

New Zealand Trauma Registry
& National Trauma Network

Annual report

2022/23

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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.

Foreword

This is the eighth annual report of the National Trauma Network (the Network).

Maturation of the Network and its quality improvement programme has seen a number of key outcomes that are reflected in the data published in this report. In line with the increased travel, tourism and general mobility of the population once COVID-19-related restrictions were lifted, overall numbers of trauma cases have increased. In particular, the South Island has seen a 12 percent increase in actual numbers, mainly led by transport-related injuries. Volume demands are a feature of health care delivery, and it is reassuring that overall outcomes have not suffered despite the increased case load.

Significant improvements have been made in some areas. The number of people dying of haemorrhage, a potentially preventable trauma death, has continued to fall and now represents just 3.2 percent of all deaths. This year, only eight patients died from bleeding after arriving at hospital, which is an extraordinary result by both Aotearoa New Zealand and world standards. This accomplishment has been driven by Te Tāhū Hauora Health Quality & Safety Commission (Te Tāhū Hauora) and the quality improvement programme it established for critical haemorrhage. Registry data, such as that included in this report, is vital to establish the case for change and to monitor the results of that change.

Tertiary surveys are an essential part of the evaluation of patients experiencing major trauma. Several regional initiatives have been launched to encourage tertiary surveys in more patients, and a datapoint in the registry records that. It is pleasing to see small increases in the number of these evaluations being completed.

In line with the focus on improving outcomes in patients with traumatic brain injury, trauma clinicians have been encouraged to ensure all patients are assessed for post-traumatic amnesia. Clinically mild impairment after major trauma may have lasting

effects, and early recognition of the consequences of concussion and other brain injuries is an important part of ensuring optimal outcomes. For the first time, a data metric that records the completion of post-traumatic amnesia assessment is being reported, and this forms a useful baseline for future quality improvement activities.

The information in this report represents the collective effort of clinicians working in pre-hospital and hospital levels providing care and carrying out quality improvement, together with the Network sponsors, the Accident Compensation Corporation (ACC), Te Whatu Ora Health New Zealand, Manatū Hauora Ministry of Health and the team at Te Tāhū Hauora. In this report, we have worked together to describe the achievements of the Network and document the relevant data.

This is the last report of Network activities under a direct contract with ACC and Te Tāhū Hauora leadership. The journey with ACC has encompassed the 8 years of published Network reports, which demonstrates a range of achievements across the full spectrum of clinical and system activities. As of 1 July 2023, the Network has been governed by Te Whatu Ora under the leadership of National Clinical Network – Trauma co-leads James Moore, an anaesthetist and intensivist from Wellington, and Max Raos, an emergency physician from Auckland. We wish them well with the ongoing work of the National Clinical Network – Trauma.

Ian Civil
National Clinical Director

Siobhan Isles
National Programme Director

March 2024



Executive summary

This is the eighth annual report of the National Trauma Network and includes statistics on major trauma in Aotearoa New Zealand as of 30 June 2023.

Case fatality rate
8.3%
up from 7.6% last year

Standardised mortality rate (Māori)
down by 25%
since 30 June 2019

Standardised mortality rate (non-Māori)
down by 10%
since 30 June 2019

Deaths from haemorrhage
3.7%
down from 5.4% last year

Paediatric mortality
≤3%
down from 12% last year

Tertiary survey completions
59%
up from 56% last year

Patients with serious traumatic brain injury

Managed in a neuroscience centre
73%
up from 71% last year

Trauma call
49%
up from 46% last year

CT scan under 2 hours
72%
up from 68% last year

Quality improvement initiatives are having a positive impact

Our quality improvement priorities continued from previous years and included critical haemorrhage, serious traumatic brain injury (sTBI) and rehabilitation. The strong focus on these three quality improvement areas has led to approaches that are nationally consistent and aligned with best practice, ultimately resulting in direct benefits for patients.

The whole-of-system approach to improving trauma care, and specific initiatives to improve the journey of care for Māori people, have resulted in the standardised mortality rate decreasing by 25 percent for Māori and by 10 percent for non-Māori.

Mixed success with improving processes of care

Critical haemorrhage

The quality improvement focus on critical haemorrhage started in 2019. As a result, most hospitals now have a critical haemorrhage response plan in line with the national guidelines. This has contributed to a decrease in deaths from critical haemorrhage, which now account for 3.2 percent of trauma deaths for 2023.

Transfer to first hospital and neuroscience centre

Following regional stakeholder consultation, customised regional neuroscience transfer policies for patients with the most serious TBIs were developed and shared with regional trauma teams, along with audit tools that support continuous learning and improvement. In the first 6 months of implementing these policies, no patients have required an audit, which suggests that these policies are supporting improved care for TBI patients.

Trauma calls

The overall percentage of trauma calls for those with TBI has increased from 46 percent to 49 percent, but the rate in small- and medium-sized hospitals is much lower and has decreased. This signals a key area for improvement because trauma calls are associated with early and effective care on arrival to hospital.

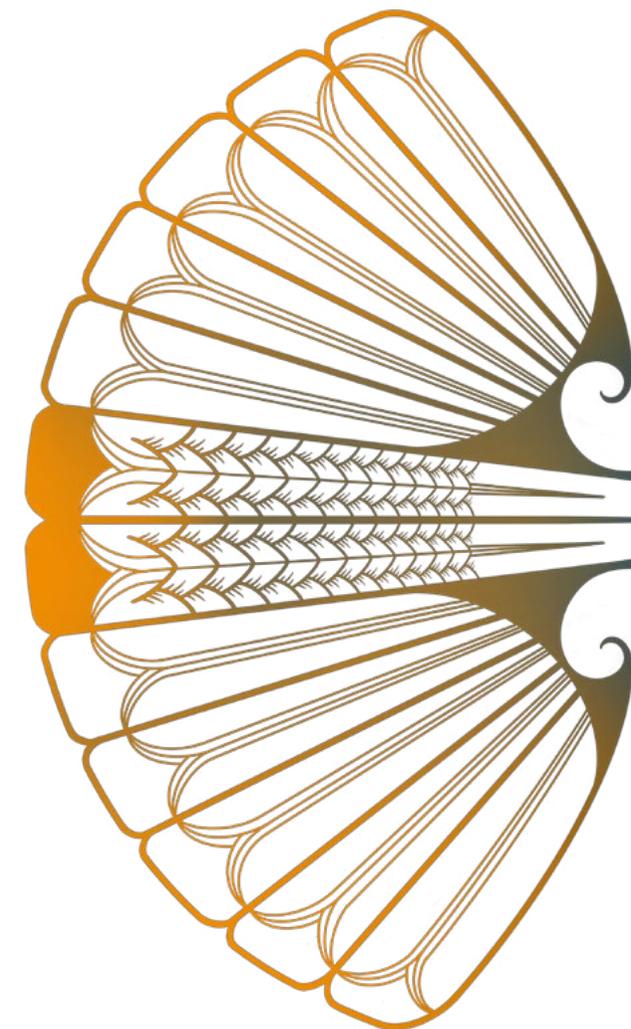
Post-traumatic amnesia assessment

The presence of post-traumatic amnesia following head injury is an important predictor of long-term functional outcomes. Assessment of post-traumatic amnesia was introduced as a data point into the trauma registry in 2022 as part of the sTBI quality improvement programme. The reported increase in these assessments is expected to lead to early identification and appropriate rehabilitation to support recovery from head injury.

Other process measures, including time to computed tomography scan, trauma call activation and providing definitive care at neuroscience centres, are yet to improve.

Rehabilitation collaborative

The case studies from the 2021/22 rehabilitation collaborative were disseminated, and two of the nine completed projects have been scaled up to support national implementation. Feedback during the 1-year follow-up with teams suggested that the education received while participating in the collaborative programme has enabled participants to use quality improvement tools and approaches in other areas of their work.



