

Annual Report 2023/24

New Zealand Trauma Registry & Trauma National Clinical Network

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Our tohu

Designed by artist Jim Wiki (Te Aupōuri), the tohu for the National Trauma Network is the pīwakawaka (fantail). The pīwakawaka symbolises the guardian who stays with us during care and rehabilitation and guides our patients and whānau through the spectrum of life and death. The main kōwhaiwhai in the body depicts the strength a person needs in dealing with injury, and the wings convey the support of whānau. The two koru at the base of the tail feathers symbolise the joining of whānau and services. The weaving pattern in the middle tail feathers depicts the strength in binding together all parts of whānau and the trauma system.

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Waerea te ara

Mānawatia te kāhui o nga atua Tāwhiwhi atu ki a Rongo, E Rongo! Whaowhia tēnei huinga, I ngā hua o te whakaaro nui ngā hua o te whakaaro rangatira, Kauparea atu ngā ātetenga kia horahia, he ngākau pai, E rarau ki te tapuwae nui o Tāne Tāne-i-te-wānanga Tāne-nui-a-rangi, Kia whakamau ai ki a tina **Hui e, tāiki e**

Clear the pathway

Give thanks to ancestral forces Commune with Rongo, Rongo! Inspire this hui with The benefits of wisdom The benefits of chiefly ideals, Clear away resistance Extend transparency, Pursue the great pathway of Tāne Tāne source of scholarly pursuits Tāne source of higher knowledge, Fasten it firmly **Strengthened in unity!**

Rongo is the god of cultivation and peacemaking in Māori mythology. Tāne, his brother, is god of the forest and birds. He is also known as Tāne-i-te-wānanga, Tāne source of higher knowledge.

Foreword

Tēnā koutou katoa

We are proud to present the national trauma annual report covering the period 1 July 2023 to 30 June 2024. This is the inaugural report of the Trauma National Clinical Network since Health New Zealand | Te Whatu Ora assumed leadership of the network and marks a significant milestone in the journey to enhance trauma care across Aotearoa New Zealand.

First, we acknowledge the whakapapa of the network and the outstanding contributions of the previous Trauma Network and its leadership, particularly Professor Ian Civil and Siobhan Isles. Their vision, commitment and expertise laid the foundation that we now build upon – a foundation rooted in collaboration, excellence and a relentless focus on improving outcomes for trauma patients and their whānau.

The Trauma National Clinical Network was established to develop a leading networked trauma system in Aotearoa New Zealand. We are committed to delivering high-quality patient-centred services that align with best practice and improve health and social outcomes for patients and their whānau. This mission is at the heart of everything we do, and this report highlights our early progress in realising this vision.

We have established rōpū rangatira, or leadership groups, that align with five key pillars of trauma care:

- **Injury prevention**: Reducing the incidence of trauma through targeted interventions.
- Acute care and out of hospital: Ensuring timely, equitable and effective responses to acute trauma.
- **Rehabilitation and transitions of care**: Supporting patients and whānau through recovery and reintegration into daily life.
- New Zealand Trauma Registry, data and insights: Harnessing the power of data to inform practice, monitor outcomes and guide innovation.
- **Trauma quality improvement**: Driving best practice and consistency through a focus on improving quality and developing standards of care.

As we reflect on the past year, we acknowledge the immense work undertaken by our team and are energised by the momentum that is building. This progress would not have been possible without the support of our partners in the Accident Compensation Corporation (ACC), Health NZ, and Te Tāhū Hauora Health Quality & Safety Commission, alongside our other stakeholders and the dedicated trauma care clinicians whose commitment and collaboration have been instrumental in advancing trauma care across the country.

Thank you for your dedication, passion and belief in the importance of this work. We look forward to continuing to build a trauma system that delivers better outcomes for all New Zealanders.



Dr James Moore FANZCA FCICM Rangitāne, Ngāti Kahungunu, Whānau-ā-Apanui National Trauma Co-Lead



Dr Max Raos FACEM Te Ātiawa National Trauma Co-Lead

Executive summary

An effective trauma system ensures high-quality care in times of need and is a cornerstone of the healthcare system in Aotearoa New Zealand. By providing the best care in the most efficient way, a well-functioning trauma system improves health outcomes for patients with major trauma and their whānau. It also improves health and social outcomes for all New Zealanders and supports the delivery of our health targets by minimising the impact of major trauma events on emergency departments (EDs).

The incidence of trauma is stable nationally but differs between regions

In 2023/24, a total of 2,661 New Zealanders were admitted to hospital with major trauma. Both the absolute number of cases and the population incidence (50 per 100,000) have remained relatively stable each year.

The population incidence does vary between regions: the Northern region has the lowest incident rate at 41.9 per 100,000 people, and Te Waipounamu has the highest rate at 61.6 per 100,000. Central and Te Manawa Taki regions have rates of 43.1 per 100,000 and 58 per 100,000, respectively.

Causes of trauma

Transport-related injuries are the predominant major trauma in all regions across Aotearoa New Zealand. Major trauma from motorcycle crashes is disproportionately high compared with the number of motorcycles on the road.

Almost one-third of all major trauma is caused by falls, and the rate of penetrating trauma remains low by international standards, at 3 per cent.

Different population groups have different rates of trauma

Males account for 70 per cent of major trauma cases, consistent with previous years. The incidence of major trauma in people aged over 65 years continues to increase but is still lower than that for people aged 15-44 years and 45-64 years.

Māori, particularly young Māori, experience disproportionately high rates of major trauma compared with the rest of the population: the rates of major trauma for Māori people aged 15-44 years are more than 50 per cent higher than for the rest of the population.

Rates of major trauma for people living in rural areas remain persistently higher (approximately 30 per cent higher in 2023/24) than for those living in urban areas.

Key outcome metrics show mixed success

Nationally, the proportion of patients transported directly to the definitive care hospital has remained roughly the same each year.

Time from incident to arrival at definitive care for those transported direct from the scene has remained largely unchanged. This is an important metric, and a shorter time from injury to hospital is associated with improved patient outcomes. We intend to work with regional trauma networks and prehospital providers to implement auditing, monitoring and quality assurance around this metric.

The numbers of people receiving tertiary surveys to identify injuries that may not have been evident on initial arrival in hospital have improved each year across regions.

The proportion of patients who have a trauma call activated on arrival in the ED has remained static over the last five years.

Shorter stays in the ED is a Health NZ priority. In general, more time in the ED is associated with worsening outcomes for all patients in the ED. Mean ED length of stay at their definitive care facility for patients with major trauma has progressively increased over the last six years but has risen significantly recently, particularly in the Central and Northern regions, where mean length of stay in the ED was 8 hours.

Case fatality rate is at its lowest since the inception of the NZ Trauma System

This year, 172 New Zealanders died from major trauma, with a case fatality rate of 6.5 per cent, the lowest rate achieved in the NZ Trauma System since its inception. This has decreased each year across all age groups, with a notable reduction in mortality in recent years for those aged 65-79 years.

The last three years have also shown statistically significant reductions in actual mortality compared with expected.

The network sees 'survivorship' – quality of life after surviving major trauma – as a key focus for the future.

