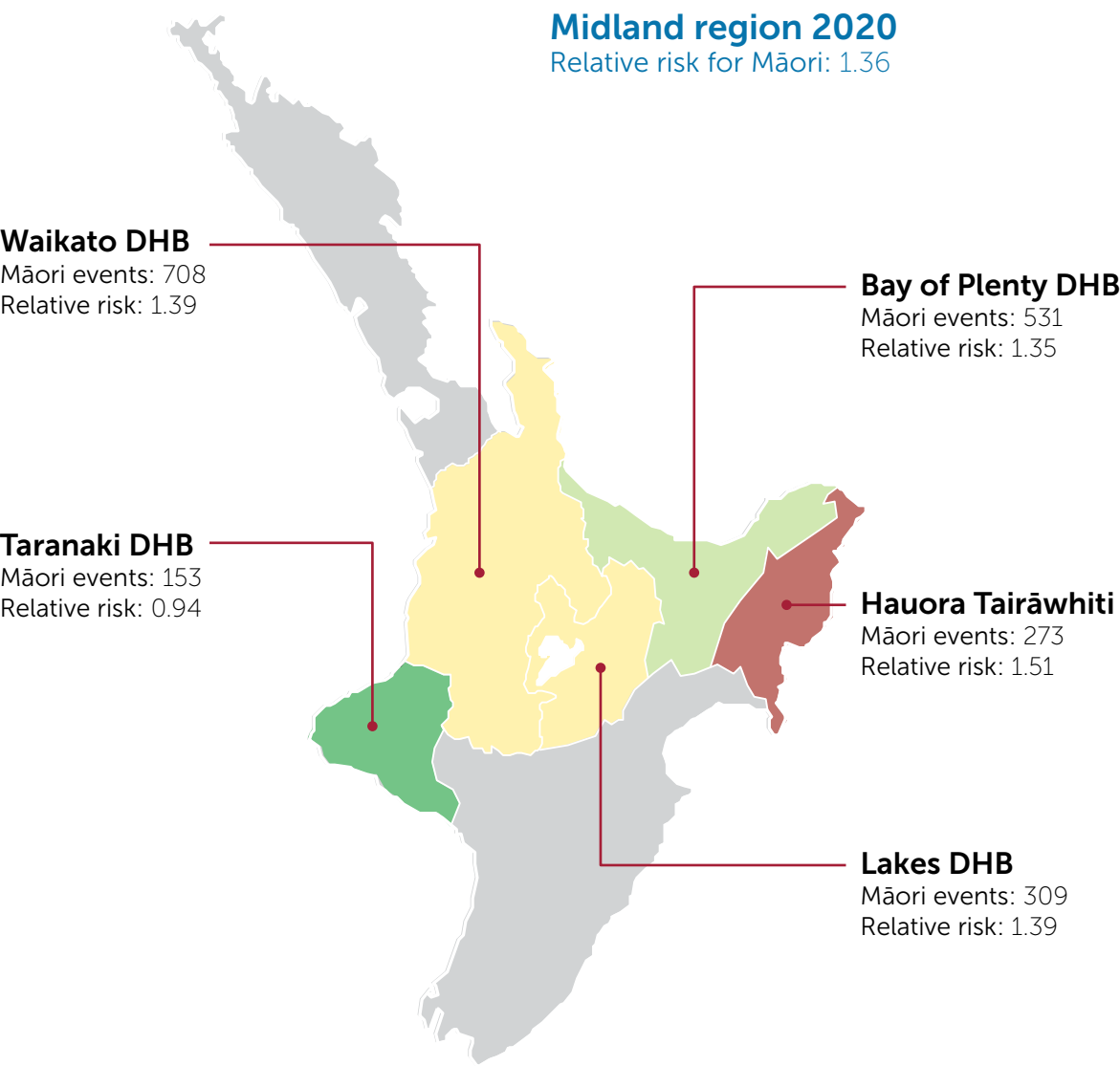


Figure 7: Te Manawa Taki-Midland region 2020 relative risk for Māori versus non-Māori (Population ethnicity adjusted per DHB, Māori events are DHB resident events). Source – Ministry of Health population projections 2018 update.

Our equity statement

Te Manawa Taki-Midland Trauma System and its staff view variation in trauma incidence and access to care as inequities in healthcare. Our clinical and prevention programs are focused on identifying and defining these inequities so they can be addressed and resolved by Te Manawa Taki-Midland Trauma System and our partners that are responsible for healthcare delivery and injury prevention. We continue to develop relationships and solutions at regional, iwi, and whānau level to address the specific issues related to groups at particular risk.

Trends

Admissions of trauma patients identifying as Māori increased by 4.9% from the previous year while admissions of non-Māori decreased by 2.2% (figure 8).

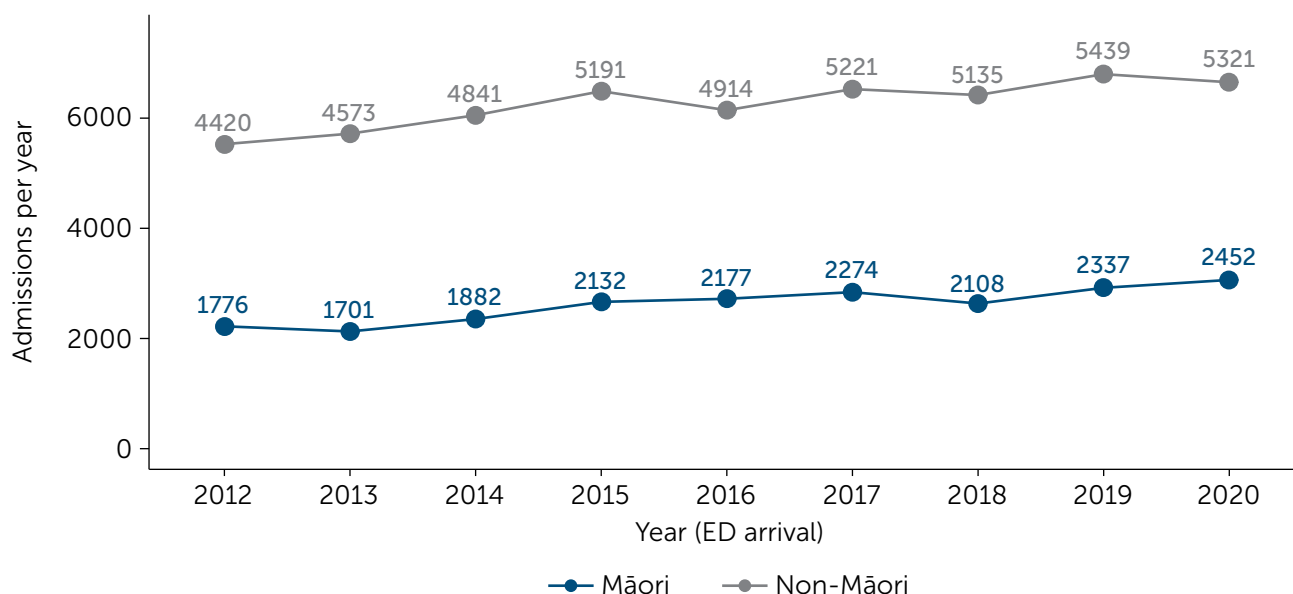


Figure 8. Annual trauma admissions 2012-2020 by ethnicity

Since 2012 rates of trauma in Māori have increased by 38.1% in comparison to non-Māori which increased by 20.4%. Overall the admission rate has increased by 26%.

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This growing equity gap has seen a 27.7% increase in incidence of 617/100,000 population for Māori in 2012 to 788/100,000 during 2020. Among non-Māori, the incidence of trauma has increased by 11.8% over the same period from 524/100,000 population in 2012 to 586/100,000 during 2020. In essence, the equity gap is increasing and requires urgent attention.

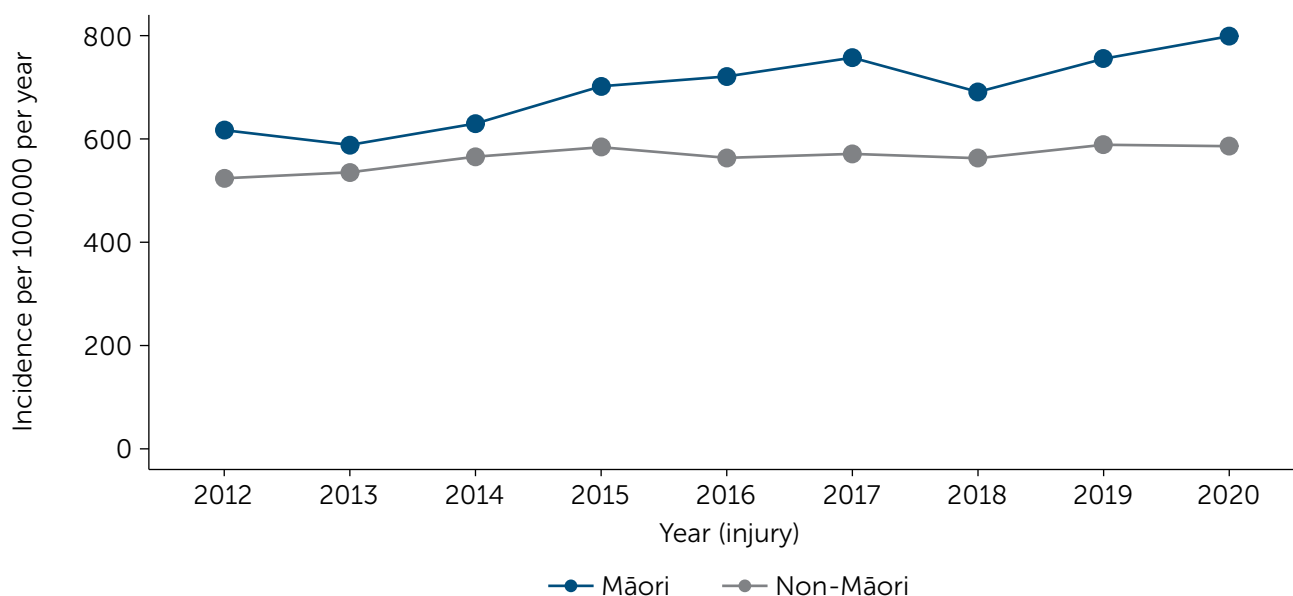


Figure 9: Annual incidence of trauma 2012-2020 (all ISS/severity) by ethnicity (Incidence calculated using Te Manawa Taki-Midland region resident events only, population ethnicity adjusted – source Ministry of Health DHB population projections 2018 update).

Injury rates among Māori are higher than non-Māori in all age bands under age 65 years (figure 10). Particularly concerning is the injury rate in the 20-34 year old Māori which is twice that of non-Māori, as well as that for Māori aged 0-4 years. Information regarding the circumstances (mechanism, place, activity) of injury surrounding this higher rate in young Māori is being passed on to responsible agencies for focussed interventions.