Developments in the national trauma programme of work

The capacity and capability to lead quality improvement programmes has improved across the motu and across all partners in the trauma system.

The National Trauma Registry continues to perform well, and this year saw a successful upgrade to the latest version of the Abbreviated Injury Scale (2015). A business intelligence dashboard now provides a range of local-level measures for all regional networks.

Engaging allied health professionals has been an important growth area, especially for quality improvement in managing TBI and rehabilitation workstreams. Trauma nursing workforce capacity continues to improve, although the resource-to-caseload ratio varies across the motu.

The research programme has continued to support injury prevention through the SORTED initiative and longer-term trauma outcomes through the final year of the patient-reported outcome measurement project.

The high-fidelity simulation training delivered by NetworkZ continues to be a valuable continuing education service, reaching 332 hospital staff. Their work has also identified barriers and enablers to address latent safety threats in emergency departments.

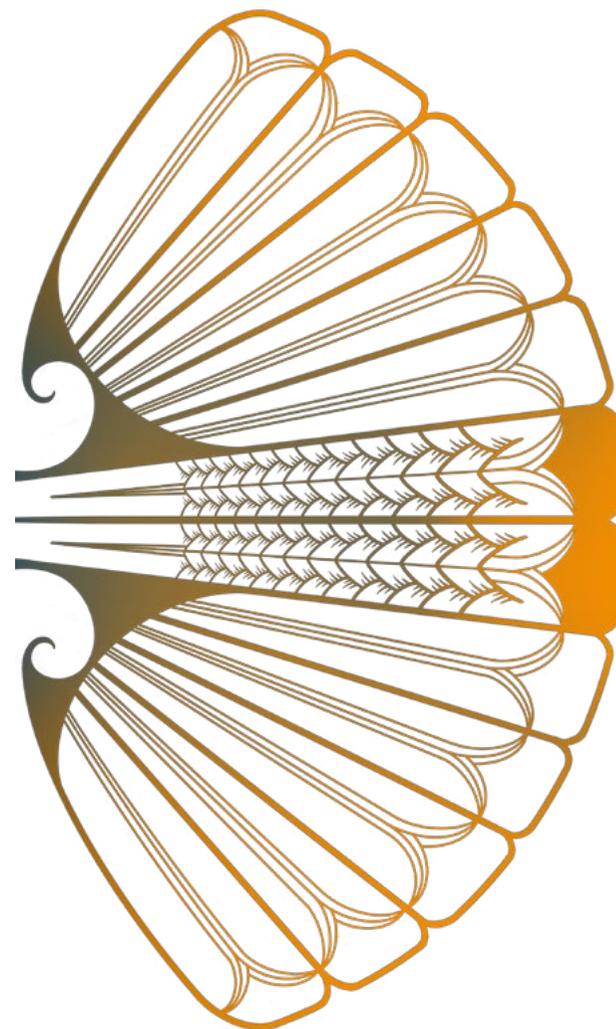
Early results from the long-term outcomes survey of patients at 6, 12 and 24 months indicate a significant cohort of major trauma patients who have deteriorating functional return between the 6- and 12-month surveys. This suggests an opportunity to improve rehabilitation so it is early, intensive and responsive.

Regional network initiatives

We continue to focus strongly on multidisciplinary teams and the allied health workforce as this is a key contributor to the success of the trauma programme. These are well-established pathways with education opportunities, alignment of local priorities and strong understanding of using data to drive quality improvement.

A key issue has been the variation in staffing capacity as this creates considerable challenges in developing a nationally consistent programme of work.

All regions have had local hospitals participate in national quality improvement projects around rehabilitation and TBI. A number of local projects have been identified as having the potential to inform wider implementation in other regions.



Margaret's story

Reconnecting with whānau in Kerikeri was top of mind for Margaret Maniapoto while on a New Year's day road trip in 2021. Travelling by car with her husband and daughter from Rotorua, they were north of Whangārei when they were involved in a serious collision that changed the course of their holiday.

Marg and her husband were transported by ambulance to Whangārei Hospital for initial assessment. Although conscious and feeling a bit sore, Marg was quickly transported to Auckland City Hospital unaware of the extent of her injuries. She recalls the system quickly kicking in and spending 2 days in intensive care. This was followed by 2 months in a high-dependency unit, where she was reconnected with her husband, who had been discharged from Whangārei Hospital after a 1-week stay. During this time, she required multiple surgeries to her aorta, bowel and vertebrae.

Marg was grateful that there were systems and resources in place to support her recovery and reflected on the amazing people that made this traumatic experience so much more comfortable for her and her whānau. She recalls the Auckland City Hospital trauma team being focused on what mattered to her.

Cultural safety was important and a significant part of the healing process. Whānau were:

- invited to share 6 o'clock karakia, and staff often joined them when available
- welcomed to her bedside, where they formed relationships with all staff supporting her recovery
- included in rounds and openly communicated with about her care, able to voice concerns and given as much information as possible so they felt comfortable.

Marg was nervous about leaving hospital and worried that the systems that supported her recovery would no longer be there. She recalls this was quickly forgotten once she returned home to Rotorua, where she received ongoing care from a public health nurse and she and her whānau received mental wellbeing support. Marg returned to work in May 2021, confident that she had the necessary support at home as well as a strong relationship with and support from the team at Auckland City Hospital.

Today, Marg is doing really well. She undergoes routine check-ups and has the potential for another back surgery but remains grateful for the empathy, compassion and support of the clinicians who supported her physical recovery and ensured the wairua ora (spiritual wellbeing) of her whānau was uplifted wherever possible.



Marg during her time in the high-dependency unit.

Part 1: New Zealand Trauma Registry report

Equity of care

Reducing inequities in care is a priority for the National Trauma Network (the Network). Throughout 2022/23, we worked to understand variations in the incidence of major trauma and the processes and outcomes of care across age groups, geographies and ethnicities.

We have weaved equity-related conversations throughout the report and provided brief narratives where appropriate. To find equity-specific measures and initiatives, look for this icon.



Patterns of injury

Incidence

In 2022/23, Aotearoa New Zealand had 2,626 major trauma cases, an increase of 9 percent from the previous year. The South Island region saw the greatest increase in incidence rates, from 51 per 100,000 people in the previous year to 64 per 100,000 people.