Rōpū rangatira

The Trauma National Clinical Network has established several work programmes with a whole-of-system perspective:

- injury prevention
- acute care and out of hospital
- rehabilitation and transitions of care
- NZ Trauma Registry, data and insights
- trauma quality improvement.

Workforce

The NetworkZ trauma simulation-based programme has trained over 200 clinicians in most of the largest and smallest EDs in 2023/24. Funding to support this national programme was provided through the Community Road Safety Fund, which is administered by the NZ Transport Agency Waka Kotahi, recognising its role in reducing the impact of road trauma in Aotearoa New Zealand.

Delivering multidisciplinary simulation-based team training in the ED setting addresses knowledge gaps and provides skills and tools. It has also enabled staff to identify and address quality and safety concerns and has provided equitable training opportunities for smaller trauma environments and transfer sites.

2023/24 at a glance



Myles' story

A collaborative effort across the trauma system

Recovering from catastrophic injuries sustained in a fall from a pylon in October 2023 required teamwork, advanced technology and perseverance for Palmerston North telecommunications technician Myles Dyeming.

Myles was performing routine maintenance on a telecommunications tower near Whanganui when he fell and suffered complex and life-threatening injuries. He was initially transported by rescue helicopter to Whanganui Hospital, where he received immediate resuscitation and stabilisation. Given the severity of his condition, he was transferred to Wellington Hospital for tertiary care via the Life Flight Air Ambulance, accompanied by a Health NZ intensive care unit retrieval team.

The transfer was challenging; Myles experienced a drop in blood pressure midflight that required ongoing blood transfusions. Thanks to the coordinated efforts of the retrieval team, he arrived safely at Wellington Hospital, where a multidisciplinary team was prepared to provide urgent care.

On arrival, Myles was taken straight to the operating theatre. A team of surgeons, anaesthetists and nurses worked to address his injuries, which included a punctured lung, a tear in the inferior vena cava (the main vein leading to the heart), liver trauma, multiple rib and sternal fractures, an aortic tear and spinal fractures.

After six days, Myles was woken and extubated, marking a key step in his recovery. He spent 11 days in the Wellington intensive care unit before being transferred to Palmerston North, his regional trauma centre, for ongoing care and rehabilitation.



Two weeks into his rehabilitation, Myles experienced significant leg swelling and pain. Investigations revealed extensive blood clots in the veins of his legs and lower abdomen. When traditional blood-thinning treatments did not resolve the clots, the team at Wellington Hospital opted for a new approach using a catheter-based clot retrieval device in the interventional radiology laboratory.

"This latest device enables us to safely remove clots, even those slightly older, which traditionally wasn't possible," explained Dr Shueh Hao Lim, Interventional Radiologist at Wellington Regional Hospital. "For Myles, we used arm access to deploy the protection device, rather than the more common neck approach, due to the constraints posed by his spinal brace."

The procedure was successful, and two days later, Myles was able to complete a 7 km walk. "I'm so happy I've got my quality of life back and that I'm here to tell my story," he said.

Myles credits his recovery to the care he received from trauma clinicians across the country. From the ambulance and local hospital teams to the retrieval service, tertiary specialists and rehabilitation staff, his story highlights the strength of Aotearoa New Zealand's trauma system and the importance of collaboration in achieving positive outcomes for patients with complex injuries. Part I: New Zealand Trauma Registry Report

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Patterns of injury

In 2023/24, a total of 2,661 New Zealanders were admitted to hospital with major trauma (defined as an Injury Severity Score [ISS] of >12). Both the absolute number of cases and the population incidence (50 per 100,000 people) have remained relatively stable year on year (Figures 1 and 2).

Region rates

Figure 1: Incidence rate (caseload) of major trauma by region, 2023/24





Figure 2: Major trauma incidence rate and 95% confidence interval (CI) per 100,000 people by region, 2018/19–2023/24

Mechanism of injury

The number of transport-related injuries remained stable at 1,340 (Table 1) compared with 1,347 in 2022/23 after increasing from 2021 to 2023. Transport-related injuries remained the leading cause of major trauma in Aotearoa New Zealand, accounting for 50 per cent of all cases; this was followed by falls, at 32 per cent, and "struck by/collision with person or object" at 8 per cent. Most transport-related cases resulted from car crashes, which accounted for 20 per cent of all major trauma admissions. It is important for the network to continue to advocate in the injury prevention space regarding our leading causes of major trauma.

Table 1: Number (per cent) of major trauma cases by mechanism of injury, by region, 2023/24

Mechanism	Northern	Te Manawa Taki	Central	Te Waipounamu	National
Fall	287 (34)	161 (26)	143 (33)	273 (35)	864 (32)
Struck by/collision with person or object	76 (9)	44 (7)	41 (10)	43 (6)	204 (8)
Other	88 (10)	56 (9)	32 (7)	77 (10)	253 (10)
All transport	392 (47)	356 (58)	215 (50)	377 (49)	1,340 (50)
Car	171 (20)	156 (25)	73 (17)	144 (19)	544 (20)
Motorcycle	104 (12)	99 (16)	63 (15)	80 (10)	346 (13)
Pedalcycle	55 (7)	49 (8)	36 (8)	88 (11)	228 (9)
Pedestrian	48 (6)	29 (5)	22 (5)	36 (5)	135 (5)
Quad bike/other	14 (2)	23 (4)	21 (5)	29 (4)	87 (3)



Key points

- Transport-related injuries are the predominant cause of major trauma in Aotearoa New Zealand.
- Major trauma from motorcycle accidents is disproportionately high given the proportion of motorcycles on the road.
- Almost one-third of all major trauma is caused by falls.

Case mix

Sex distribution for major trauma was unchanged from previous years, with males accounting for 70 per cent of cases (Table 2).

In terms of injury intent, 89 per cent of cases were unintentional, 7 per cent were inflicted by another person, and 2 per cent were self-inflicted, all of which were relatively similar to numbers from previous years. The rate of penetrating trauma remains low by international standards, at 3 per cent. The distribution of ISS scores was also unchanged from previous reports.

Table 2: Major trauma incidents by sex, injury intent, type of injury and Injury Severity Score, 2023/24

Characteristic	Number (%)
Sex	
Male	1,872 (70)
Female	784 (30)
Injury intent	
Unintentional	2,375 (89)
By other	188 (7)
Self-inflicted	44 (2)
Not known	54 (2)
Dominant injury type	
Blunt	2,564 (96)
Penetrating	74 (3)
Burns	16 (1)
Unknown	7 (0)
Injury severity score	
13–24	1,989 (75)
25-44	623 (23)
45+	49 (2)

Age

Major trauma in people aged over 65 years has been increasing since 2018. Although the population in general is ageing, several possible explanations exist for this trend, including a more active ageing population, people spending longer in the workforce and more awareness and visibility of the issue of trauma in older adults.



Figure 3: Annual major trauma caseload by age group, 2018/19-2023/24

Ethnicity

Māori, particularly young Māori, continue to be disproportionately affected by major trauma.

Māori aged 15-44 years experience more than 100 per cent higher rates of major trauma than the rest of the population.