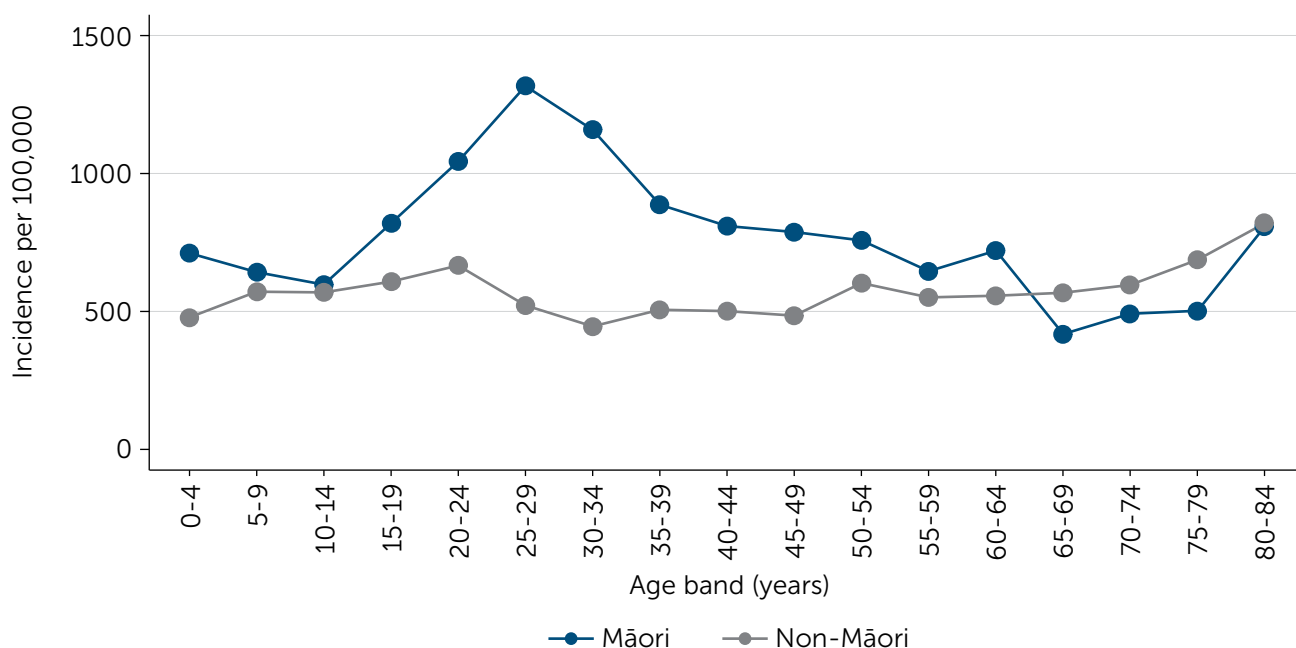


Figure 10. Te Manawa Taki-Midland region incidence of injury 2020 by ethnicity and age band

The group at the most extreme risk of injury are young Māori aged 20-34 years. The most common cause of injury was due to assault, followed by RTC and falls as shown below.

Cause of injury		Events (%)
	Assault	143 (32.9)
	Road traffic crash	97 (22.3)
	Fall	79 (18.2)
	Sharp glass / knife / hand tool	72 (16.6)
	Motorcycle	43 (10.0)
Total		434 (100)

Table 1. Top five causes of injury for Māori age 20-34 years. Of the 143 Māori patients injured due to assault, 37 (25.9%) were female

Focus: Effect of COVID-19 lockdown on trauma

Amongst the many unknowns that faced us as the country was being locked down, there was speculation that trauma admissions would decline toward zero and staff could be redeployed. We saw a 40% decrease in major trauma however these patients would typically occupy the same beds that would be required for COVID-19 patients. Extra pressure in ICU would occur if major trauma patients developed complications as a result of diminution of care. Based on findings from our early research a recommendation was made to maintain the integrity of multidisciplinary care models – this proved to be a successful strategy. Coincident with this our existing pre-hospital and inter-hospital referral matrices continued to work well in distributing patients to definitive care. We produced two papers to assist Te Manawa Taki-Midland and other facilities internationally to understand the dynamics of COVID-19 and balance competing resources, The research summary is as follows:

Admission to hospital for injury during COVID-19 alert level restrictions

In April 2020, the New Zealand Medical Journal published our first article, "Variation in volumes and characteristics of trauma patients admitted to a level one trauma centre during national Alert Level 4 lockdown for COVID-19 in New Zealand". In response to positive feedback following this we undertook a second study to assess the effects of community lockdown phases on trauma-related admissions to Te Manawa Taki-Midland hospitals over the period 15 February to 10 July 2020, comparing volume variation with the same period in 2017-2019.

We found a 36.7% ($p < .00001$) reduction in injury admissions during Alert Level 4 lockdown compared with the same period in 2017, 2018 and 2019. This was in the context of volume increases during the pre-lockdown period (17.8%, $p < .00001$) and a 'rebound' as restrictions eased. There was an increase in injuries occurring at home (28.3%, $p < .00001$) and on footpaths (37.9%, $p = 0.00076$), while there was a decline in events on roads (33.0%, $p = 0.017$), at schools (75.0%, $p < .00001$) and in sports areas (79.7%, $p < .00001$). Falls remained the dominant mechanism of injury in 2020, contributing 39.9% of all hospitalisations.

The reduction in hospital admissions during alert levels 4 and 3 was short lived, with a rebound evident when restrictions eased. Hospital resources across the region have been strained because this rebound coincided with a planned 'catch up' on healthcare that was delayed during the higher community restriction levels.

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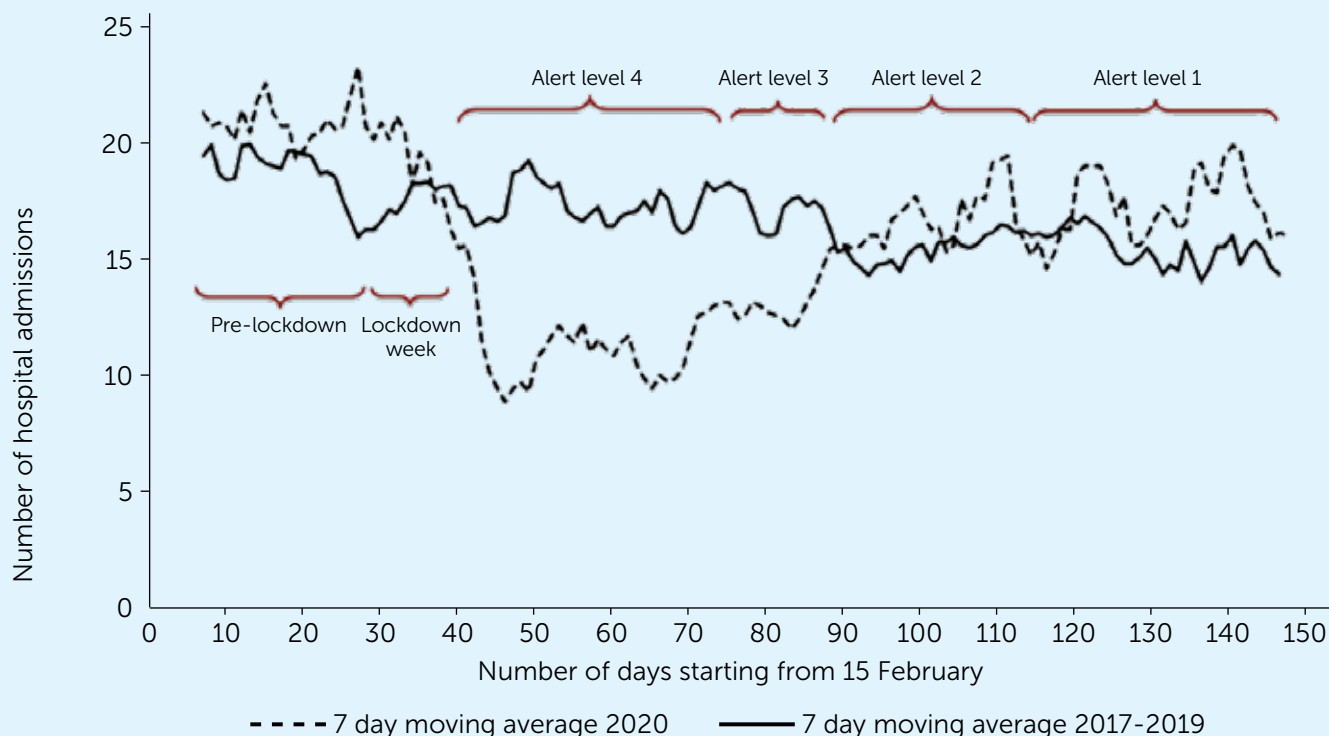


Figure 11: Hospital admissions: Seven-day moving average 15 February-10 July 2020 compared with 2017-2019

It was stressful learning how to put on all the PPE correctly and in a hurry to help trauma patients.

It was hard not getting cross with people coming in when they had broken the lockdown rules and had car accidents. They didn't realise how many people they were putting at risk.



Ashley's story

A patient experience

On 5 March 2019, I left work and headed home biking along the cycleway down Te Rapa Road, Hamilton. A car parked on the cycleway opened his door right on me. I'm usually really careful because I know how dangerous roads can be, but I didn't see this fella. He just opened his door onto a 60km/h busy road, which struck me, and I bounced off into an oncoming car going past which also ran me over. I don't remember anything at all of this day. I had seven broken ribs, both of my shoulder blades were broken, and I was in a coma from a head injury. I was in Waikato Hospital ICU for about 10 days and had surgery to stabilise my ribs so I could manage breathing better.

I have flashback memories of only the first couple of weeks. Those early days were perhaps the hardest on my family. Not knowing how I was going to be, the time off work required to support me and meet with doctors. Managing our children and their anxieties, not to mention the everyday life stuff that continues while basically your world has slammed to a stop.

I was in hospital for four weeks – that's a long time for anyone to cope, but then I had to go to Auckland to have ongoing rehabilitation. Sometimes the traffic was so bad for my partner it would take her three hours to get back home. It also was really hard for my family who live in Tauranga and Tokoroa to visit so actually I felt quite isolated. After seven weeks I needed my family, my friends, my house and some sense of normality so I discharged myself.

I have been told by my specialists that I have come a long way and made a miraculous recovery. I am now back working full time, but on a daily basis I still suffer dizziness, balance issues and feel crazy tired at the end of a day. I also had a lot of work pressures in the past few months from my employer where I had to get a lawyer involved to save my job.

One split decision by someone else changed my life so dramatically. Last year was seriously the worst year of my whole life. Until cycle lanes or roads can be made much safer for a cyclist, I don't envision biking again.



Process indicators

Time in Emergency Department (ED)

20

Major trauma patients continue to spend much longer in the ED than the Te Manawa Taki-Midland target of 60 minutes. During 2020, the median time in Te Manawa Taki-Midland DHB EDs ranged from 205 to 267 minutes suggesting there continues to be significant room for improvement in this area. Key impediments to reaching this target is the limited availability of inpatient beds and delay to interventions.