Figure 1: Incidence rate of major trauma by region, 2022/23

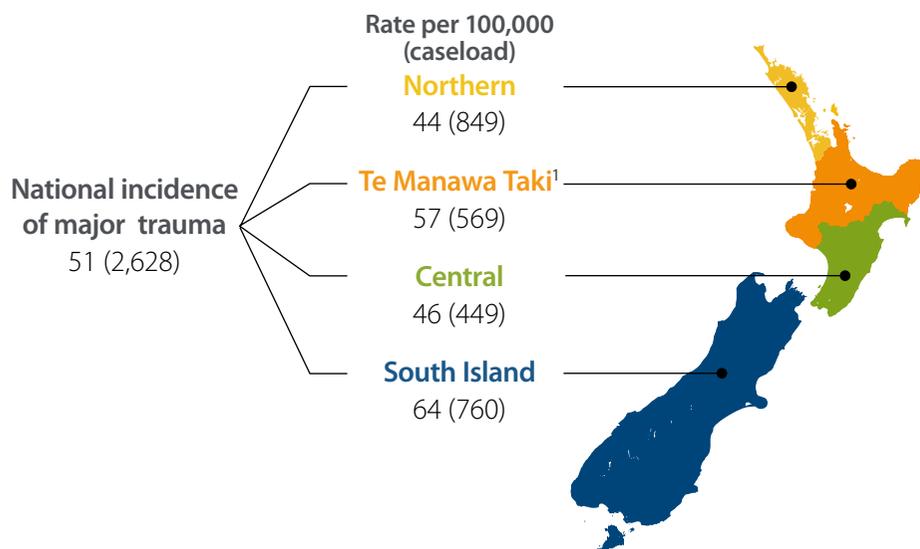
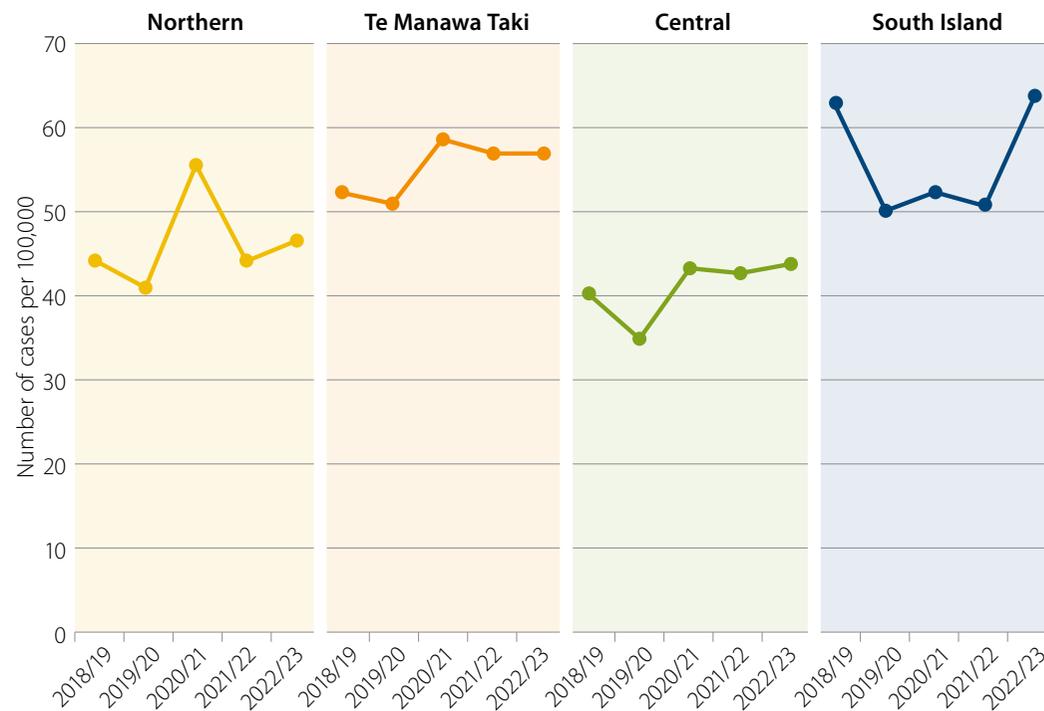


Figure 2: Incidence rate of major trauma per 100,000 people by region, 2018/19–2022/23



Mechanism

The number of transport-related injuries in Aotearoa increased by 16 percent, from 1,162 in 2021/22 to 1,351 in 2022/23. This increase has mainly been caused by car crashes, which increased by 24 percent, from 500 in 2021/22 to 619 in 2022/23. The increase in major trauma cases for the South Island appears to be driven by more transport-related injuries. This increase in transport-related injuries was only seen to a minor degree in the northern region and not at all in Te Manawa Taki and Central. More work is needed to understand the reasons for these increases.

¹ The Te Manawa Taki region covers Bay of Plenty, Lakes, Hauora Tairāwhiti, Taranaki and Waikato.



Table 1: Number (percent) of major trauma cases by mechanism of injury and region, 2022/23²

Region	Mechanism of injury			Number and percentage of injuries					
	Falls	Other	Struck by/ collision with person or object	All transport	Car	Motorcycle	Pedal cycle	Pedestrian	Quad bike/ other
Northern	276 (33)	82 (10)	84 (10)	407 (48)	180 (21)	101 (12)	53 (6)	53 (6)	20 (2)
Te Manawa Taki	182 (32)	39 (7)	45 (8)	303 (53)	164 (29)	81 (14)	34 (6)	13 (2)	11 (2)
Central	151 (34)	36 (8)	40 (9)	222 (49)	85 (19)	63 (14)	29 (6)	29 (6)	16 (4)
South Island	253 (33)	52 (7)	40 (5)	415 (55)	189 (25)	85 (11)	82 (11)	35 (5)	24 (3)
National	862 (33)	209 (8)	210 (8)	1,347 (51)	618 (24)	330 (13)	198 (8)	130 (5)	71 (3)

² Percentages are rounded to the nearest whole number so may not add up to 100 percent.

Sex, injury severity score (ISS), type of injury and injury intent

Sex patterns remained consistent with previous years, as 71 percent of cases were male. Blunt trauma cases and unintentional injuries were 10 percent higher, and injuries inflicted by others were 10 percent lower, than in 2021/22. The increase in transport incidents, which usually involve multi-system trauma, appears to have increased the number of patients with an ISS of 45+. There were 27 more ISS 45+ incidents in 2022/23 than in 2021/22.

Table 2: Major trauma incidents by sex, injury intent, type of injury and injury severity score, 2022/23, N = 2,628³

Characteristic	Number (%)
Sex	
Female	769 (29)
Male	1,857 (71)
Injury intent	
By other	208 (8)
Self-inflicted	36 (1)
Unintentional	2,338 (89)
Unknown	46 (2)
Dominant injury type	
Blunt	2,513 (96)
Burns	26 (1)
Penetrating	79 (3)
Unknown	10 (<1)
Injury severity score	
13–24	1,936 (74)
25–44	626 (24)
45+	66 (2)

3 Percentages are rounded to the nearest whole number so may not add up to 100 percent.

Ethnicity and age

Rates of major trauma increase with age. Since 2019/20, rates among people aged 65–79 and ≥80 years appear to be increasing over time. Māori experience higher rates across all age groups, except those aged >80 years. Incidence rates of major trauma per 100,000 people for those aged <80 years are lowest for Asian peoples.

Figure 3: Annual major trauma caseload by age group, 2018/19–2022/23

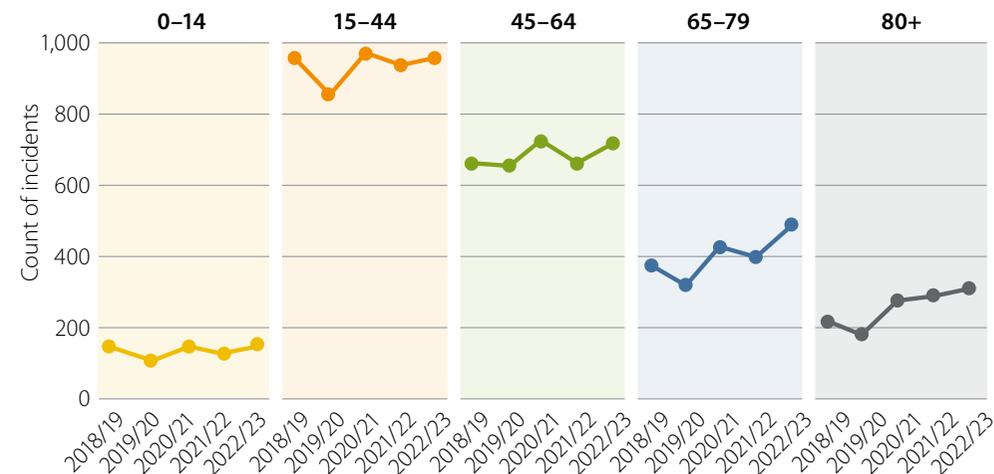
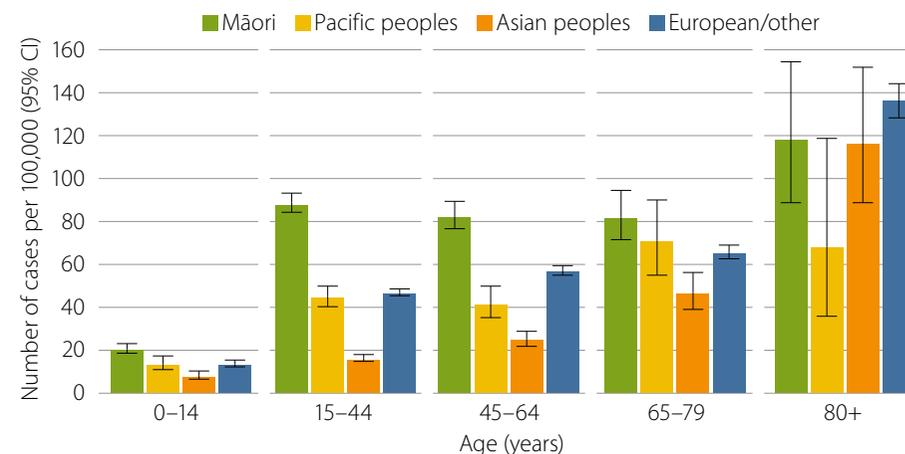