As a network, we are committed to understanding the factors contributing to this disparity and, more broadly, how we can provide a culturally safe experience for Māori who experience major trauma.



Figure 4: Annual major trauma incidence rate and 95% confidence interval (CI) per 100,000 people by age group and ethnicity, 2018/19–2023/24

Age-standardised rates

Age-standardised rates of trauma for all ethnicities have remained stable over the last six years. Both wāhine Māori and tāne Māori are over-represented in major trauma incidence; however, tāne Māori have the highest incidence of all sex and ethnic groups in Aotearoa New Zealand (Figure 5).



Figure 5: Age-standardised major trauma rates and 95% confidence interval (CI) per 100,000 people by ethnicity, 2018/19–2023/24



Figure 6: Age-standardised major trauma rates and 95% confidence interval (CI) per 100,000 people by sex and ethnicity, 2018/19–2023/24

For transport-related injuries, rates in Māori are dramatically higher than in the rest of the population. This represents an important potential focus for ongoing injury-prevention initiatives.



Figure 7: Age-standardised major trauma rates and 95% confidence interval (CI) per 100,000 people by sex, ethnicity and mechanism of injury, 2018/19–2023/24

Rurality

Although far fewer people live in rural areas than in urban settings, the incidence of major trauma is significantly greater for rural New Zealanders (Figure 8), a difference that has not changed over time.

Table 3: Caseload of major trauma by rurality, 2018/19–2023/24, number (per cent)

Rurality of domicile	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Rural	560	508	649	608	676	651
	(25)	(24)	(26)	(25)	(26)	(25)
Urban	1,721	1,594	1,883	1,795	1,914	1,932
	(75)	(76)	(74)	(75)	(74)	(75)



Rates over time

Figure 8: Annual major trauma incidence rate and 95% confidence interval (CI) per 100,000 people by rurality of domicile, 2018/19–2023/24

Rates by mechanism

The difference in rates of major trauma between rural and urban Aotearoa New Zealand is predominately driven by transport-related injuries. This represents an important target for future injury-prevention initiatives across government.



Figure 9: Major trauma incidence rate and 95% confidence interval (CI) per 100,000 people by rurality of domicile and mechanism of injury, 2018/19–2023/24

Rates by region

When rurality is considered by region, the highest rates of major trauma occur in the Northern region even though most of the general population of that area live in urban settings. This may represent an interplay between rurality and ethnicity, as a high proportion of Māori patients live in rural Northland.



Figure 10: Major trauma incidence rate and 95% confidence interval (CI) per 100,000 people by rurality of domicile and definitive care region, 2018/19–2023/24



Key points

- Māori experience disproportionately high rates of major trauma compared with the rest of the population.
- Rates of major trauma for people living in rural areas are approximately 30 per cent higher than for those living in urban areas.
- For both Māori and rural residents, this is predominately driven by higher rates of transport-related injuries.

Outcomes

This year, 172 New Zealanders died from major trauma, with a case fatality rate (CFR) of 6.5 per cent.

This represents the lowest CFR achieved in the Aotearoa New Zealand trauma system since its inception.

Although we cannot be complacent, the network considers 'survivorship', or quality of life following survival after major trauma, a key focus for the future.

Case fatality rate

Table 4: Case fatality rate, 2018/19–2023/24, number (per cent)

2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
204 (8.6)	159 (7.3)	210 (8.2)	184 (7.6)	221 (8.4)	172 (6.5)

In 2023/24, there was a reduction in mortality in those aged 65-79 years in recent years (Table 5). Further work is required to understand the reasons for this.

Table 5: Case fatality rate by age (years), 2018/19–2023/24, number (per cent)

Age (years)	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
0-14	8	7	8	15	≤5	≤5
	(5.6)	(6.2)	(5.5)	(11.5)	(≤3)	(≤3)
15-44	51	31	52	34	52	48
	(5.3)	(3.5)	(5.4)	(3.6)	(5.4)	(5.1)
45-64	43	43	41	30	44	22
	(6.5)	(6.4)	(5.6)	(4.5)	(6.1)	(3.1)
65-79	47	34	50	44	54	35
	(12.5)	(10.1)	(11.7)	(11)	(11)	(6.5)
80+	55	44	59	61	66	66
	(25.6)	(23.5)	(21.2)	(20.8)	(21.2)	(20.4)

Cause of death

Cause of death	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Haemorrhage	26	16	28	10	8	7
	(12.7)	(10.1)	(13.3)	(5.4)	(3.6)	(4.1)
Multiple organ	17	12	13	16	20	9
failure	(8.3)	(7.5)	(6.2)	(8.7)	(9)	(5.2)
Central nervous system	128 (62.7)	101 (63.5)	138 (65.7)	118 (64.1)	138 (62.4)	120 (69.8)
Medical	23	16	27	36	42	28
	(11.3)	(10.1)	(12.9)	(19.6)	(19)	(16.3)
Unknown	10	14	≤5	≤5	13	8
	(4.9)	(8.8)	(≤3)	(≤3)	(5.9)	(4.7)

Table 6: Number (per cent) of deaths by cause, 2018/19-2023/24

Haemorrhage remains a key priority for the network, as it is the primary cause of death that is potentially preventable with optimal care processes. The proportion of deaths due to haemorrhage continues to remain low since the critical bleeding quality improvement programme was instituted in 2020. The absolute number of deaths attributed to haemorrhage last year remains in single digits.

The proportion of deaths from central nervous system causes (e.g. severe traumatic brain injury [TBI]) has remained stable at 69.8 per cent (or 120 deaths).



Figure 11: Percentage of deaths by cause, 2018/19-2023/24

Risk-adjusted mortality

Standardised mortality ratio (SMR)

The SMR expresses the actual number of deaths as a ratio of the predicted mortality based on modelling. The expected mortality model adjusts for variables known to influence outcomes, including age, physiological markers of severity and anatomical injury. We continue to demonstrate a progressive improvement in the SMR, and the last three years have shown statistically significant reductions in actual mortality compared with expected.

Overall SMR



Figure 12: Standardised mortality ratio with 95% confidence intervals, 2015/16–2023/24

SMR by ethnicity and year

Considering SMR by ethnicity, there have been statistically significant reductions in major trauma mortality in both Māori and New Zealand European/other. Ongoing monitoring and work is required to ensure that these promising improvements in mortality are sustained over time.



Figure 13: Standardised mortality ratio by ethnicity with 95% confidence intervals, 2015/16–2023/24



• Ongoing work on outcomes in the future should include quality-of-life and functional outcomes based on trauma 'survivorship'.

Process of care

Ideally, patients are transferred from the scene of injury directly to the hospital that can provide definitive care. Many factors influence whether a patient can be transported directly to definitive care, including geography and distance, inclement weather or patient-related factors such as the need for emergent life-saving procedures and staged medical interventions. Therefore, some patients are initially transported to a nearby hospital and later transferred for definitive care.

Direct to definitive care

Nationally, over the last six years, the proportion of patients transported directly to the definitive care hospital has remained static. There is some variation across the country, with Te Manawa Taki transporting more directly to definitive care (83 per cent) than the Northern region (77 per cent). This may represent the split in tertiary services between Auckland City and Middlemore Hospitals.