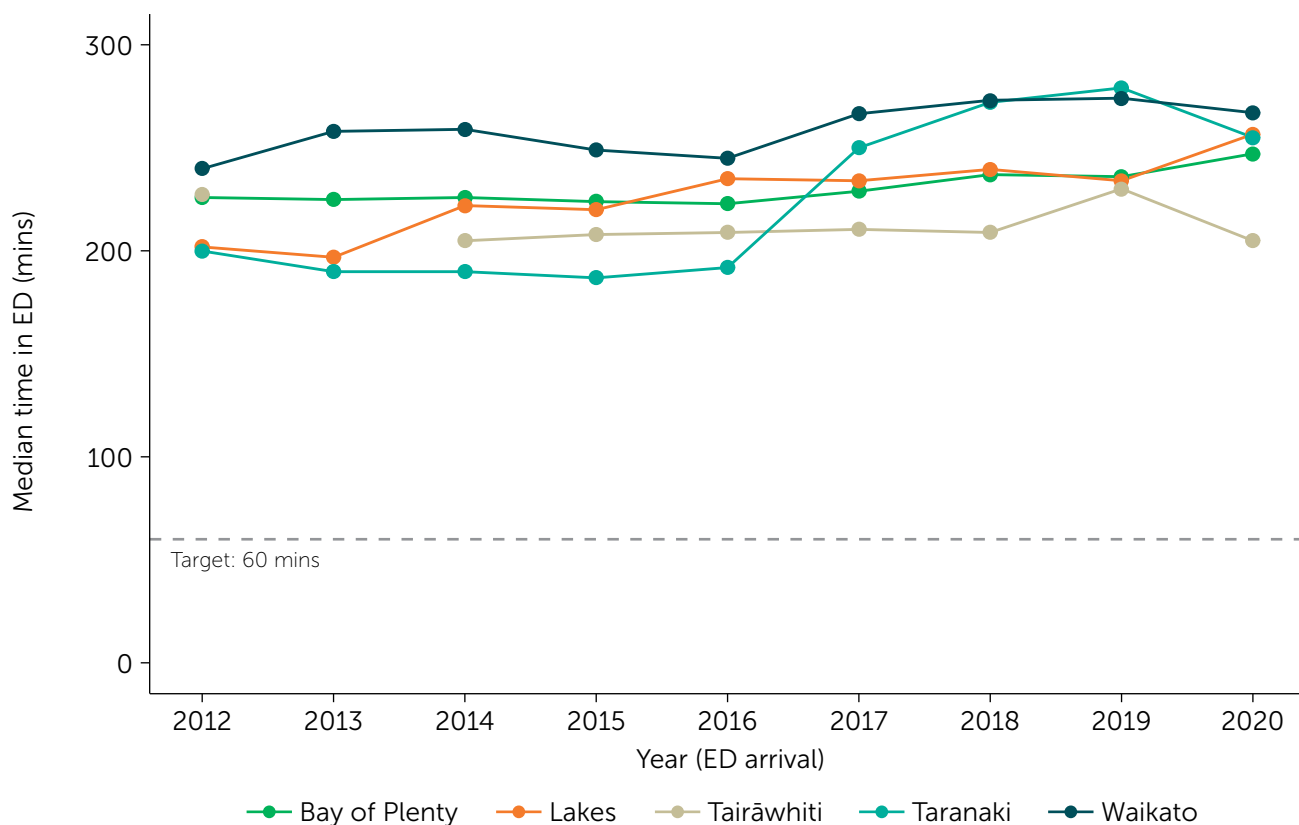


Figure 12. Median time in ED for major trauma (ISS > 12) patients 2011-2020 by DHB



During 2020, the median time spent in EDs for major trauma patients ranged from 225 to 298 minutes and except for Waikato, median times in ED for non-majors ranged from 204 to 270 minutes (figure 13).

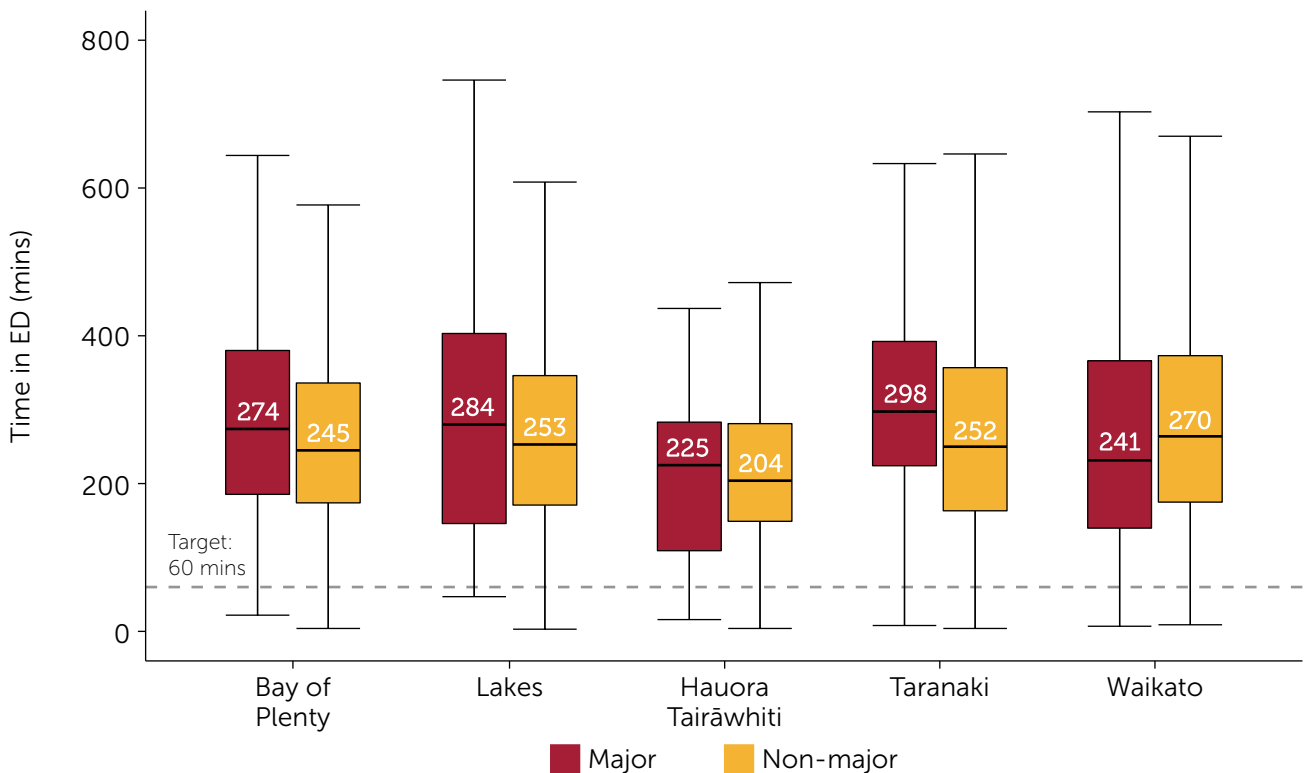


Figure 13. Time in Emergency Department (ED, mins) by severity and DHB

Trauma team activation

Severely injured trauma patients require a rapid, thorough, systematic assessment and treatment. The Trauma team is a multidisciplinary group of individuals drawn from the specialties of emergency medicine, intensive care, surgery, nursing, allied health and support staff, who work together as a team to assess and manage major trauma patients. The percentage of major trauma patients receiving a trauma team activation continues to remain below the target of 80%.

During 2020, across the Te Manawa Taki-Midland region, 58% of major trauma patients received a trauma team activation on their first admission direct from scene. With team activation ranging from 35% to 73% there is a need for improvement in this area (figure 14).

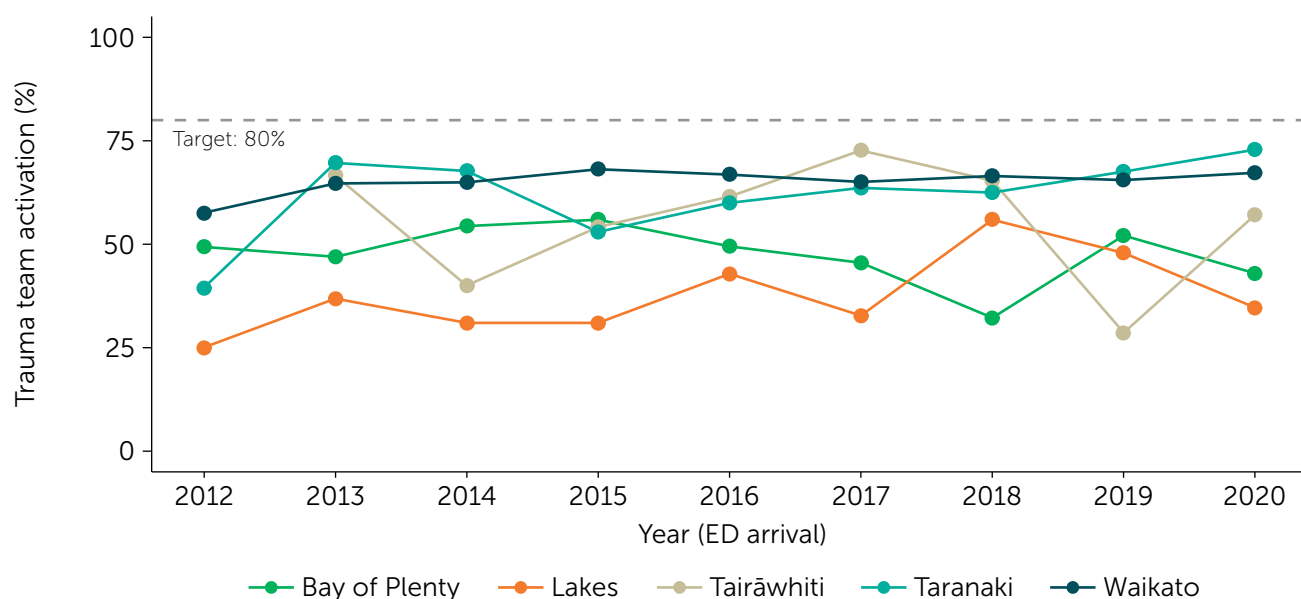


Figure 14. Percentage annual major trauma admissions with a trauma team activation by arrival facility DHB

Where a trauma team response is activated, the time spent in ED is significantly reduced (figure 15). Region-wide, trauma team activation resulted in a reduction of 94 minutes (30.1% reduction) spent in ED. Even with activation of a trauma team response, time in ED remains longer than the MTS target of 60 minutes.