Figure 4: Annual major trauma incidence rate per 100,000 people by age group and ethnicity, 2018/19–2022/23. CI = confidence interval



Paediatric

The number of paediatric cases increased by 23 from last year. Over half of incidents for those aged <15 years involved a serious head injury, and this is a consistent trend year-on-year. Some of the lessons learned in the improvement projects for adult serious traumatic brain injury (sTBI) may be used to also improve the management and longer-term recovery of TBI in paediatric patients and their whānau.

Table 3: Number (percent) of major trauma cases with sTBI for those aged <15 years, 2018/19–2022/23

sTBI	2018/19	2019/20	2020/21	2021/22	2022/23
No sTBI	57 (39)	50 (47)	66 (45)	51 (39)	62 (41)
Has sTBI	88 (61)	56 (53)	80 (55)	79 (61)	91 (59)

The case fatality rate for this age group has declined this year after almost doubling between 2020/21 and 2021/22. Cases from previous years are being reviewed to identify factors that may have contributed to the increased number of paediatric deaths and opportunities to learn from them.

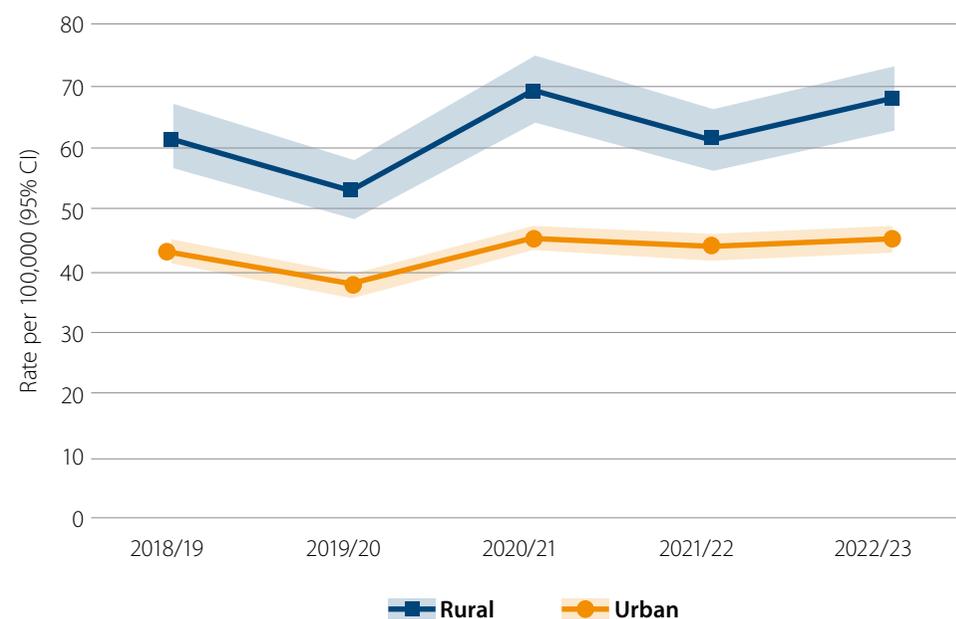
Table 4: Case fatality rate for those aged <15 years, 2018/19–2022/23, number (percent)

2018/19	2019/20	2020/21	2021/22	2022/23
8 (6)	6 (6)	9 (6)	15 (12)	≤5 (≤3)

Rurality⁴

Approximately 81 percent of people in Aotearoa live in urban areas. Over the last 5 years, approximately 74 percent of major trauma cases have occurred in urban areas. However, when viewed per 100,000 population, rates of major trauma are higher for people living in rural areas. Although fewer total cases, the higher rate is indicative of 19 percent of people in Aotearoa living rurally. The higher rate of major trauma for rural populations is largely attributable to transport-related incidents, particularly those involving cars and motorcycles. Among major trauma occurring in rural areas, a higher proportion is experienced among those aged 0–14 years and those aged >80 years.

Figure 5: Annual major trauma incidence rate and 95% confidence intervals per 100,000 people by geographic classification for health, 2018/19–2022/23



⁴ Rural/urban classification is based on Otago University's geographic classification for health using the patient's domicile at the time of the incident. See the University of Otago site 'Rural-urban classification for NZ health research and policy' for more detail: blogs.otago.ac.nz/rural-urban-nz. Broadly, the classification is based on travel distance from dense urban areas, defined by access to health services.

Figure 6: Annual major trauma incidence rate and 95% confidence intervals per 100,000 people by geographic classification for health and mechanism of injury, 2018/19–2022/23