Table 7: Percentage of patients who were directly transported to definitive care, 2018/19–2023/24

Region	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Northern	76	74	76	78	76	77
Te Manawa Taki	78	82	80	81	83	83
Central	82	78	81	84	78	82
Te Waipounamu	87	82	84	84	83	82
National	81	79	80	81	80	81

Time to definitive care

Since 2018/19, the time from incident to arrival at definitive care for patients transported direct from scene has remained largely unchanged. Shorter time from injury to arrival at hospital is an important metric that is associated with improved patient outcomes. We intend to work with regional trauma networks and prehospital providers to implement audit, monitoring and quality assurance around this metric.

The time taken to transport patients directly to definitive care has remained relatively static nationally in the last two years.

Region	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Northern	1.4	1.4	1.5	1.5	1.6	1.6
Te Manawa Taki	1.7	1.8	1.8	1.8	1.8	1.8
Central	1.4	1.5	1.6	1.7	1.5	1.7
Te Waipounamu	1.8	1.8	1.9	1.9	2.0	2.0
National	1.6	1.6	1.6	1.7	1.8	1.8

Table 8: Median hours from incident to arrival at definitive care for those transported direct from scene, 2018/19–2023/24

In 2023/24, the median time to transfer patients from the first receiving hospital to definitive care rose by over two hours since the prior year. Notably, the median transfer time rose in Te Manawa Taki (7.3-hour increase) and Central (4-hour increase) regions. We will engage with regional networks to understand the potential reasons for this. There are many possible reasons for delays in transfer, but delaying definitive care is associated with adverse patient outcomes. The network has established a work programme under the acute care rōpū rangatira to streamline transfers between hospitals for patients whose needs exceed those of the first receiving hospital.
Table 9: Median hours from incident to arrival at definitive care for those with a transfer, 2018/19–2023/24

Region	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Northern	9.8	11.4	11.2	10.5	11.3	11.4
Te Manawa Taki	8.6	9.0	8.5	10.7	10.3	17.6
Central	16.1	10.8	16.1	13.7	12.4	16.4
Te Waipounamu	16.0	19.1	13.8	11.2	15.7	15.2
National	11.1	12.2	12.0	11.2	12.0	14.2

Tertiary facility as definitive care

Tertiary trauma centres are designated by the network as specialised referral centres for management of patients with complex multisystem trauma. Whether patients are managed in a tertiary trauma hospital varies significantly across the country. For patients with major trauma, this ranges from 48 per cent in Central region to 81 per cent in Te Waipounamu. For patients with major multisystem trauma (defined as an Abbreviated Injury Scale of 3 or more, in two or more body systems), this variation remained, with access to tertiary care ranging from 62 per cent in Central region to 87 per cent in Northern region and Te Waipounamu. Table 10: Percentage of patients who received definitive care at a tertiary facility, 2018/19–2023/24

Region	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Northern	84	79	82	83	80	78
Te Manawa Taki	69	65	64	60	60	56
Central	51	49	51	49	52	48
Te Waipounamu	81	84	82	83	80	81
National	74	72	72	72	71	69

Table 11: Percentage of patients with major multisystem trauma who received definitive care at a tertiary facility, 2018/19–2023/24

Region	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Northern	88	77	90	84	87	87
Te Manawa Taki	81	81	74	72	71	67
Central	51	57	60	49	65	62
Te Waipounamu	83	91	93	88	83	87
National	79	78	81	76	79	78

Trauma call on arrival

Trauma calls describe an intervention on arrival in the emergency department (ED), with the activation of a specialised team of clinicians to provide initial assessment, management and stabilisation of an injured patient. Trauma call activation depends on recognition of the degree of patient injury and the perceived risk of deterioration. Some patients with major trauma will have injuries that are relatively stable and unlikely to deteriorate. Further, because the definition of major trauma is made retrospectively based on injury coding, this

may not be immediately obvious on presentation to the ED. Previous reports have shown a clear association between activation of a trauma call and more rapid access to imaging, such as computed tomography (CT) scans and interventions. The proportion of patients who have a trauma call activated has remained static over the last five years.

Region	2019/20	2020/21	2021/22	2022/23	2023/24
Northern	53	57	58	56	52
Te Manawa Taki	59	58	52	48	53
Central	47	55	54	56	58
Te Waipounamu	44	45	45	47	40
National	51	54	52	52	50

Table 12: Percentage of patients with a trauma call by region, 2019/20-2023/24

There is a difference between the size of the hospital and the likelihood of activation of a trauma call. Multiple factors influence this. This finding will be considered by the acute care ropū as part of its work.

Table 13: Percentage of patients with a trauma call by size of definitive care facility, 2019/20-2023/24

Size of facility	2019/20	2020/21	2021/22	2022/23	2023/24
Small	38	34	32	27	27
Medium	49	51	45	40	43
Tertiary	54	58	58	59	57

Factors associated with a higher likelihood of trauma call activation include transport-related trauma and transport by helicopter to the ED. Trauma related to a fall or being elderly was associated with a lower likelihood of trauma call activation. Again, the age and mechanism of injury are probably related, as trauma calls are less likely to be activated for a low-energy mechanism of injury, such as a low fall. Table 14: Percentage of patients with a trauma call by age, mechanism and mode of transport, 2023/24

Characteristic	Percentage
Age (years)	
0-14	55
15-44	64
45-64	54
65-79	36
80+	20
Mechanism	
Transport	66
Fall	25
Struck by/collision with person or object	40
Other	58
Mode of transport from scene	
Helicopter ambulance	79
Police/prison/fire vehicle	23
Private/public vehicle/taxi/walk-in	17
Road ambulance	53
Unknown	13

Tertiary survey

Tertiary surveys are undertaken in the first few days after admission to identify injuries that may not have been evident or identified on initial arrival in hospital. This means any newly identified injuries can be appropriately managed and any required rehabilitation or follow-up care can be provided.

Since the collection of tertiary survey data began in 2019/20, the completion rates have improved each year across regions. In 2023/24, Central region showed the largest improvement (an increase of 11 per cent) since the previous year.

Region	2019/20	2020/21	2021/22	2022/23	2023/24
Northern	29	50	57	58	63
Te Manawa Taki	46	53	50	56	62
Central	26	43	54	61	72
Te Waipounamu	39	52	62	60	59
National	35	50	56	59	63

Table 15: Percentage of patients with a tertiary survey by region, 2019/20–2023/24

The proportion of tertiary surveys completed continues to increase in medium and tertiary hospitals; however, rates in smaller hospitals have plateaued in the last two years.

Table 16: Percentage of patients with a tertiary survey by size of definitive care facility, 2019/20–2023/24

Size of facility	2019/20	2020/21	2021/22	2022/23	2023/24
Small	11	36	37	54	51
Medium	22	55	65	69	77
Tertiary	42	52	57	58	63

Factors associated with a higher likelihood of a tertiary survey being completed include transportation-related injury and arrival to hospital by helicopter. Conversely, elderly patients and falls-related injuries were associated with a lower likelihood of tertiary survey completion.