22

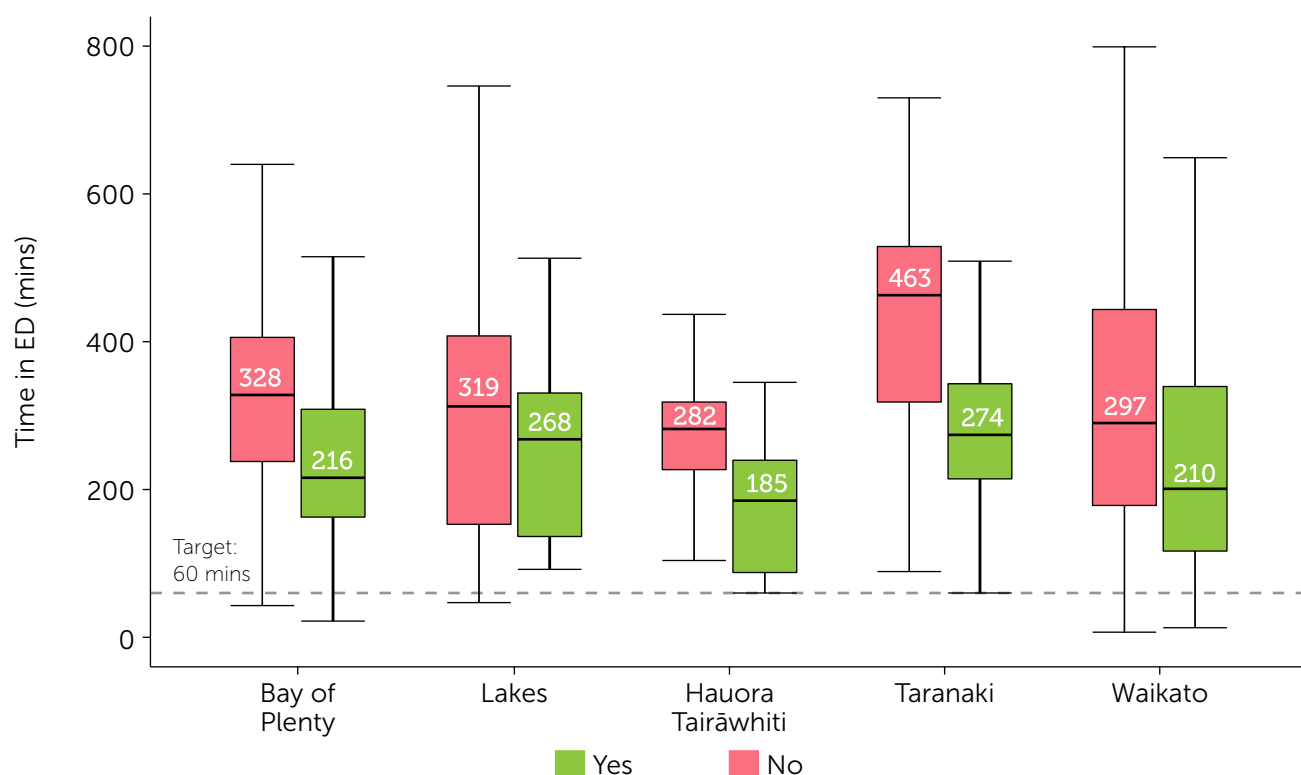


Figure 15. Time in ED, major trauma patients (ISS >12), by trauma team activation status (Yes/No) and DHB

While Te Manawa Taki-Midland Trauma System is improving in this area, trauma team activation rates and time in ED are both still some way from achieving our targets. A monthly trauma team activation monitoring report has recently been developed to assist our understanding of trends in trauma team activation rates and time in ED. It is likely that improvement will depend on early decision-making on patient disposition, and provision of acute inpatient beds.

Average time to index CT

An index computed tomography scan (Index CT) is the first CT scan a trauma patient receives after arrival at hospital. The time taken from patient arrival to receiving an Index CT provides a measure of how rapidly a facility and its staff mobilise to acquire diagnostic imaging information for severely injured patients. During 2020, the average time to index CT increased in four Te Manawa Taki-Midland DHBs and remained above the Te Manawa Taki-Midland Trauma System target of 60 minutes in all but one Te Manawa Taki-Midland DHB (figure 16). Times have recently been increasing, indicating a need for process evaluation and improvement.

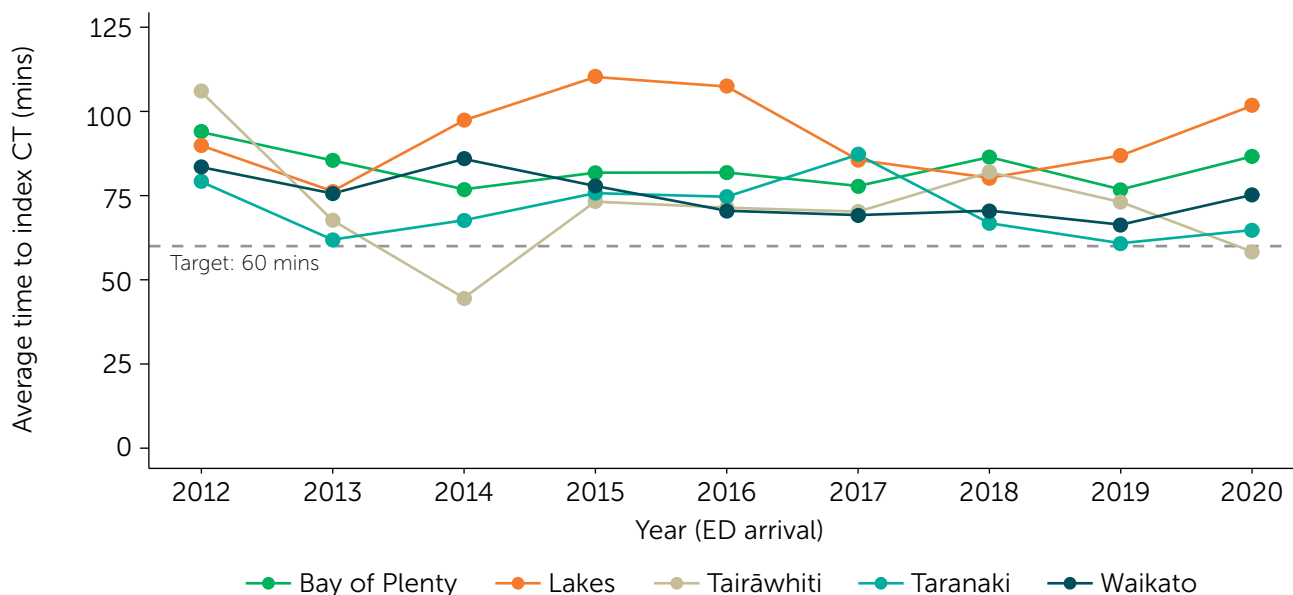


Figure 16. Average time to Index CT for major trauma (ISS > 12) patients by arrival year and DHB

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Blood alcohol testing

The percentage of major trauma patients (all ages) whose blood was tested for Blood Alcohol Level (BAL) on their first facility admission continues to lie below the national target of 100%. Te Manawa Taki-Midland wide testing rate was 78% for 2020, with individual DHB testing rates ranging from 58.6% to 90.5% (figure 17).

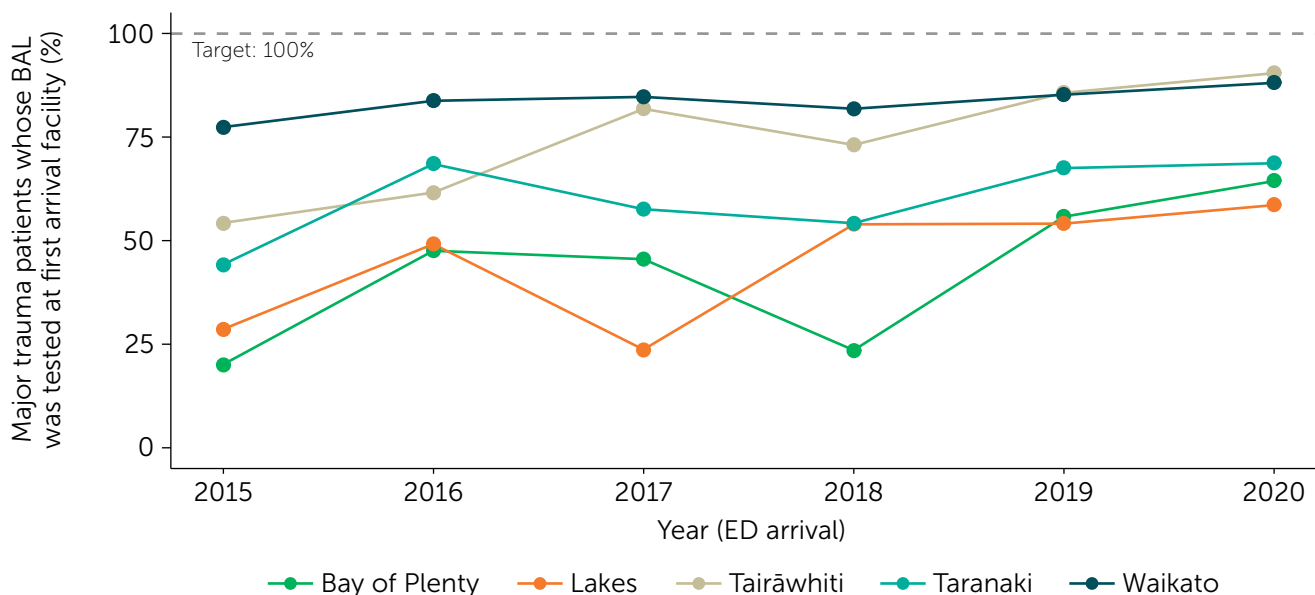


Figure 17. Percentage of major trauma patients whose BAL was tested at their first arrival facility (all ages)

Our recent study on blood alcohol exposure showed that 18 % of major trauma patients had alcohol in their bloodstream at the time of admission. The study highlighted the groups most likely to have BAL positivity and emphasised the need for ongoing monitoring of BAL to assist prevention initiatives.

For more information visit <https://doi.org/10.1111/1742-6723.13797>

Cause of injury

During 2020 94.5% of trauma was caused by blunt force, 2.8% were burns and 2.7% penetrating.

Type of injury	Major trauma (ISS > 12) events (col %)	Non-major trauma (ISS < 13) events (col %)	Total events (col %)
Blunt	579 (95.7)	5683 (94.5)	6262 (94.5)
Penetrating	6 (< 1.0)	159 (2.6)	179 (2.7)
Burn	20 (3.3)	177 (2.9)	183 (2.8)
Total	605 (100)	6019 (100)	6624 (100)

Table 2. Primary injury type by severity 2020 (n = 6624)

Injury intent	Major trauma (ISS > 12) events (col %)	Non-major trauma (ISS < 13) events (col %)	Total events (col %)
Unintentional	542 (89.6)	5604 (93.1)	6146 (92.7)
By other	48 (7.9)	351 (5.8)	399 (6.0)
Self-inflicted	14 (2.3)	57 (< 1.0)	71 (1.1)
Unknown	1 (< 1.0)	7 (< 1.0)	8 (< 1.0)
Total	605 (100)	6019 (100)	6624 (100)

Table 3. Injury intent by severity 2020 (n = 6624)

Across all trauma events (all ISS), the top five causes of injury in 2020 were falls (37.9%, n = 2517), RTC, motorcycle, pedal cycle, and assault (figure 18). Among major trauma admissions, RTC (27.9%, n = 169), followed by falls (20.9%, n = 127) and motorcycle (15.2%, n = 92), were the top three causes of injury.