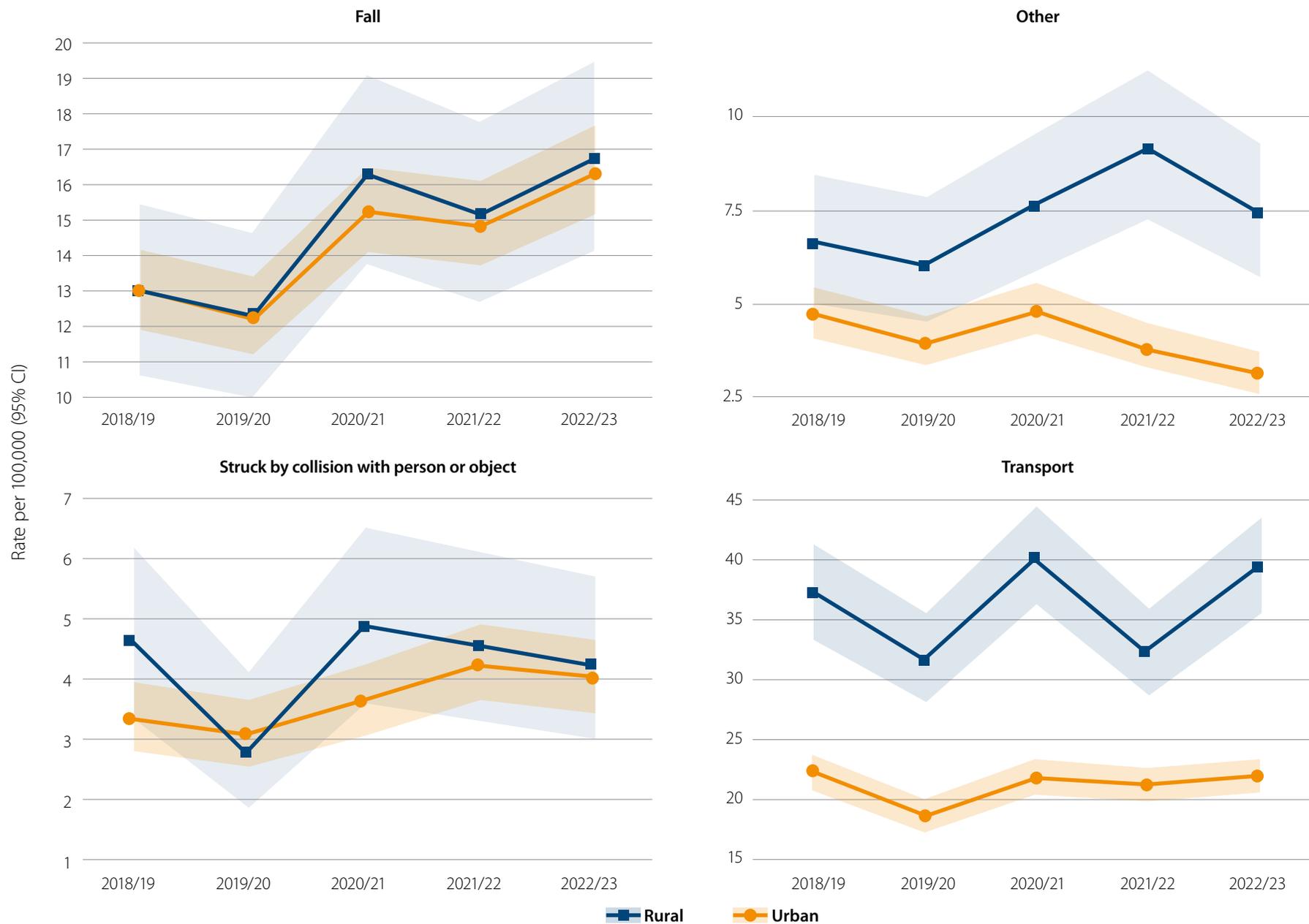


Figure 7: Annual major trauma incidence rate and 95% confidence intervals per 100,000 people by geographic classification for health and mechanism of injury for transport incidents, 2018/19–2022/23



We continue to see an increase in the number of older people experiencing major trauma and disproportionate rates across ethnicities and geographies. These present opportunities to understand risk factors that may support targeted campaigns to reduce these rates.

Outcomes after admission to hospital

This year, 219 people died from major trauma, with a case fatality rate of 8.3 percent. Trends in case fatality rates across age groups were consistent between 2018/19 and 2022/23. Some variation has been observed with paediatric case fatality rates (see Table 4).

Table 5: Case fatality rate, 2018/19–2022/23, number (percent)

2018/19	2019/20	2020/21	2021/22	2022/23
203 (8.6)	153 (7.2)	209 (8.2)	184 (7.6)	219 (8.3)

Table 6: Case fatality rate by age group, 2018/19–2022/23, number (percent)

Age (years)	2018/19	2019/20	2020/21	2021/22	2022/23
15–44	50 (5.2)	32 (3.8)	52 (5.4)	34 (3.6)	51 (5.3)
45–64	43 (6.5)	41 (6.2)	40 (5.5)	31 (4.7)	44 (6.1)
65–79	47 (12.5)	32 (10)	49 (11.4)	44 (11)	53 (10.9)
≥80	55 (25.6)	42 (23.3)	59 (21.2)	60 (20.5)	66 (21.2)

The proportion of deaths caused by haemorrhage continued to decline (3.7 percent or eight cases of death due to haemorrhage) and was the lowest since the registry began. The proportion of deaths from ‘other/unknown’ causes increased to 12 cases (5.5 percent). All other causes of death remain consistent with those in previous years.

Table 7: Number (percent) of deaths by cause, 2018/19–2022/23

Cause of death	2018/19	2019/20	2020/21	2021/22	2022/23
Central nervous system	128 (63.1)	99 (64.7)	139 (66.5)	117 (63.6)	137 (62.6)
Haemorrhage	26 (12.8)	15 (9.8)	28 (13.4)	10 (5.4)	8 (3.7)
Medical	23 (11.3)	13 (8.5)	26 (12.4)	36 (19.6)	42 (19.2)
Multi-organ failure	17 (8.4)	12 (7.8)	13 (6.2)	17 (9.2)	20 (9.1)
Other/unknown	9 (4.4)	14 (9.2)	3 (1.4)	4 (2.2)	12 (5.5)

Risk-adjusted mortality – standardised mortality ratio

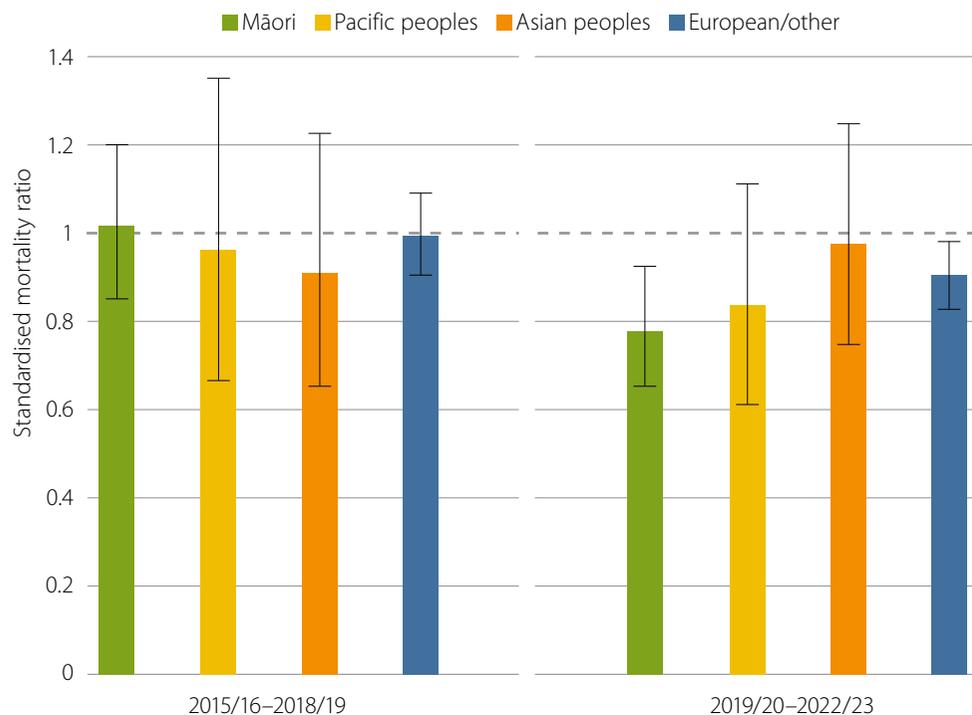
From 2015/16, when the New Zealand Trauma Registry began, to now, we have seen a general improvement in case fatality rate, as demonstrated over previous annual reports. Adjusting for age, physiological markers of severity, anatomical injury and mechanism of injury, the standardised mortality ratio also shows a reduction in mortality, with the most recent 2 years having a ratio significantly lower than 1 (Figure 8). This suggests that the systems of care across Aotearoa are achieving the primary goal of improving the survivability of major trauma.

Figure 8: Standardised mortality ratio with 95% confidence intervals, 2015/16–2022/23



When broken down by ethnicity, the standardised mortality ratio was close to 1 for all ethnicities from 2015/16 to 2018/19, when the national quality improvement programme began. Since the introduction of the programme, mortality for Māori, European and other ethnicities has reduced to be significantly less than 1. Although this suggests that the introduction of the trauma quality improvement programme may be having an impact, more analyses are required to understand the contributing factors to this reduction in expected mortality, particularly among Māori.