Table 17: Percentage of patients with a tertiary survey by age, mechanism and mode of transport, 2023/24

Characteristic	Percentage
Age (years)	
0-14	75
15-44	67
45-64	70
65-79	59
80+	38
Mechanism	
Transport	78
Fall	44
Struck by/collision with person or object	57
Other	51
Mode of transport from scene	
Helicopter ambulance	74
Police/prison/fire vehicle	69
Private/public vehicle/taxi/walk-in	55
Road ambulance	63
Unknown	52

Time spent in the ED

Time in the ED is a Health NZ priority. In general, more time spent in the ED is associated with worsening outcomes for all patients in the ED. Mean ED length of stay at their definitive care facility for patients with major trauma has progressively increased over the last six years, but it has increased substantially over the last year, particularly in the Central and Northern regions, where mean length of stay in the ED was eight hours.



Figure 14: Mean length of stay with confidence interval (CI) in definitive care emergency department (ED) by region and year of injury, 2018/19–2023/24

Tertiary trauma hospitals that have established an admitting trauma service (Auckland City, Waikato, Christchurch) had a significantly lower ED length of stay than those without an admitting trauma service (Middlemore, Wellington, Dunedin). This is probably because hospitals without access to an admitting trauma service often require patients to be reviewed in the ED by multiple different medical specialities before admission.



Figure 15: Mean length of stay and confidence interval (CI) in definitive care emergency department (ED) by tertiary facility subset and year of injury, 2018/19–2023/24

Blood alcohol collection

Blood alcohol collection provides valuable information for treating clinicians and is important information for injury prevention initiatives. Rates of blood alcohol measurement have remained largely unchanged over the last four years. Table 18: Percentage of patients with blood alcohol concentration recorded at first hospital, 2018/19–2023/24

Region	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Northern	76	77	73	74	73	69
Te Manawa Taki	64	68	76	72	69	71
Central	52	51	62	63	63	65
Te Waipounamu	43	46	50	55	60	58
National	59	62	66	67	67	66

Blood alcohol was more likely to be collected from patients who arrived with a transport-related mechanism of injury. It was less likely to be collected from patients who were injured due to a fall.

Table 19: Percentage of patients with blood alcohol concentration recorded at first hospital by mechanism of injury, 2018/19–2023/24

Mechanism	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Transport	69	70	78	79	80	80
Fall	41	46	45	46	46	42
Struck by/ collision with person or object	56	61	65	66	65	65
Other	59	60	70	72	67	70

Approximately one in five patients with major trauma had a positive blood alcohol measurement. Detectable blood alcohol was more likely in patients injured by being struck by or colliding with another person or object. 23

18

25

18

detected at first hospital by mechanism of injury, 2018/19–2023/24								
Mechanism	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24		
Transport	23	23	30	26	25	22		
Fall	29	30	32	27	24	20		
Struck by/								

45

21

30

31

34

22

39

30

Table 20: Percentage of patients with recorded concentration and blood alcohol detected at first hospital by mechanism of injury, 2018/19–2023/24



collision

Other

with person or object

Key points

- Access to tertiary trauma centre management varies between regions, and transfer times to definitive care have risen, particularly in Te Manawa Taki and Central regions, in the last 12 months.
- The rate of tertiary survey completion, particularly in medium and tertiary hospitals, continued to improve.
- Time in the definitive care ED continued to rise, particularly in the Northern and Central regions. Tertiary hospitals with an admitting trauma service had a significantly shorter time in ED than those without an admitting trauma service.

Serious traumatic brain injury

Table 21 presents characteristics of patients with serious TBI (sTBI), defined as an Abbreviated Injury Scale head score of \geq 3, by level of consciousness (assessed by the Glasgow Coma Scale [GCS]) at arrival at hospital. Complex sTBI refers to patients with sTBI plus serious injury (Abbreviated Injury Scale \geq 3) in one or more other body regions, whereas 'isolated sTBI' refers to patients without major extracranial injuries. For reference, data summarising outcomes in patients without sTBI is also included.

Notably, many patients with sTBI do not have impairment of consciousness on arrival. Most patients with sTBI and moderate or severely impaired consciousness receive a trauma call, and a CT scan in under 2 hours, although both could be improved in patients with isolated sTBI and moderate impairment of consciousness (GCS 9-12).

Mortality among those with sTBI and severely impaired consciousness (GCS <9) is high, at 42 per cent and 37 per cent for complex and isolated sTBI, respectively.

	Impaired consciousness				
Characteristic	Mild/none (GCS >12)	Moderate (GCS 9–12)	Severe (GCS <9)	Total	
Complex sTBI					
Caseload	180	20	97	297	
Case fatality rate (%)	3	10	42	16	
Median (mean) ISS	22 (25)	29 (30)	36 (38)	27 (30)	
Neuroscience centre for definitive care (%)	62	85	88	72	
Trauma call on arrival (%)	59	95	95	73	
Less than 2 hours until CT (%)	77	95	86	81	

Table 21: Characteristics of serious traumatic brain injury (sTBI), 2023/24

Isolated sTBI				
Caseload	499	59	115	673
Case fatality rate (%)	6	15	37	12
Median (mean) ISS	17 (19)	20 (21)	25 (24)	17 (20)
Neuroscience centre for definitive care (%)	57	81	89	64
Trauma call on arrival (%)	22	46	80	34
Less than 2 hours until CT (%)	57	81	97	66
No sTBI				
Caseload	•	•	•	1,691
Case fatality rate (%)	•		•	2
Median (mean) ISS	•	•		17 (19)
Neuroscience centre for definitive care (%)				55
Trauma call on arrival (%)	•	•	•	52
Less than 2 hours until CT (%)				64

CT, computed tomography scan; GCS, Glasgow Coma Scale; ISS, Injury Severity Score.

Neuroscience facilities are tertiary centres with additional capability to manage patients with serious neurological trauma. This includes neurosurgery facilities and associated services such as neuro-intensive care and specialised nursing and allied health staff. The proportion of patients with sTBI who receive definitive care at a neuroscience facility has varied naturally over the last five years. This remains an area with scope for improvement, and a process for auditing cases where definitive care was provided outside a neuroscience centre is ongoing. Table 22: Percentage of patients with serious traumatic brain injury and impaired consciousness who received definitive care at a neuroscience facility, 2018/19–2023/24

Region	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Northern	93	92	94	84	84	89
Te Manawa Taki	86	98	85	80	83	83
Central	77	78	86	81	88	86
Te Waipounamu	93	87	91	86	100	93
National	88	90	90	83	88	88

Some patients with brain injury do not have an abnormal head CT scan, and their brain injury can remain unrecognised. Screening for post-traumatic amnesia (PTA) is important to help identify patients with brain injury so they can be monitored and – where necessary – referred for ongoing specialist input and rehabilitation. Patients are considered 'at risk' of brain injury if they have either injury to the head or injury to two or more body systems after experiencing a trauma.