24

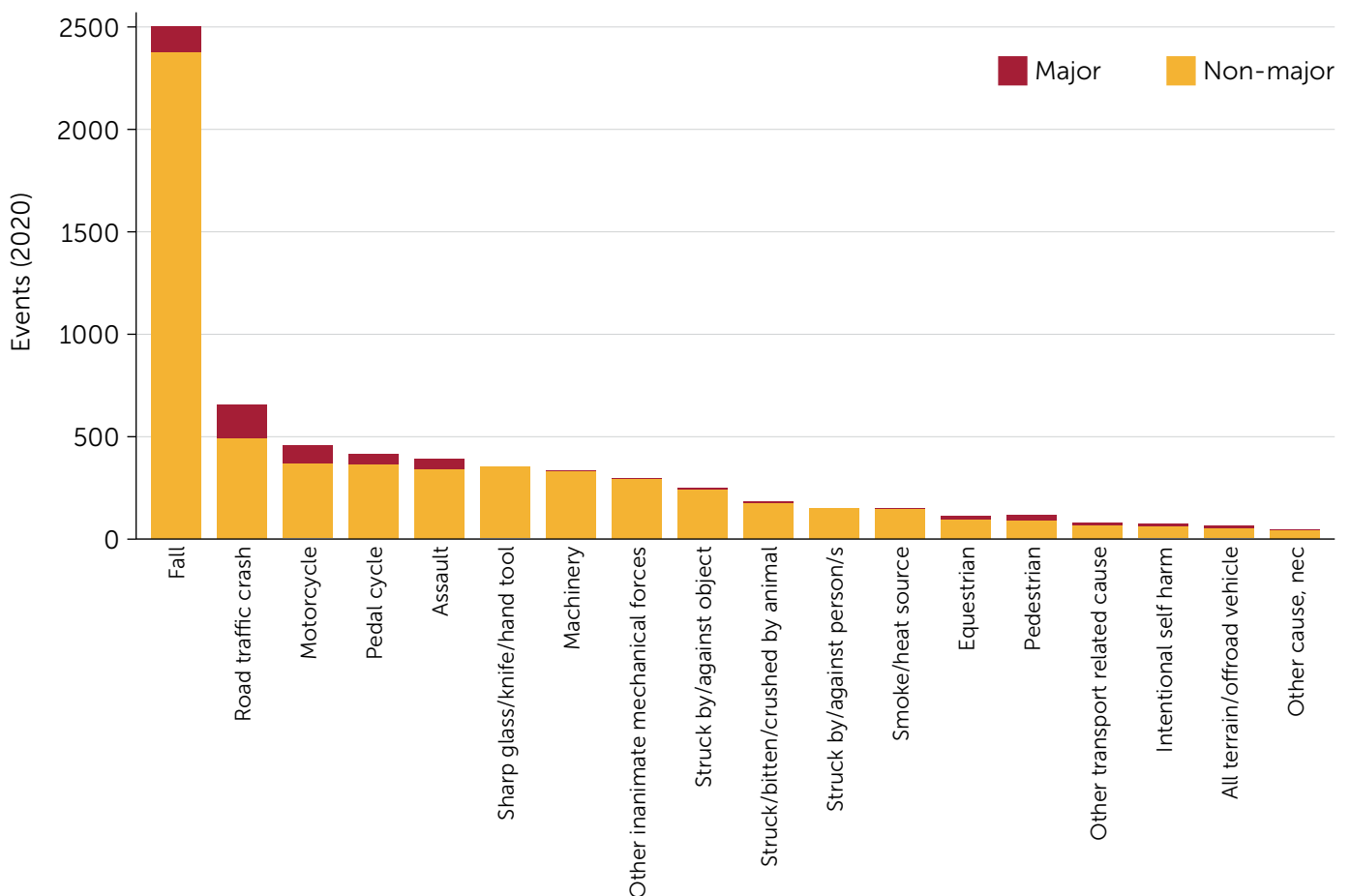


Figure 18. Cause of injury by severity

Falls among major trauma patients show a peak in the 60-65 year age band while among non-majors there is an additional peak among teenage children (figure 19). Where injury was due to motorcycle crash, there were distinct differences in an age peaks between major and non-major trauma. Motorcycle crash patients with major trauma showed an age peak in the 45-55 age band while motorcycle injuries among non-major trauma patients tended to be younger with a distinct peak in their low twenties.

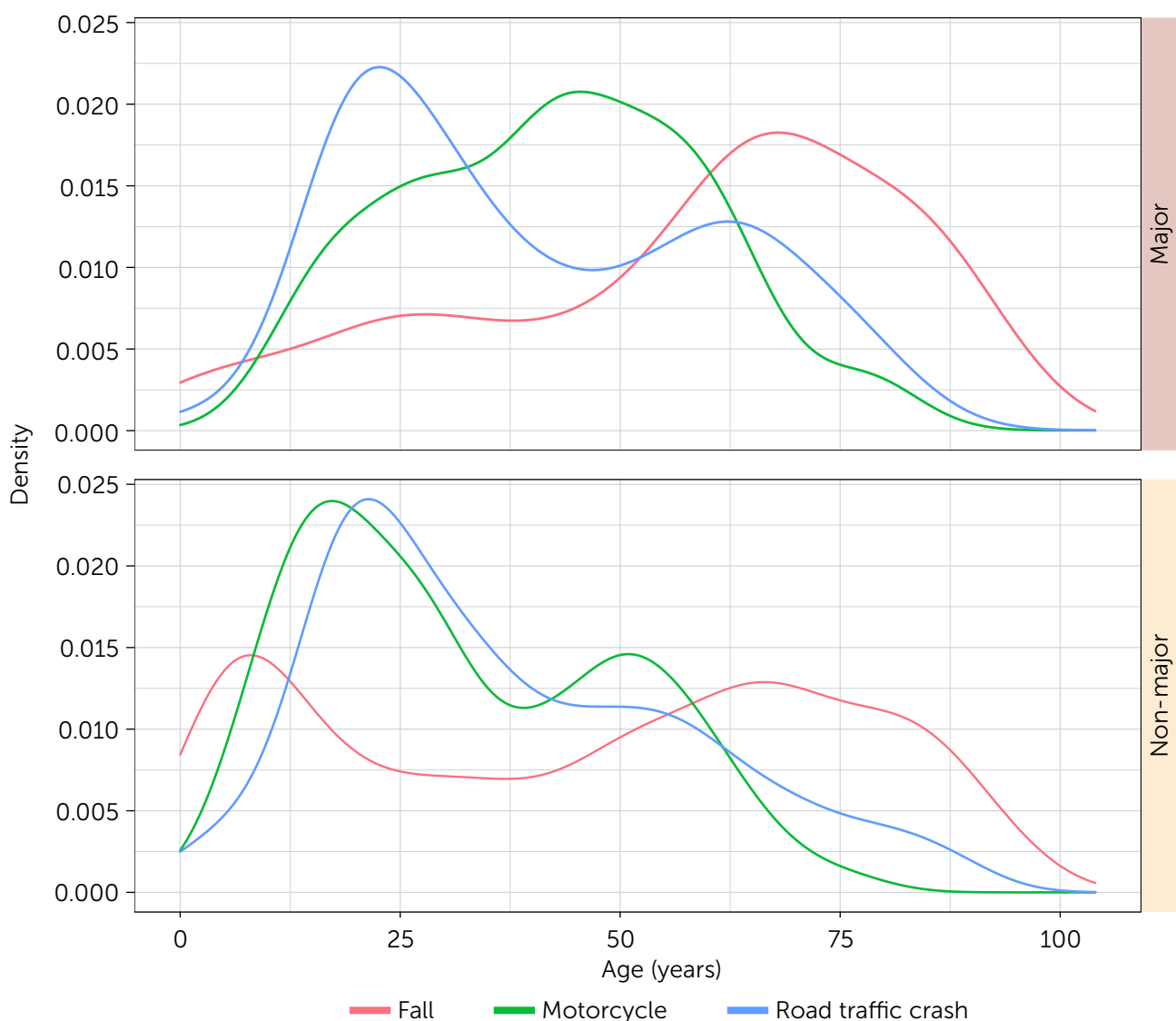


Figure 19. Age density plot by cause of injury (top 3) and major or non-major severity, n = 4237



Injuries

The trauma patient can have many individual injuries. During 2020 just over 16,000 individually coded injuries were entered into the Midland Trauma Registry with an average of 2.4 injuries per patient (figure 20). Major trauma patients had an average of 6.8 injuries recorded, and non-major trauma patients had 2 injuries recorded. Among major trauma patients, the highest number of individual recorded injuries were to the abdomen and pelvic contents. (28.3%, n = 1181 recorded injuries), among non-major trauma patients there were high numbers of injuries to the face and neck (45.4%, n = 5489 individually coded injuries).

All individually coded injuries entered into the Midland Trauma Registry includes a severity score on a six point scale of AIS 1 = Minor to AIS 6 = Maximal (currently untreatable). An algorithm employs these individual injury score to derive a total ISS which ranges from 1 to 75 (if any individual injury has an AIS of 6, the ISS score is automatically assigned 75. Among major trauma patients (where total ISS > 12), a majority of individual injuries had a AIS severity of 2 (44.5%, n = 1859 individual coded injuries)

"Sometimes it's the seemingly little things that make all the difference. Just showing patients their x-rays and explaining their injuries to them assists them to understand what happened to them." – Carolyn Duncum, Trauma CNS, Lakes DHB