Figure 9: Standardised mortality ratio by ethnicity with 95% confidence intervals, 2015/16–2022/23



Processes of care

Ideally, patients are transferred from the scene of injury directly to a hospital that can provide definitive care. Sometimes this does not happen because geography makes it difficult, the patient has time-critical injuries or the nature of their injuries is not recognised early. Therefore, some patients are first transported to a nearby hospital and later transferred for definitive care.

For all of Aotearoa over the last 5 years, 80 percent of patients were transported directly to a definitive care hospital. There is some variation across the country, with the South Island consistently transporting more directly to definitive care (83 percent) compared with the northern region (76 percent).

Table 8: Percentage of patients directly transported to definitive care, 2018/19–2022/23

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

Since 2018/19, the time taken to transport patients directly to definitive care has remained consistent (Table 9). The greatest variation in time to definitive care is among patients transferred from regional hospitals. Although the proportion of patients transported directly to definitive care decreased in the central region in 2022/23, the median time from incident to arrival at definitive care for those transported reduced by 2 hours.

Table 9: Median time (hours) from incident to arrival at definitive care for those transported direct from scene, 2018/19–2022/23

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

In 2022/23, the time taken to transfer patients to definitive care in the South Island was almost 4 hours longer than in 2021/22 (Table 10). Notably, scene location combined with the geography of the South Island may contribute to observed variation in rates of primary transfers to definitive care. As such, this result appears to be within a normal pattern of longer transfer times for the South Island since 2018/19. Although this involved only 16 percent of major trauma cases in 2022/23, it is important that decisions around direct transport options are explored as early as possible.

Table 10: Median time (hours) from incident to arrival at definitive care for those transferred, 2018/19–2022/23

Region	2018/19	2019/20	2020/21	2021/22	2022/23
Northern	9.8	11.8	11.3	10.5	11.3
Te Manawa Taki	8.6	9.0	8.5	10.7	10.3
Central	15.3	10.9	16.1	13.7	12.1
South Island	17.0	19.1	13.9	11.2	14.8
National	11.1	12.6	12.0	11.2	11.8

Trauma call on arrival 

Trauma calls are a feature of a contemporary trauma system. They initiate a process to mobilise clinical teams to an emergency department to ensure effective management of a patient with serious or complex injuries. Variations in staffing mean that trauma calls occur in a greater proportion of cases at large and tertiary hospitals. Given the benefits of trauma call activation on management of care, future work could focus on increasing the precision of activations across all facilities, particularly our medium/large secondary hospitals, which show year-on-year reductions in trauma call activations.

Table 11: Percentage of patients with a trauma call by size of hospital, 2019/20–2022/23

Size of hospital	2019/20	2020/21	2021/22	2022/23
Small secondary	30	30	30	28
Medium/large secondary	50	48	46	43
Tertiary	64	63	61	62

While these measures have been explored in previous annual reports, other factors that appear to influence whether a trauma call is triggered include injury severity and mechanism of injury. Transport incidents have a higher proportion of trauma calls than other mechanisms and may contribute to the observed variation in trauma calls by ethnicity.

Table 12: Percentage of patients with a trauma call by ethnicity, 2019/20–2022/23

Ethnicity	2019/20	2020/21	2021/22	2022/23
Māori	57	65	61	59
Pacific peoples	63	54	58	56
Asian peoples	59	57	61	53
European/other	53	50	48	48

Tertiary survey 

Tertiary surveys are undertaken to identify injuries that have become evident after initial investigations. This enables new identified injuries to be appropriately managed and ensures any required rehabilitation or follow-up care is provided to ensure the best possible outcome. There has been a notable annual improvement in the completion rate of tertiary surveys since data collection began in 2019/20. This is true across regions and hospital size. In 2022/23, the number of tertiary surveys completed continued to increase in smaller hospitals but plateaued in the larger tertiary hospitals.

Table 13: Percentage of patients with a tertiary survey by size of hospital, for those who survived to discharge, 2019/20–2022/23

Size of hospital	2019/20	2020/21	2021/22	2022/23
Small secondary	20	47	48	59
Medium/large secondary	25	49	60	68
Tertiary	47	57	62	62

The percentage of tertiary surveys completed each year has consistently improved among Māori and European/other ethnicities. Among Asian and Pacific peoples, completions initially improved in previous years but reduced or plateaued in 2022/23.

Table 14: Percentage of patients with a tertiary survey by ethnicity, for those who survived to discharge, 2019/20–2022/23

Ethnicity	2019/20	2020/21	2021/22	2022/23
Māori	38	58	62	69
Pacific peoples	26	46	56	54
Asian peoples	36	58	70	57
European/other	37	52	58	63

Given the importance of identifying all injuries to ensure optimal management of care during rehabilitation and recovery, there is room to improve tertiary survey completion rates across all ethnicities and hospital sizes.

Post-traumatic amnesia (PTA) assessment

TBIs may occur during a major trauma event with or without indication of a head injury. To ensure we could identify whether the 2022/23 quality improvement programme was improving processes of care for TBI, we included completion rates for PTA assessment (yes/no/unsure) in the national trauma registry for the first time.

The sTBI expert advisory group recommended the scope for the quality improvement initiative work towards all patients hospitalised for major trauma with injuries to two or more body regions receiving a PTA assessment. A validated tool, such as the full Westmead PTA Scale, provides a more sensitive indication of severity of brain injury, can predict functional outcome and enables appropriate rehabilitation pathways to be determined.

Table 15 provides a baseline into the progress of PTA assessment rates across regional networks. In three of the four regions, PTA assessment had most often been completed where head injury was indicated but much less so where there was no indication of head injury.

Through the quality improvement programme and improvements to registry data definitions, work is planned through 2023/24 to ensure the collection of PTA information is embedded into the workflow of trauma teams across Aotearoa regardless of indication of head injury.

Table 15: Number (percent) of major trauma cases with a PTA assessment by definitive care region and indication of head injury (scene Glasgow Coma Scale score of <15 and/or any recorded Abbreviated Injury Score injury to the head), for those who survived to discharge, Q3–Q4 2022/23

Definitive care region	Indication of head injury	No indication of head injury
Northern	180 (68)	28 (23)
Central	98 (75)	52 (55)
South Island	150 (73)	44 (27)
National	428 (71)	124 (33)

Part 2: Quality improvement

Te Tāhū Hauora Health Quality & Safety Commission (Te Tāhū Hauora) has continued to lead the quality improvement programme of the National Trauma Network. This year was the final year of the inaugural 5-year contract to provide this leadership to the Network. This contract has been extended for an additional 2 years to embed and further develop the quality improvement programme.

Te Tāhū Hauora has increased the capability of the trauma workforce to embed quality improvement approaches into their local services and facilitate priority improvement projects. Investment in quality improvement programmes has contributed to the reduction in expected mortality since their inception. This section describes progress on a number of priority areas throughout 2022/23.

Haemorrhage

The critical haemorrhage project aimed to reduce mortality from haemorrhage and associated multi-organ failure. Each year since publication of the critical bleeding bundle of care, haemorrhage⁵ mortality rates have declined because of early recognition of critical bleeding and accelerated movement through treatment processes to definitive surgical bleeding control. In 2021, deaths from haemorrhage accounted for 12.3 percent of trauma mortality in Aotearoa. This more than halved to 5.6 percent by 2022 and to 3 percent in 2023 (see Table 7).

The risk of someone experiencing critical bleeding can be estimated by considering a number of factors. These factors contribute to the haemorrhage risk index (HRI), which ranges from 0 (lowest risk) to 6 (highest risk), with a score ≥ 3 indicating high risk. A higher risk score indicates a higher likelihood of critical bleeding. One indicator of improved management of critical bleeding is related to the number of deaths in patients considered at high risk of haemorrhage. Since the release of the critical bleeding bundle of care, we have seen yearly reductions in case fatality rates for those with an HRI > 2 .