Table 23: Percentage (number) of patients who survived to discharge and received screening for post-traumatic amnesia by definitive care region, 2023/24

Region	Yes	No/unknown
All major trauma		
Northern	79 (623)	21 (162)
Te Manawa Takiª	67 (165)	33 (82)
Central	60 (245)	40 (165)
Te Waipounamu	72 (516)	28 (203)

At risk ^b							
Northern	83 (599)	17 (122)					
Te Manawa Takiª	69 (162)	31 (72)					
Central	63 (234)	37 (138)					
Te Waipounamu	75 (500)	25 (164)					
Serious traumatic brain injury							
Northern	91 (272)	9 (26)					
Te Manawa Takiª	89 (56)	11 (7)					
Central	72 (106)	28 (41)					
Te Waipounamu	81 (172)	19 (40)					

^a Sites that implemented validated post-traumatic amnesia assessment. Waikato and Gisborne are working towards transitioning to a validated tool for 2024/25.

^b Patients with either any head injury or an injury to at least two body regions, without burns as dominant injury type or poisoning as mechanism of injury.



Key points

- Most patients with sTBI and moderate or severely impaired consciousness receive a CT scan in under 2 hours.
- The proportion of patients with sTBI who receive definitive care at a neuroscience facility has naturally varied over the last five years.
- Mortality among those with sTBI and severe impairment of consciousness (GCS <9) is high.

Part 2: Rōpū Rangatira

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Rōpū rangatira

Patients who experience trauma and their whānau move through the system; they are not solely under the care of one speciality or service. Transitions of care are an integral part of a patient's journey through the trauma system. Patients and their whānau are vulnerable when they move between different parts of the system because there is an increased likelihood of patient safety risks, loss of clinical information and loss of whakawhanaungatanga.

In establishing the National Clinical Network for Trauma, this whole-of-system perspective was embedded through the development of rōpū rangatira.

Rōpū rangatira: Injury prevention



Dr Osman Mansoor FNZCPHM Public Health Medicine Specialist, National Public Health Service, Tairāwhiti



Paul Kennedy Manager, Targeted Investments -Injury Prevention ACC

Focus of work programme

1. Identify and recommend prioritised, cross-agency/system opportunities to sustainably and economically prevent trauma.

Rōpū rangatira: Acute care and out of hospital



Dr Tony Smith FCICM Deputy Clinical Director Hato Hone St John



Christopher Duncan FACEM Emergency Medicine Consultant Middlemore Hospital

Focus of work programme

- 1. Staging and inter-hospital transfers.
- 2. Definition and classification of receiving hospitals.
- 3. Development of national guidelines the first few days in hospital.

Rōpū rangatira: Rehabilitation and transitions of care



Kat Quick Clinical Lead – Trauma Rehabilitation Te Tāhū Hauora



Caroline Juniot Health Sector Partnerships Manager ACC

Focus of work programme

1. Implementing PTA assessment across the motu.

- 2. Understanding the delivery and outcomes of inpatient Allied Health activity for patients with major trauma through data analytics.
- 3. Scoping the opportunity to develop either a wellbeing action plan for patients with major trauma or to develop a guide to accessing ACC-funded community services.

Rōpū rangatira: NZTR, data and insights



A/Prof Chris Harmston FRACS Consultant General Surgeon Te Tai Tokerau



Prof Ian Civil FRACS Clinical Director of Trauma Service Te Toka Tumai

Focus of work programme

- 1. Develop a data visualisation dashboard to increase visibility of data and insights from NZTR to drive local quality improvement.
- 2. Automate reporting of data and key performance indicators.
- 3. Maintain integrity of data quality to inform health system performance.

Rōpū rangatira: Trauma quality improvement



A/Prof Grant Christey FRACS General Surgeon and Trauma Specialist Waikato Hospital



Jessica Lockett Quality Improvement Advisor Te Tāhū Hauora

Focus of work programme

- 1. Conduct a capacity and capability survey.
- 2. Progress deliverables from the serious chest injury expert advisory group.
- 3. Review outcomes of the paediatric mortality rates analysis in Aotearoa New Zealand.

Part 3: Research and Improvement Priorities

NZTR data governance

NZTR data governance group

Te Rēhita Whētuki o Aotearoa, the New Zealand Trauma Registry (NZTR), is an important facet of the Trauma National Clinical Network programme. It provides the foundation for a data-driven approach to delivering a high-quality trauma system.

The NZTR data governance group provides assurance for the ethical and appropriate use of data held in the NZTR.



Daniel Patrick Independent Chair

Research

The Accident Compensation Corporation (ACC) invested \$100,000 in grants to support major trauma research. The major trauma research grant aims to encourage research into priority areas related to the management of, and outcomes from, serious injury in Aotearoa New Zealand.

The successful recipients of this grant were

- University of Otago. Investigators are Dr Helen Harcombe, Associate Professor Gabrielle Davie, Mr Dave Barson, Dr Brett Maclennan and Associate Professor Trudy Sullivan. The research topic is 'Major trauma and comorbidities: prevalence, changes over time and implications'.
- Te Toka Tumai/University of Auckland. Investigators are Dr Luke Boyle, Dr Doug Campbell, Professor Ian Civil, Dr Paul McBride, Associate Professor Bridget Dicker and Dr Matthew Moore. The research topic is 'Validation of days alive out of hospital as an outcome measure for patients with major trauma'.

Outcomes of these research projects are expected to be available to the national clinical network in 2025/26.

Patient-reported outcome measures after major trauma

It is well recognised internationally that recovery after major trauma is slow for some patients and that they can experience life-long effects on function and quality of life. Patient-reported outcome measures (PROMs) provide crucial insights into the chronicity of serious injury and help us understand why some patients recover better than others. PROMs data can be used to guide the design of post-discharge health and disability services for patients with trauma by providing a measure of long-term outcomes and identifying variations in outcomes between demographic and injury groups.

The University of Otago was contracted to collect post-injury PROMs data from a cohort of patients who received definitive care in the Northern, Central and Te Waipounamu regions in 2020/21. The study followed up with patients at six months, 12 months and in August 2023 at 24 months. The emerging themes from the Otago PROMs study are:

- women in the major trauma cohort generally reported a worse health state than men, particularly during the early phases of their recovery
- no significant change was observed in the reported health state for the group with sTBI between 6 and 12 months after injury
- people who were discharged from hospital to rehabilitation reported a significant improvement in their health state between 6 and 12 months
- a higher proportion of the major trauma cohort reported moderate, severe and extreme problems with pain than in the Aotearoa New Zealand population.

The Trauma National Clinical Network and trauma quality improvement ropū rangatira are exploring these themes to inform future quality improvement opportunities and collection of PROMs.

Serious chest injury trauma expert advisory group

Almost 50 per cent of patients with major trauma have a significant chest injury. In 2023, analysis of chest trauma management data showed that Aotearoa New Zealand performs well in regard to survival rates and definitive care length of stay when compared with data from Victoria, Australia. However, findings suggested that very few patients with serious chest injury undertake community-based rehabilitation in Aotearoa New Zealand and that they had suboptimal long-term patientreported outcomes.



Dr Jacques Marnewick FRACS Clinical Lead, Serious Chest Injury

A review of local chest trauma management pathways showed that the way patients with chest trauma are managed varies widely across the country. This highlighted an opportunity to create consistent national guidance while accounting for variations in regional/local capability.