16,268 individual patient injuries

recorded in the Midland Trauma Registry 2020

Major trauma injuries

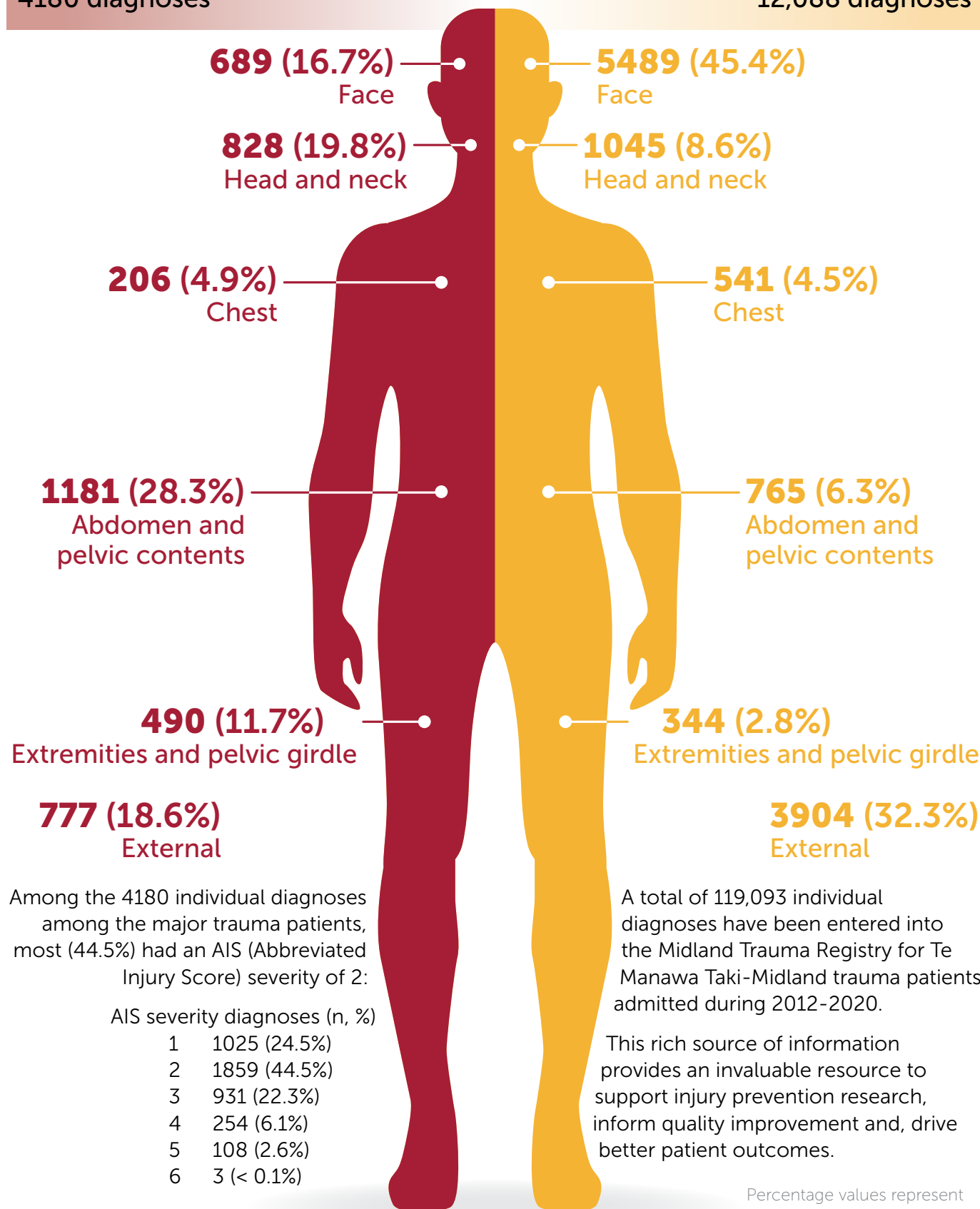
610 events

4180 diagnoses

Non-major trauma injuries

6071 events

12,088 diagnoses



27

Figure 20. Injuries recorded among major and non-major trauma patients admitted during 2020 in Midland Trauma Registry

Spinal injuries

In a recent study, we reviewed 3061 spinal injuries that were recorded in Te Manawa Taki-Midland between 2012 and 2019, including 224 patients with spinal cord injury. The study showed that 70% of spinal injuries were isolated and therefore scored as non-major trauma, and that 30 patients per year were being transported to out-of-region for acute care or rehabilitation facilities. The study revealed the enormous size of the problem and prompts us to look at how we are providing acute and rehabilitation services for these patients

In 2020, 621 trauma patients were admitted with spinal injuries, 565 of which had spinal injuries that did not involve the spinal cord. 56 patients had at least one spinal cord injury (figure 21) (excludes cauda equina injuries) representing an increase of 21.7% from 2019 (2019, spinal cord injuries = 46). Almost a third of spinal injuries with spinal cord involvement were due to falls (table 4).

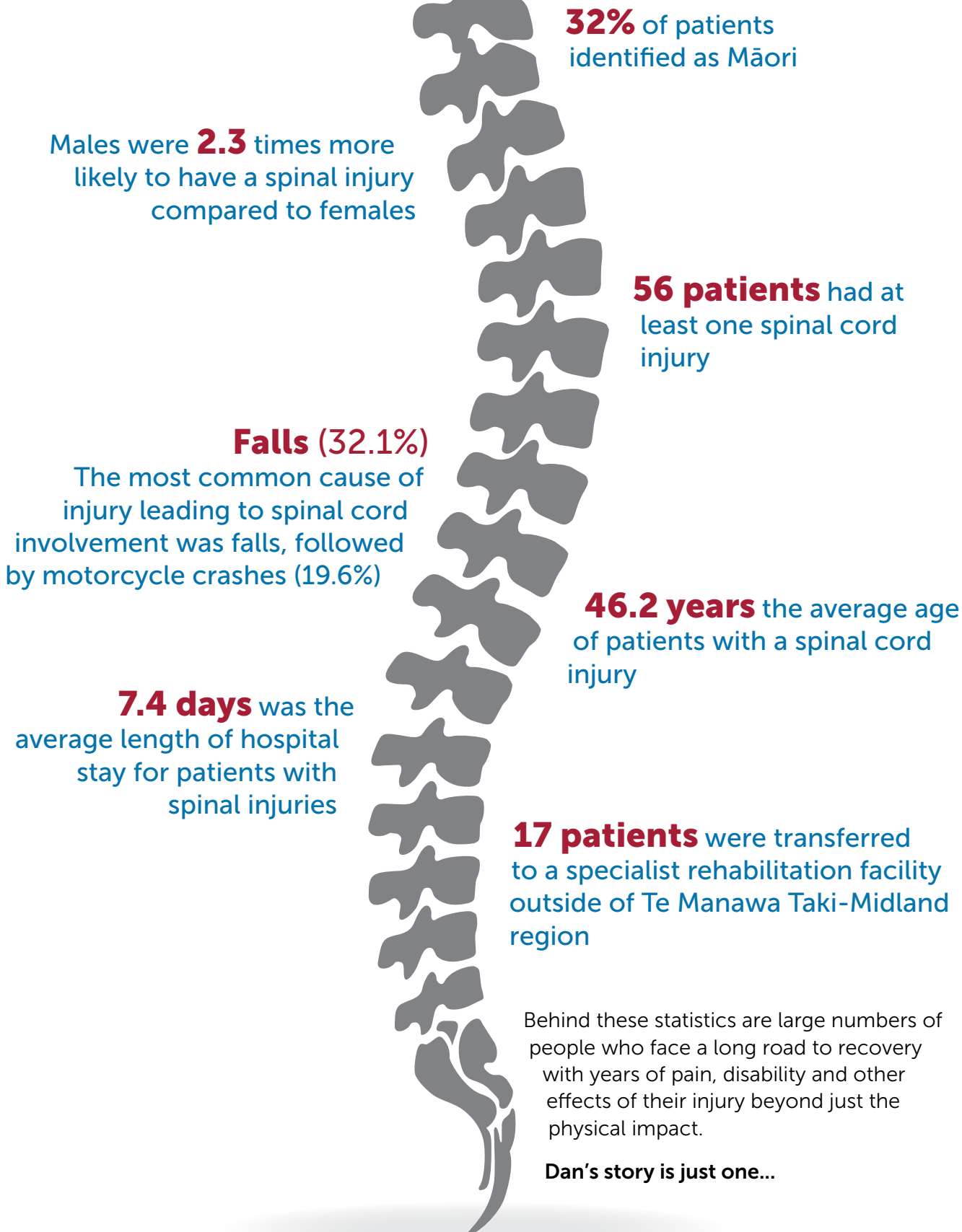
AIS injury diagnosis code	AIS Severity	Diagnoses, n	Patients, n
Lumbar fractures	2	208	101
Thoracic fractures	2	281	173
Cervical fractures	2	62	48

Table 4. Breakdown of spine injuries among spinal patients who did NOT have spinal cord involvement



621 trauma patients

were admitted to
Te Manawa Taki-Midland facilities
with spinal injuries during 2020



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Figure 21. Spinal injuries in Te Manawa Taki-Midland admitted patients 2020

Dan's story

A patient/whānau experience of spinal injury

Kia ora, we are a family of four from Whāingaroa/Raglan. Dan, Briar and our two children, Pania and Taika.

The following is an account of an injury sustained by Dan early in 2020 and his recovery, hastened by the treatment at Waikato Hospital, and the Waikato Rehabilitation Centre.

In late February 2020, Dan broke his back.

He was riding slowly on a friend's motorcross bike when he accidentally pulled the throttle down. This caused the bike to throw him backwards, where he landed awkwardly, smashing his T12 vertebrae and crushing his spinal cord.

Dan underwent a six-hour surgery to repair his spinal column and in the days, and weeks following the accident, the level of recovery that he would regain was uncertain.

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Immediately following the accident Dan had no movement in either of his legs or feet and only partial feeling. After the surgery he could only move his big toe on his right foot. But this gave him huge hope.

With help from the team of health professionals at the hospital he was able to stand with a frame only three days after surgery.

While this was hugely encouraging there were still some concerns, and the doctors discussed transferring him to the spinal unit in Auckland in order to have more specialised care.

While this was something that of course we would have done if necessary, we were worried about this in terms of our family's wellbeing, and whether/how we would be able to support him if he was further away.

Fortunately, a space became available at the rehabilitation centre directly across the road from the hospital and it was decided that he would go there following two weeks in the hospital.

With more rest and privacy, Dan was able to focus on his rehabilitation and he was discharged from the rehab centre to come home after another two weeks.

Rehabilitating locally was absolutely the best thing for Dan, and for our community of family, friends and work colleagues as we were all able to visit him regularly. This was a huge factor in his recovery, keeping him busy and positive.

We believe this would have been much harder if he had been in Auckland, isolated from his family, and his community. The stress and financial strain would also have been more significant.

Our children (who were six and eight at the time) were devastated by the accident and him being in hospital. Being able to see him take steps towards recovery was so important for them. They were able to bring him things (we even took our dog in one day!) and have cuddles and laughs together regularly.

We absolutely believe that the care that Dan received from everyone involved in his recovery, and the ease with which we were able to visit him, were huge factors in his recovery.

Dan being able to stay in Hamilton was really significant and we will always be grateful for this.

He came home one week before NZ went into level 4 lockdown and was able to continue his rehabilitation quietly at home. He is still doing really well and continues to make progress in his recovery.

From Dan

Having a positive mindset is a key factor in recovery. Dealing with the uncertainty of the long-term outcomes and short-term discomfort did take a lot of emotional and physical energy.

Having family there during the early stages of rehab to share and delight in the small wins was awesome for me. Having family to share in the hard times was also very helpful. Having your family come to see you also keeps it clear what you are focused on getting well for.