Table 16: Case fatality rate (number [percent]) for those with an HRI > 2 (excludes central nervous system deaths), 2020/21–2022/23

2020/21	2021/22	2022/23
21 (19.3)	11 (11.8)	13 (9.8)

The critical bleeding bundle of care has been designed specifically so it can be adapted to meet the needs of local models of trauma care, including resourcing and infrastructure. This has successfully demonstrated that initiatives intended to deliver national consistency can be adapted locally to ensure improvement across Aotearoa.

A survey of hospital services 24 months after the bundle was published showed that almost 80 percent of sites had in place a formal activation protocol for critical haemorrhage, up from 54 percent at 12 months. The use of simulation training has also been undertaken in most emergency departments and operating theatres across Aotearoa to embed the bundle of care principles into practice. Critical haemorrhage from trauma remains a rare occurrence for many hospitals; this approach supports increased clinical confidence. Teams have also been enabled to undertake clinical case reviews to enable continuous learning opportunities.

Traumatic brain injury

Overview

Improving the management of serious traumatic brain injury (sTBI)⁶ has been a priority of the Network for the past 2 years. Dr David Knight spent a year scoping opportunities across the sector, then led the TBI quality improvement programme through acute and rehabilitation workstreams. The acute workstream focused on guidance for transportation and transfer between regional hospitals and neuroscience centres. The rehabilitation workstream focused on enabling and empowering hospital trauma teams to best identify the presence and severity of brain injury across all patients hospitalised for major trauma. This section highlights some of the key measures being used to monitor progress of this quality improvement programme.

Table 17 shows the characteristics of TBIs over 2022/23. Although injury severity scores are similar for those with and without TBI, the case fatality rate is over three times higher for those with an isolated TBI.⁷ In 2022/23, only 67 percent of patients with an isolated TBI received an index computed tomography (CT) scan within 2 hours. For complex TBI,⁸ the case fatality rate increased from 14.9 percent in 2021/22 to 22 percent in 2022/23. Despite the increased fatality rate, more people are accessing neuroscience centres for definitive care, and the proportion of patients receiving CT within 2 hours increased from 79 percent to 88 percent. This data suggests that processes in care continue to improve, particularly for patients with complex TBI.

- Te Tāhū Hauora Health Quality & Safety Commission. 2021. Improving trauma care for critically bleeding patients: A national best-practice critical bleeding bundle of care with associated guidance and massive transfusion protocol. URL: www.hqsc.govt.nz/resources/resource-library/improving-trauma-care-for-critically-bleeding-patients-a-national-best-practice-critical-bleeding-bundle-of-care-with-associated-guidance-and-massive-transfusion-protocol-2
- For the purposes of this quality improvement project, a serious traumatic brain injury was a broad definition that included: **Severe traumatic brain injury:** GCS < 9 following application of an external force to the head; **Severe anatomical traumatic brain injury:** Abbreviated Injury Scale (AIS) Head score > 2 . CT defined anatomical brain injury; **Moderate-severe brain injury:** Brain injury defined by length of post traumatic amnesia (PTA) and potentially referenced to determine rehabilitation pathway.
- An isolated severe brain injury was defined as an Abbreviated Injury Score head & neck (AIShead) of three or more with no significant injury in other regions (defined as an Abbreviated Injury Score of more than two).
- Similar to an isolated brain injury except the individual experiences another significant injury to another region of the body, thus making the injury complex, more than one body system.

Table 17: Characteristics of TBIs, 2022/23

Characteristic	Complex TBI	Isolated TBI	No TBI
Caseload, n (%)	299 (11)	667 (25)	1,662 (63)
Median (mean) age, years	45 (46)	56 (51)	51 (50)
Case fatality rate (%)	22	13	4
Median (mean) Injury Severity Score	29 (32.2)	17 (20)	17 (18.7)
Neuroscience centre for definitive care (%)	77	72	NA
Trauma call on arrival (%)	77	36	53
Median minutes until index CT	50	74	73
Less than 2 hours until CT (%)	88	67	68

NA = not applicable.

The assessment of patients at the scene can influence transport decisions as well as urgency for diagnostic testing upon presentation to hospital. If a person presents with impaired consciousness (Glasgow Coma Scale [GCS] score of ≤ 13), there is a higher urgency to determine if this is related to internal injury, reducing the time to CT. Table 18 indicates that time to CT is faster for those with than for those without impaired consciousness.

Table 18: Median time to index CT by level of cognitive impairment, 2018/19–2022/23

Scene GCS indicates	Median minutes to CT
Impaired consciousness	51.5
No impaired consciousness	79.0

CT = computed tomography.

Acute workstream

This year, 23 percent of complex TBI and 28 percent of isolated TBI patients received care in a non-neuroscience hospital that is unlikely to have nursing and allied health resources familiar with managing sTBI. Patients with sTBI will likely benefit from the specialised nursing and allied health resources commonly available in neuroscience centres, regardless of need for neurosurgical intervention.

Table 19: Number (percent) of patients with sTBI at a neuroscience centre as their first hospital, 2018/19–2022/23

Ethnicity	2018/19	2019/20	2020/21	2021/22	2022/23
Māori	85 (45)	57 (38)	87 (43)	99 (44)	107 (43)
Pacific peoples	23 (47)	22 (56)	32 (58)	21 (36)	33 (49)
Asian peoples	49 (68)	30 (57)	39 (57)	35 (66)	46 (64)
European/other	306 (59)	243 (53)	284 (52)	283 (53)	325 (56)

Rates of transport or transfer to a neuroscience centre had been steadily declining over the last 4 years; however, we have observed an increase in the number of Pacific peoples receiving first (49 percent) or definitive (79 percent) care for sTBI at a neuroscience centre. We hope this may be an early reversal of the trend. Despite this improvement, Pacific and Māori populations remain the least likely to go to a neuroscience centre as their first hospital. As a result, if they are transferred, the time that elapses before they arrive at the centre for definitive care is much longer than for other ethnic groups.

This variation may be related to geography, for example, more Māori people live rurally, which means they are less likely to be directly transported to a neuroscience centre. Although destination policies may not enable improvement in this measure, it may be an opportunity to reinforce the importance of early transfer from regional hospitals to neuroscience centres as an ongoing measure for the acute sTBI quality improvement programme.

The first year of the acute sTBI quality improvement programme has sought to ensure all patients with a severe TBI, defined for the purposes of this programme as a pre-intubation GCS score of < 9 and an abnormal CT head scan, are managed within a neuroscience centre, irrespective of their need for neurosurgery. In collaboration with subject matter experts and key stakeholders, [guidelines \(aka action plans\)](#) were developed to promote equitable access to specialist services for the patients most likely to benefit from admission to a neuroscience centre. To support a learning culture, an [audit tool](#) was developed to allow clinicians and local and regional trauma teams to learn from cases that are not transferred within the desired 24 hours. We expect these measures to continue to improve.

Table 20: Number (percent) of patients with an sTBI at a neuroscience centre as their definitive care hospital, 2018/19–2022/23

Ethnicity	2018/19	2019/20	2020/21	2021/22	2022/23
Māori	142 (75)	118 (79)	147 (73)	168 (74)	182 (73)
Pacific peoples	40 (82)	31 (79)	40 (73)	36 (61)	53 (79)
Asian peoples	63 (88)	41 (77)	50 (74)	42 (79)	55 (76)
European/other	389 (75)	334 (73)	383 (70)	368 (70)	418 (72)

Rehabilitation workstream

During the 2022/23 quality improvement programme, Te Tāhū Hauora used the Institute for Healthcare Improvement breakthrough series collaborative methodology⁹ to work with nine hospital teams from across Aotearoa to identify opportunities to improve the collection of PTA assessment data for all patients hospitalised with major trauma.