To support improvements in patient outcomes and reduce variation in care, a serious chest injury project was established, supported by an expert advisory group. This group is composed of multiple medical specialists, allied health experts and rural health representatives and is led by Dr Jacques Marnewick, supported by the Trauma National Clinical Network, ACC and Te Tāhū Hauora.

The focus of this project is to develop a best-practice, nationally consistent chest trauma guideline. It will encompass all aspects of the patient journey, from initial assessment and triage to inpatient care and eventually postdischarge follow-up and rehabilitation. The ultimate aims are to reduce mortality and morbidity in this cohort of patients, regardless of geographical location and definitive care hospital.

We anticipate that national guidance to support serious chest trauma will reduce variation of care and thus improve patient outcomes.

Post-traumatic amnesia

The sTBI collaborative ran between October 2022 and June 2023, following concerns that systematic assessment of TBI in the major trauma population was inconsistent, inequitable and – in places – very limited. An undiagnosed TBI can affect long-term outcomes for patients, delay their functional recovery and reduce their quality of life.

The sTBI collaborative aimed to improve identification of TBI by conducting PTA assessments for patients with major trauma to ensure all patients with brain injury receive timely rehabilitation. Full details can be found in the <u>Serious</u> <u>Traumatic Brain Injury in Aotearoa New Zealand: Summary of Improvement</u> <u>Work report.</u>

In July 2024, Te Tāhū Hauora analysed quantitative data (from the NZTR) and qualitative data (gathered via semi-structured interviews and focus groups) to understand whether the collaborative's aim was met.

NZTR data showed that, over 18 months, all but one of the collaborative sites demonstrated median PTA completion rates higher than the national rate. In the first year of collecting the PTA data point (October 2022 and October 2023), the median PTA assessment was 75 per cent for collaborative sites and 66 per cent for non-participating sites. Between November 2023 and April 2024, these increased to 84 per cent for collaborative sites and 68 per cent for non-participating sites.

Factors associated with a higher likelihood of being assessed for PTA included having a higher ISS, being managed in a larger hospital, the major trauma event being caused by transport or being struck by or colliding with a person or object and the injury occurring in younger people. Little difference in rates was seen across ethnic groups.

Qualitative results identified that the project teams felt that:

- the collaborative resulted in successful implementation of change ideas
- innovative solutions reduced the effort required of staff to complete new, improved processes
- staffing capacity was seen as the biggest barrier to service improvement

- recent health system changes made quality improvement initiatives challenging
- improvements were spread beyond initial services
- initiatives targeted a focus on improvements for vulnerable populations.

The sTBI collaborative has resulted in lasting service improvement initiatives that have improved the assessment of brain injury for the most seriously injured New Zealanders. Work is now under way to connect with teams outside of the collaborative to share resources and support their local improvement opportunities with PTA assessment. Thanks to the many Health NZ staff involved in making this project successful.



sTBI collaborative teams from Te Tai Tokerau Whangārei, Hauora a Toi Bay of Plenty, Te Matau a Māui Hawke's Bay, Taranaki and Dunedin

Part 4: Workforce

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NetworkZ

The NetworkZ Trauma Programme delivers multidisciplinary simulation-based (SIM) team training in the ED setting. The SIM training is based on real-world clinical scenarios that provide an interactive and realistic experience, followed by facilitated structured discussions (debriefs). The immersive in-situ approach strengthens relationships and tests systems for improved organisation, team and individual performance.

The NetworkZ trauma SIM programme has trained over 200 clinicians in most of the largest and smallest EDs in 2023/24. The value has been in the diversity of staff who support trauma, and this programme enables disparate individuals and teams to come together and work to enhance patient safety outcomes.

The trauma SIM course addresses individual knowledge gaps and provides communication skills and tools and an opportunity to discuss departmental attitudes and values. As a nationally delivered programme, it has been a vehicle for identifying and addressing quality and safety concerns along with equipping smaller trauma environments and transfer sites with equitable training opportunities.

The inclusion of a paediatric 'patient' has positively impacted the training and focused it on managing a rapidly evolving neurological trauma in a child. This enabled discussions about how to transport and to where, what could be done locally and the management of whānau. Māori navigators, social workers and paediatricians added greatly to the depth of the training and sharing each group's perspectives.

During SIM training, common latent safety threat themes are identified. These are 'system-based threats to patient safety that can materialise at any time and are



Waitakere Hospital, 'mother and child' injury simulation – 2024

previously unrecognised by healthcare providers, unit directors or hospital administration' (Fan et al, 2016).

Latent safety threats are discussed with clinical teams and stakeholders to identify factors to improve patient safety and enhance healthcare processes.

Funding to support this national SIM programme was provided through the Community Road Safety Fund, which is administered by NZ Transport Agency Waka Kotahi, recognising its role in reducing the impact of road trauma in Aotearoa New Zealand.

Quality improvement facilitators training

The Improving Together: Quality Improvement Facilitators programme has been running throughout 2024, aiming to build capability in quality improvement skills for the trauma sector while supporting participants to complete innovative local improvement projects.

Fourteen clinicians from across Aotearoa New Zealand have been completing this course. They represent a range of professions (including nursing, physiotherapy, paramedicine, occupational therapy and pharmacy) and work clinically across the trauma system, from prehospital through to acute care and community rehabilitation.

The methodology used was based on the Institute for Healthcare Improvement Breakthrough series collaborative model and the Model for Improvement. The programme was designed for the Aotearoa New Zealand health and disability context, incorporating te ao Māori principles and embedding consumer codesign throughout the curriculum.

Projects covered the spectrum of trauma care in Aotearoa New Zealand

Prehospital

Improving prehospital recognition and transportation of paediatric trauma

Hospital-based acute services

- Improving trauma call rates in the ED
- Screening for PTA in the ED
- Implementing screening for acute psychological distress following major trauma
- Improving deep vein thrombosis prophylaxis management in patients
 with major trauma
- Incorporating a co-designed process for rehabilitation goal setting within a Te Whare Tapa Whā model

- Reducing barriers to discharge from inpatient rehabilitation
- Introducing a trauma nurse-led follow-up service

Community-based rehabilitation services

- Improving the timeliness of home care support assessments
- Supporting transitions between residential and community rehabilitation services for patients with TBI
- Enhancing wellbeing outcomes using a te ao Māori framework
- Implementing a mindful rehabilitation early intervention initiative

A key success of this programme was the increase in quality improvement capability across the sector, with a 100 per cent pass rate for the cohort. Participants have been awarded credentialing in Intermediate Health Quality Improvement (Level 4) from the New Zealand Qualifications Authority.