Briar, Pania, Taika, Mum, Dad, whānau and friends' visits to see me while in hospital were the highlight of each day. Something to look forward to. Their visits provided the impetus to keep going, to stay focussed and to provide motivation for the next milestone in the recovery, be it; rehab exercises, more steps with the walker or the ability to perform a new daily task.

I am thankful that I was able to rehab in Waikato. It meant I was closer to home and my network. The care that I got was first class. I was very motivated to get well. Having my loved ones around made all the difference and still does.



Outcomes

Mortality

During 2020, 58 trauma patients died while in Te Manawa Taki-Midland facilities, 42 were major trauma and 16 non-major trauma patients. Of the total 58 deaths, 11 were due to medical causes (e.g. example pneumonia) rather than as a result of their injuries leaving 47 patients (35 major, 12 non-major) who died due to their injuries (figure 22).

Of these 47 patients 32 died from Central Nervous System (CNS) injury (68.9%), 10 by exsanguination (20%) and 5 from multi organ failure.

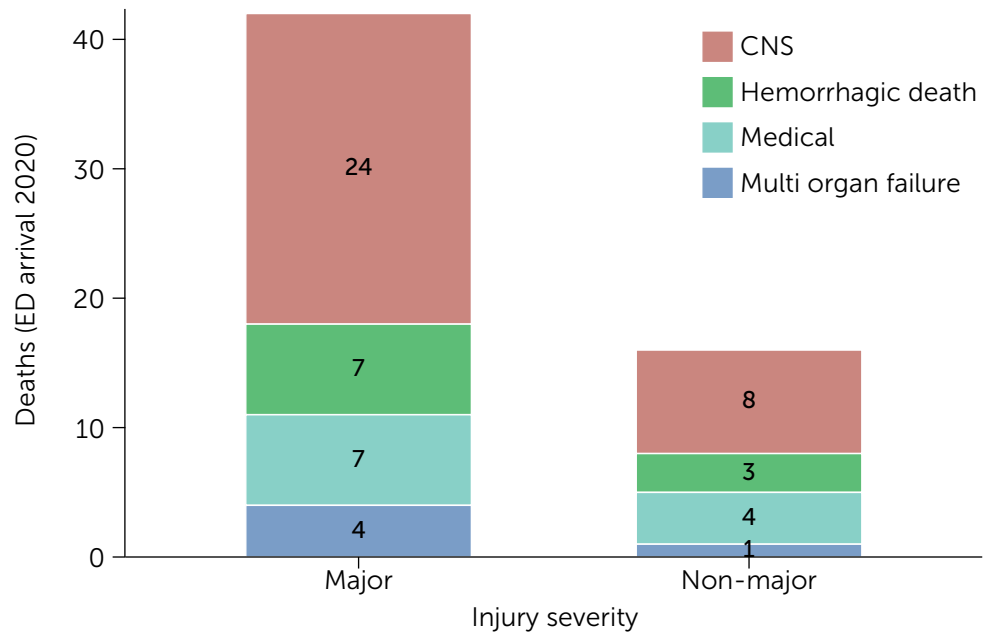


Figure 22. Cause of death among trauma patients while in Te Manawa Taki-Midland facilities (CNS – Central Nervous System injury)

Case Fatality Rate (CFR)

The case fatality rate (CFR) is the percentage of patients admitted due to trauma who died as a result of their injuries. During 2020, the CFR for all patients while admitted to Te Manawa Taki-Midland facilities was 0.71%, well below the international best practice target of 1% (Table 4). Among major trauma patients who died of non-medical causes, the CFR was 5.78%, also well below the international best practice target of 10% (figure 23). This is an encouraging trend that reflects general improvements in care across the region.

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	Major and non-major	Major trauma (ISS > 12)	Non-major trauma (ISS < 13)
Events (n)	6624	605	6019
Non-medical Death (n)	47	35	12
CFR (%)	0.71%	5.78%	0.19%

Table 5. Case fatality rate 2020 by severity (excludes 11 deaths due to medical causes)

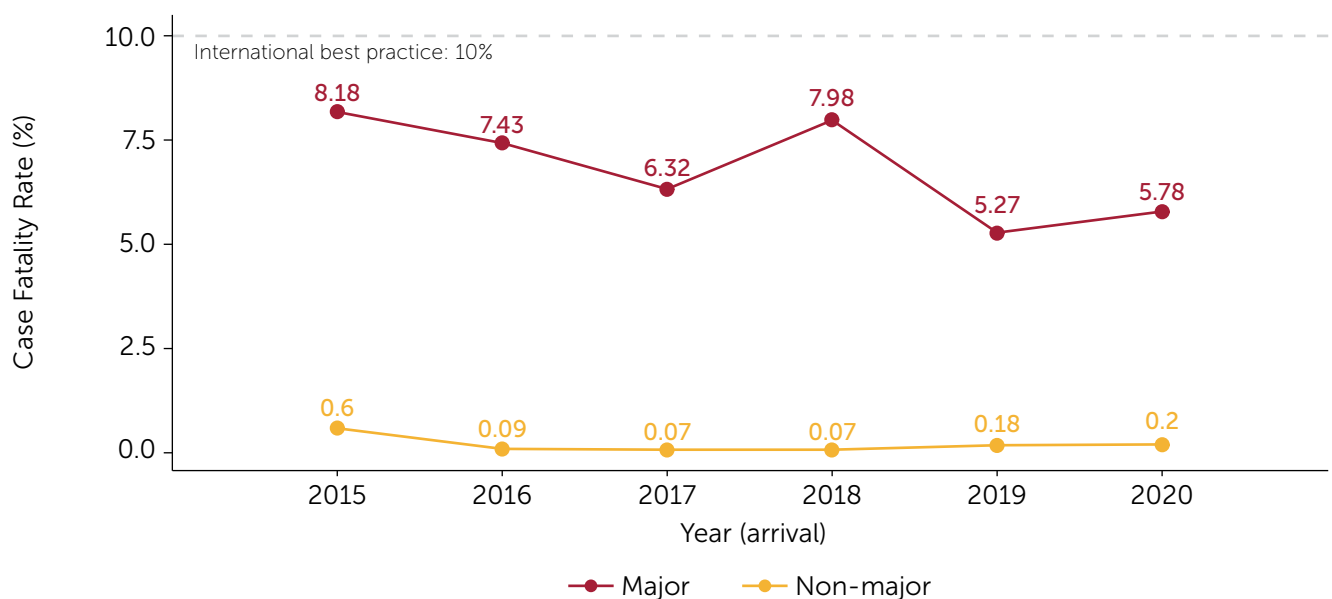


Figure 23. Annual case fatality rate (CFR, %) 2015-2020 by severity

Highest death rates were seen in over-65 years, penetrating injury, intentional self-harm and pedestrian.

		Died	Survived	Total	CFR %
Total		35	563	598	5.8
Gender	Female	9	160	169	5.3
	Male	26	403	429	6.1
Ethnicity	Māori	8	186	194	4.1
	Non-Māori	27	377	404	6.7
Lifestage (years)	0-14	1	30	31	3.2
	15-64	19	425	444	4.3
	65+	15	108	123	12.2
Primary injury type	Blunt	31	541	572	5.4
	Penetrating	4	16	20	20.0
	Burn	-	6	6	0.0
Cause of injury	Road traffic crash	11	157	168	6.5
	Fall	7	116	123	5.7
	Intentional self-harm	4	10	14	28.6
	Pedestrian	4	21	25	16.0
	Assault	3	45	48	6.3
	Motorcycle	3	87	90	3.3
	Other	3	127	130	2.3

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Table 6. CFR among major trauma (ISS > 12) patients by demography and cause of injury (excludes 7 medical deaths, excludes any deaths following transfer out of region)

During 2020, 89% of all trauma patients, and 66% of major trauma patients, admitted to Te Manawa Taki-Midland facilities were discharged home at the end of their stay. (table 7). Only 12.6% of major trauma patients were discharged to rehabilitation facilities.

Te Manawa Taki-Midland final discharge disposition	Major trauma (ISS > 12) events (col %)	Non-major trauma (ISS < 13) events (col %)	Total events (col %)
Home	369 (65.5)	5460 (90.9)	5830 (88.8)
Rehabilitation	71 (12.6)	110 (1.8)	181 (2.8)
Hospital for convalescence	32 (5.7)	99 (1.6)	131 (1.9)
Residential aged care*	10 (1.8)	104 (1.7)	114 (1.7)
Other**	31 (5.5)	77 (1.3)	108 (1.6)
Left against medical advice	13 (2.3)	92 (1.5)	105 (1.6)
Other acute care facility	33 (5.9)	45 (<1)	78 (1.2)
Special accommodation	2 (<1)	15 (<1)	17 (<1)
International medical facility	2 (<1)	-	2 (<1)
Total	563 (100)	6003 (100)	6566 (100)

Table 7. Final discharge disposition (where survived – 6624 events, 58 died = 6566) patients admitted 2020

*Not normally resident, **Includes prison

Cost of trauma

The annual total cost of trauma admissions across Te Manawa Taki-Midland region DHBs continues to climb. During 2020, the cost of trauma admissions is estimated to have been NZ\$63.9 million, an increase of 7.2% on the previous year.

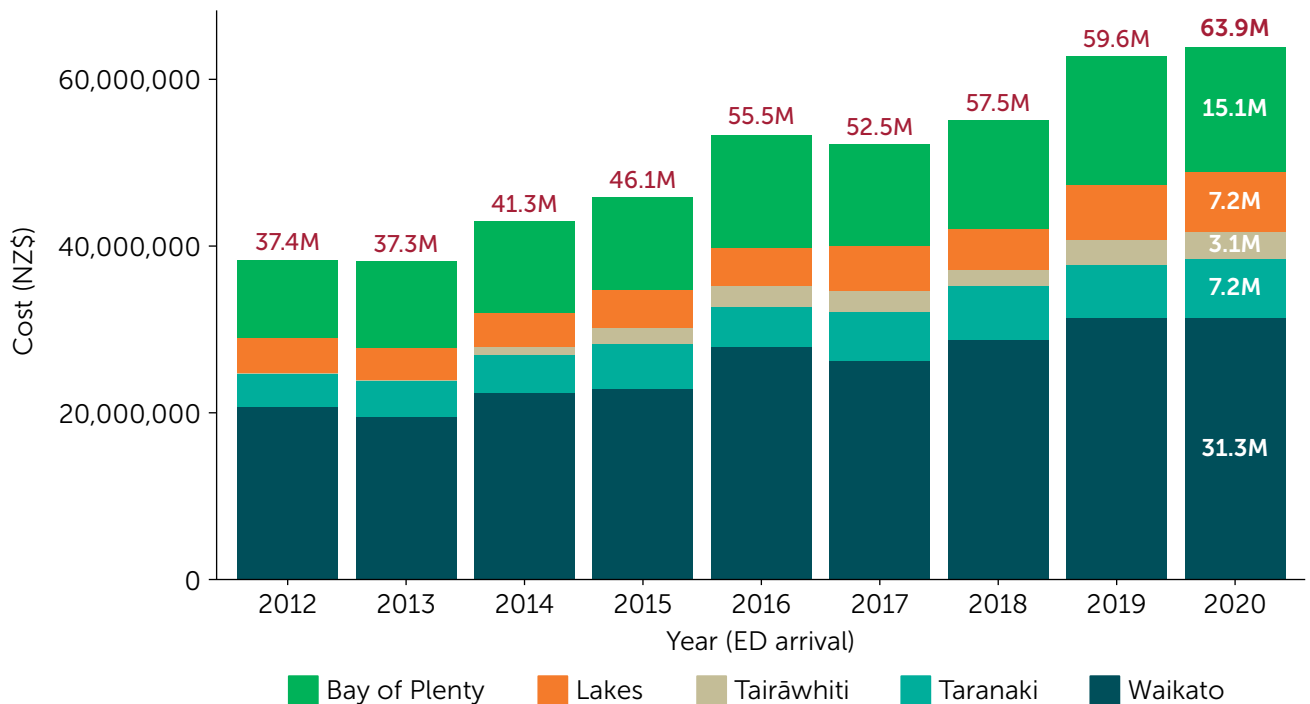


Figure 24. Annual cost of inpatient costs of trauma by DHB (cost values based on ~95% admissions costed)

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During 2020, 37% (NZ\$23.7 million) of total in-hospital trauma costs were attributable to falls related injuries, followed by RTC 16.2% (NZ\$10.4 million). Among major trauma admissions, RTC accounted for NZ\$6.2 million (9.7% of total cost), while among non-major trauma, admissions due to falls cost NZ\$21.4 million alone.