Quality Improvement Facilitator training participants and faculty at the final celebration day

Appendices

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Appendix A: Royal Australasian College of Surgeons key performance indicators

Table 24: Case fatality rate (Injury Severity Score ≥13), 2018/19–2023/24, number (per cent)

2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
204 (8.6)	159 (7.3)	210 (8.2)	184 (7.6)	221 (8.4)	172 (6.5)

Table 25: Median hours from incident to arrival at definitive care for patients transported direct from scene (Injury Severity Score ≥13) by definitive care region, 2018/19–2023/24

Region	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Northern	1.4	1.4	1.5	1.5	1.6	1.6
Te Manawa Taki	1.7	1.8	1.8	1.8	1.8	1.8
Central	1.4	1.5	1.6	1.7	1.5	1.7
Te Waipounamu	1.8	1.8	1.9	1.9	2.0	2.0
National	1.6	1.6	1.6	1.7	1.8	1.8

Table 26: Median hours from incident to arrival at definitive care for patients transferred (Injury Severity Score ≥13) by definitive care region, 2018/19–2023/24

Region	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Northern	9.8	11.4	11.2	10.5	11.3	11.4
Te Manawa Taki	8.6	9.0	8.5	10.7	10.3	17.6
Central	16.1	10.8	16.1	13.7	12.4	16.4

Region	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Te Waipounamu	16.0	19.1	13.8	11.2	15.7	15.2
National	11.1	12.2	12.0	11.2	12.0	14.2

Table 27: Discharge destination following in-hospital stay (Injury Severity Score ≥13) by definitive care region (per cent), 2023/24

Discharge destination	Northern	Te Manawa Taki	Central	Te Waipounamu	National
Home	57	67	58	61	61
Rehabilitation	19	13	14	17	16
Hospital for convalescence	12	6	19	9	11
Died	7	7	5	7	6
Left against medical advice/discharge at owr risk	12	2	2	2	2
Residential aged care service or nursing home not the usual place of residence	2	3	0	1	2
Other	0	1	1	1	1
Special accommodation	1	0	1	1	1
Unknown	0	0	1	0	0

Table 28: Median hours to index computed tomography scan for patients with impaired consciousness (Glasgow Coma Scale ≤13; Injury Severity Score ≥13), by definitive care region, 2023/24

Northern	Te Manawa Taki	Central	Te Waipounamu	National
0.6	0.8	1.1	0.8	0.8

Table 29: Percentage of patients with blood alcohol concentration recorded at first hospital (Injury Severity Score ≥13) by first care region, 2018/19–2023/24

Region	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24
Northern	76	77	73	74	73	69
Te Manawa Taki	64	68	76	72	69	71
Central	52	51	62	63	63	65
Te Waipounamu	43	46	50	55	60	58
National	59	62	66	67	67	66

Table 30: Median hours at first hospital for those transferred (Injury Severity Score ≥13) by first care region, 2023/24

Northern	Te Manawa Taki	Central	Te Waipounamu	National
4.8	8.4	11.6	6.2	6.9

Table 31: Median hours in emergency department (Injury Severity Score ≥13), by definitive care region, 2023/24

Northern	Te Manawa Taki	Central	Te Waipounamu	National
7	5	8	6	6

Appendix B: Published research on trauma injury in New Zealand

Civil, I., Isles, S., Campbell, A., & Moore, J. (2023) The New Zealand National Trauma Registry: an essential tool for trauma quality improvement. *European Journal of Trauma and Emergency Surgery*, 49 (4), 1613–1617. doi: 10.1007/s00068-023-02310-z

Maclennan, B., Wyeth, E., & Derrett, S. (2024) Health-related quality of life following trauma: Prevalence of problems and factors associated with sixmonth outcomes in a New Zealand cohort. *Injury*, 55 (4), 111468. doi: 10.1016/j.injury.2024.111468

Owen, H.E., Wyeth, E.H., Maclennan, B., Barson, D., McBride, P., Gabbe, B.J., Civil, I., & Derrett, S. (2023) Cohort profile: The Trauma Outcomes Project, a prospective study of New Zealanders experiencing major trauma. *BMJ Open*, 13 (11), e075480. doi: 10.1136/bmjopen-2023-075480

Te Tāhū Hauora Health Quality & Safety Commission. (2024) *Rehabilitation collaborative review: 1 year on*. [Online] Available from: <u>https://www.hqsc.govt.nz/assets/Our-work/National-trauma-</u> <u>network/Publications-resources/RehabCollabReview-Jul-2024.pdf</u>

Te Tāhū Hauora Health Quality & Safety Commission. (2024) Serious traumatic brain injury in Aotearoa New Zealand: Summary of improvement work. [Online] Available from: <u>https://www.hqsc.govt.nz/resources/resource-library/serious-</u> <u>traumatic-brain-injury-in-aotearoa-new-zealand-summary-of-improvement-</u> <u>work/</u>

Wake, E., Ranse, J., Campbell, D., Gabbe, B., & Marshall, A.P. (2024) Follow-up after major traumatic injury: a survey of services in Australian and New Zealand public hospitals. *BMC Health Services Research*, 24 (1), 630. doi: 10.1186/s12913-024-11105-w

Appendix C: SMR commentary and technical notes

The SMR is calculated by dividing the sum of the observed deaths by the sum of the predicted deaths after each incident has been risk adjusted. Confidence intervals are calculated using *R*'s base Poisson test function (R Core Team, 2024).

The risk-adjustment model is a generalised additive model fit using *R*'s mgcv package (Wood, 2011). The model is trained on all incidents between July 2015 and June 2019. The model adjusts for:

- the patient's first recorded pulse and first recorded systolic blood pressure (and the interaction between them)
- the patient's age and their first recorded Glasgow Coma Scale score (and the interaction between them)
- the patient's New Injury Severity Score (NISS, derived from Abbreviated Injury Scale [AIS] codes).
- the patient's recorded blood base deficit/excess
- the patient's highest recorded AIS severity injury to the head region
- the patient's highest recorded AIS severity injury to the vascular region
- the patient's comorbidities, as calculated using the multimorbidity index (Stanley and Sarfati, 2017)
- the mechanism of injury of the incident.
Appendix D: References

Fan, M., Petrosoniak, A., Pinkney, S., Hicks, C., White, K., Almeida, A.P., Campbell, D., McGowan, M., Gray, A., & Trbovich, P. (2016) Study protocol for a framework analysis using video review to identify latent safety threats: trauma resuscitation using in situ simulation team training (TRUST). *BMJ Open*, 6 (11), e013683. doi: 10.1136/bmjopen-2016-013683.

R Core Team. (2024) *R*: A language and environment for statistical computing. [Online] Available from: https://www.R-project.org

Stanley, J. & Sarfati, D. (2017) The new measuring multimorbidity index predicted mortality better than Charlson and Elixhauser indices among the general population. *Journal of Clinical Epidemiology*, 92, 99–110. doi: 10.1016/j.jclinepi.2017.08.005.

Wood, S. N. (2011) Fast stable restricted maximum likelihood and marginal likelihood estimation of semiparametric generalized linear models. *Journal of the Royal Statistical Society. Series B, Statistical Methodology*, 73, 3–36. doi: 10.1111/j.1467-9868.2010.00749.x This annual report represents collaboration between people and funding from Health NZ, ACC, Te Tāhū Hauora and Waka Kotahi.



He Kaupare. He Manaaki. He Whakaora. Prevention. Care. Recovery.





I orea te tuatara ka patu ki waho A problem is solved by continuing to find solutions



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