During 2020, major trauma cost NZ\$16.2 million (25.4%) and non-major cost NZ\$47.7 million (74.6%). This is an increase of 9.3% and reduction of 0.4% respectively (figure 25).

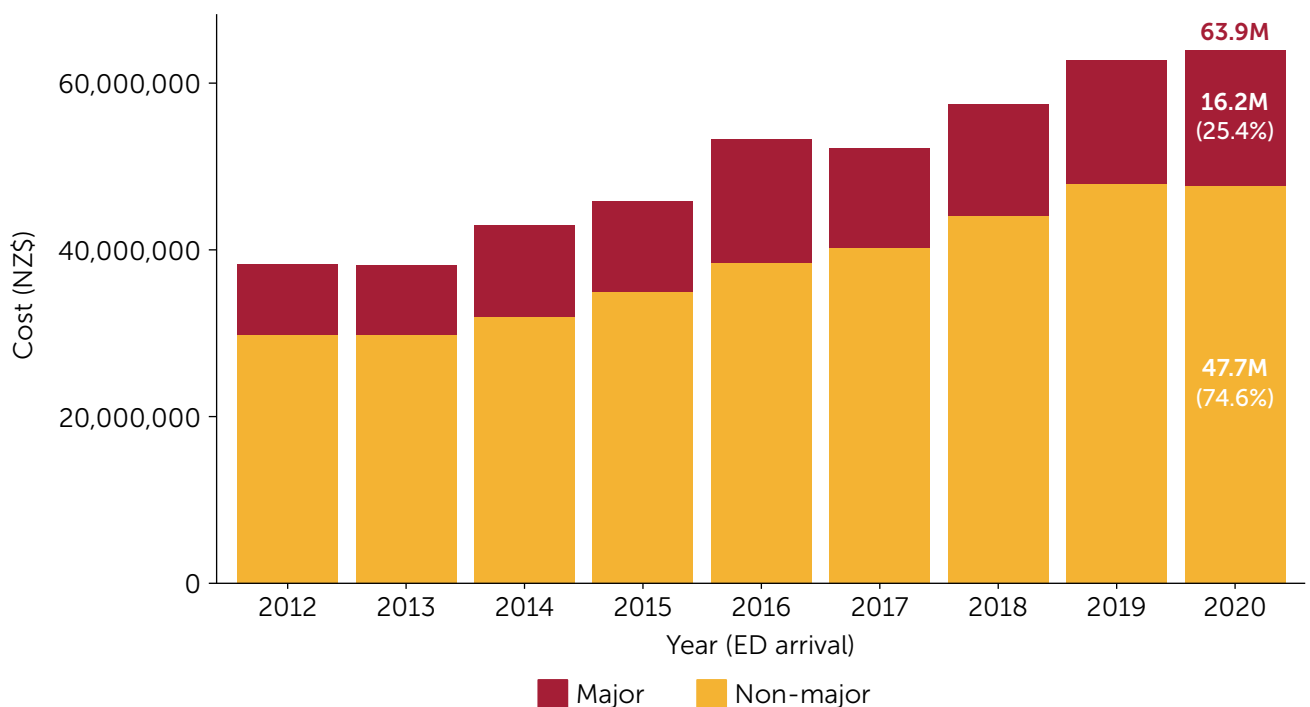


Figure 25. Annual cost of inpatient costs of trauma by DHB (cost values based on ~95% admissions costed)

The median inpatient facility costs while in Te Manawa Taki-Midland facilities was \$14,239 for major trauma patients and \$6114 for non-major trauma patients.



Achievements



Equity focus: Collaboration with Ngā Toka Hauora Māori and the development of Te Manawa Taki Taskforce

Our focus on reducing inequities has resulted in support from Ko te Kāwanatanga o Te Manawa Taki (Te Manawa Taki governance group) and Ūpoko Kaimahi (Te Manawa Taki chief executives). Work began with Ngā Toka Hauora Māori to begin addressing the significant inequities affecting Māori in our region and we look forward to the partnership and collaborative projects as plans develop.



Loop closure and trauma quality assessment report

Loop closure is a key component for any trauma performance improvement and patient safety programme. It involves definition of problem and adjustments of systems and processes to prevent further occurrences. Te Manawa Taki-Midland Trauma System database allows for tracking and trending of types of issues encountered, and can measure the responses to intervention. In 2020, Te Manawa Taki-Midland Trauma System TQIP established quarterly reporting of collated trauma registry information to assist with problem identification, action planning and loop closure. Items of this report include process indicators, matrix breaches, mortality in the non-major group as well as trauma registry quality assurance activity. These will be tested and further developed over the next few years.



Delivering high quality trauma care throughout COVID-19 lockdowns

Te Manawa Taki-Midland Trauma System supported the DHBs responses to COVID-19 lockdown by developing a plan based on the referral matrices with extra requirements to streamline transfer of vulnerable patients and prevent unnecessary utilisation of ICU beds. A study conducted during lockdown revealed variation in trauma volumes and type that allow hospitals to plan for future lockdowns.



Trauma team training

To optimise care and outcomes for trauma patients and their whānau it is imperative that all aspects of the system work efficiently, effectively and systematically. Trauma teams often do not work together on a day-to-day basis but are expected to function effectively under high-stress conditions. To improve communication and processes of care Te Manawa Taki-Midland DHBs run their own simulation programmes to practice these scenarios and look for any process improvements on a regular basis. This year the National NetworkZ sessions delivered by the University of Auckland were included as part of these programmes. Due to COVID-19 restrictions not all courses were able to be delivered in 2020, these have been rescheduled for early 2021. A trauma call simulation course for clinical trauma personnel has been developed at Waikato DHB and will be available to Te Manawa Taki-Midland trauma staff as the course grows.



Standardised trauma reception processes

Te Manawa Taki-Midland Trauma System staff worked with local clinical champions to develop guidelines, protocols and training to get time critical patients quickly into the environment such as theaters or ICU where care can be delivered immediately. This is embedded in the regional trauma guidelines and subject to audit in the TQIP.



Regional case reviews

Te Manawa Taki-Midland Trauma System continues to strengthen service delivery and support consistency in trauma management; notably the establishment of trauma services, the regional guidelines, pre hospital and inter-hospital transfer matrices. In 2020, a programme of regional case reviews was commenced designed to stimulate discussion, test our responses to challenging patients and reveal opportunities for improvement. These are anonymised, interactive regional case discussions inclusive of all phases of care including prehospital, admission and inter-facility transfer and have been well attended by clinicians directly involved in trauma care including external agencies such as St John and FENZ.

"Being involved with consumer engagement projects such as the Patient Diary and Transition from Critical Care to the Ward has been really rewarding as we are improving our trauma patient and their families experience in a measured and focused way." – Bronwyn Denize, Trauma CNS, Waikato DHB

"It's nice to be able to improve patient experience. Recently I reviewed a ward patient in significant pain. After arranging a referral to the pain team, the patient and their family were incredibly thankful and appreciative of my involvement." – Carolyn Duncum, Trauma CNS, Lakes DHB



Regional data collection and injury audit

Continuous high quality data is the key element of a trauma system. Injury scoring is essential to trauma registries as it provides measurable information to enable benchmarking, informing decisions, protocol creation, injury prevention and report building. It is therefore vital to have confidence in our data collection and coding practices.

Te Manawa Taki-Midland Trauma System conducted a regional wide audit of data collection and injury coding practices. The outcome from this audit confirmed staff were complying with international standards and injury coding was at a high standard.

Recommendations from the audit were:

- Identify an escalation pathway for complex coding within DHBs
- Complete double coding of major trauma patients when transferred between facilities
- Attend regular AIS refresher course
- Continue to participate in Te Manawa Taki-Midland Trauma System and National Major Trauma Clinical Network's coding consistency exercises.



HQSC Quality Improvement Facilitators (QIF) course participation

Trauma QIF was delivered to 11 participants nationally four of which came from Te Manawa Taki-Midland DHBs. This course was delivered by Ko Awatea in collaboration with HQSC and participating DHBs. Participants learnt about quality improvement methodologies and how to implement them using local trauma quality improvement projects as the vehicle.

The four projects that benefitted were:

- Improving the major trauma patient and whānau experience – transitioning between clinical areas at Waikato Hospital
- Trauma Reach clinic development
- Development of a safety net plan to assist patients manage their adverse outcomes reported within the Trauma Reach Clinic
- Trauma community transition-reduce the number of readmissions and improve satisfaction with transition for Māori men aged 18-40.

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HEALTH QUALITY & SAFETY
COMMISSION NEW ZEALAND
Kupu Taurangi Hauora o Aotearoa



Road to Zero for the Waikato region

Our region has some of the worst road crash statistics in the country. In 2019 78 people were killed and 359 were seriously injured on the roads in the Waikato region alone. This level of trauma is significantly higher than what the region might expect based on our population numbers. Te Manawa Taki-Midland Trauma System staff were part of the Transport Safety Strategy Project Steering Group, working on behalf of the Regional Transport Committee to develop the Waikato Road to Zero Strategic Direction for 2020-2030. Road safety is a direct outcome of transport policies, practices and land use planning. It is impacted by many other processes requiring integration across portfolios. For the full plan view www.waikatoregion.govt.nz/assets/WRC/WRC-2019/6698-Road-to-Zero-for-the-Waikato-2020.pdf



Published articles

Articles involving Te Manawa Taki-Midland Trauma System

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