Participating teams identified a number of challenges related to identifying and assessing the severity of TBI. Patients would often be distributed across hospital units – such as cardiothoracic wards, orthopaedics or general medicine – according to the nature of other distracting injuries. Often CT scans would not indicate the presence of a TBI, which reduced the priority of further assessing for and managing an undiagnosed TBI. A broad range of clinical assessment tools were being used at various points, with variable validity and reliability. Additionally, clinical team members had varying levels of capacity and capability to assess the presence and severity of a TBI.

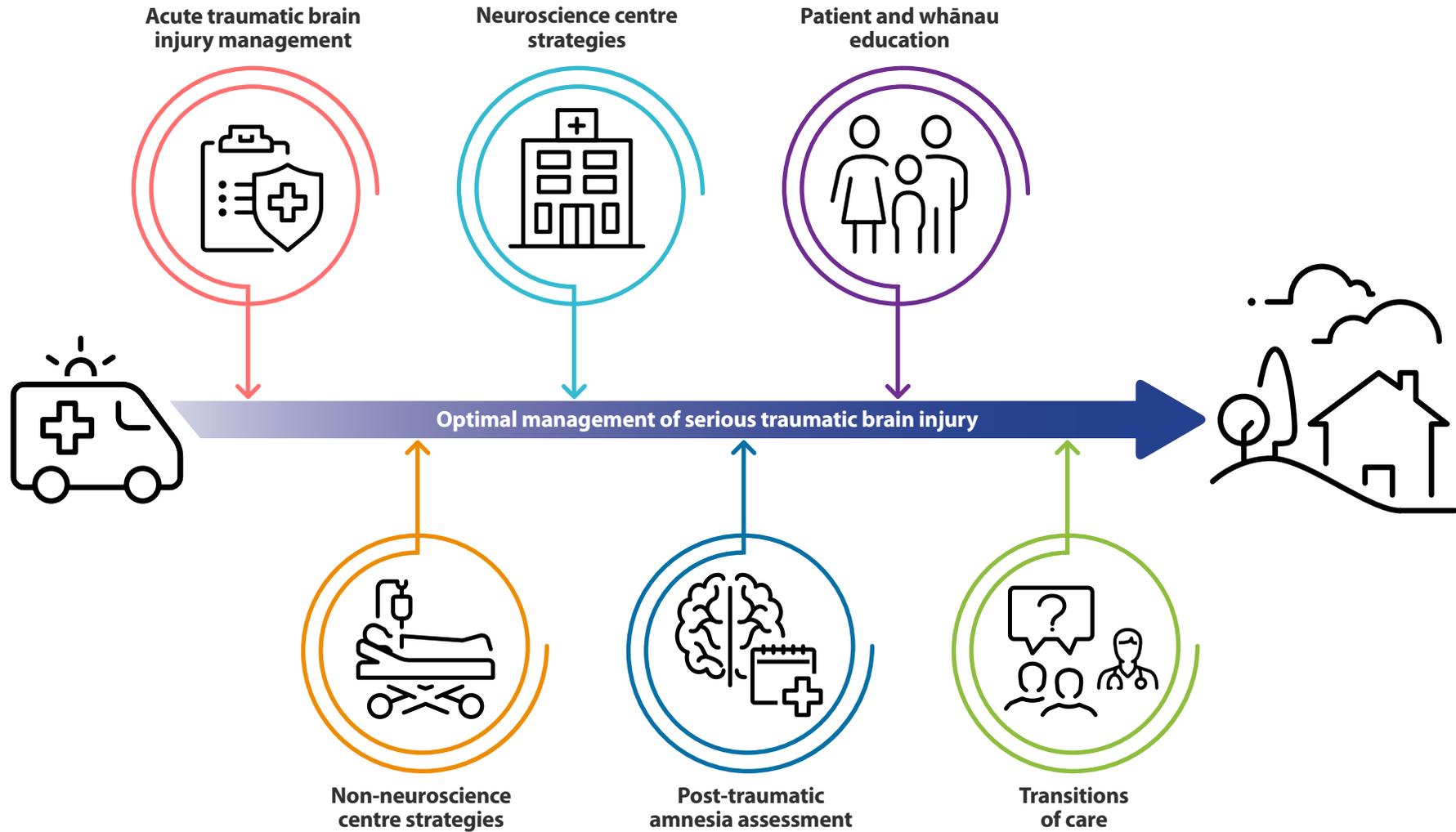
During the collaboratives, teams contributed to a broad range of lessons learned and opportunities for continuous improvement across all Aotearoa hospitals in 2023/24. These include:

- the use of clinical education resources to support consistent and reliable understanding and use of the full and abbreviated Westmead PTA assessment tools
- the increased use of multidisciplinary team members, such as physiotherapists or occupational therapists, to undertake the required screening and assessments for TBI
- building capabilities of team members to assess and discharge over weekends
- the development of patient/whānau-centred resources to enable a positive experience for patients discharged to community rehabilitation services.

⁹ The Breakthrough Series: IHI’s Collaborative Model for Achieving Breakthrough Improvement. IHI Innovation Series white paper. Boston: Institute for Healthcare Improvement; 2003. URL: www.ihl.org.



Overview of traumatic brain injury project



Rehabilitation

Rehabilitation has been a significant and ongoing priority during the 2022/23 year. Widespread publication of the rehabilitation collaborative projects undertaken in 2021/22 has resulted in international interest from colleagues wishing to learn from the progress made in Aotearoa. Clinical lead Kat Quick presented this work at the World Injury Prevention Conference in 2022, the World Trauma Congress 2023 and the Australian & New Zealand Trauma Society Trauma Conference 2023.

These collaboratives have also enabled increased allied health involvement in the multidisciplinary team for trauma care. The profile of the allied health trauma workforce is growing in strength, with allied health representation across the four trauma regional groups and regular cross-region allied health meetings being held to share service improvements and support collaboration.

Substantial time has been spent learning about the gaps in rehabilitation service provision and access. Subsequently, a working group was established between the Network, ACC and Te Tāhū Hauora to target improvements in how major trauma patients transition from acute care into the community. A robust plan to test and trial improvement opportunities from this group in clinical practice is due to start in early 2024.

Rehabilitation has been recognised as an integral part of trauma care and successfully woven into the sTBI and upcoming chest trauma project. The importance of rehabilitation in affecting the quality of life of major trauma survivors has been recognised with the inclusion of rehabilitation as a key workstream within the quality improvement programme until June 2025.

Patient-reported outcome measurement

With more people surviving major trauma, our systems need to consider longer-term outcomes that focus on survivors' quality of life. Patient-reported outcome measures are a tool that can help us understand those longer-term outcomes and provide insights into the effectiveness of our rehabilitation system in supporting recovery from major trauma. The Network, in conjunction with Te Tāhū Hauora and the University of Otago, engaged a cohort of major trauma survivors who were injured between 1 July 2020 and 30 June 2021. These patients helped us get a snapshot of the patient-reported outcomes 2 years after each person's injury event.

Paretian classification of health change

The EQ-5D-5L is a health status measure composed of five questions in five dimensions of health: mobility, self-care, usual activities, pain and discomfort, and anxiety and depression. Participants complete these surveys at 6, 12 and 24 months following injury and respond to each dimension on a Likert scale with five levels of severity: no problems, slight problems, moderate problems, severe problems and unable to perform or extreme problems.

A Pareto classification of 'improve' indicates that the participant has improved in at least one domain and not worsened in any domain of the EQ-5D-5L, whereas a classification of 'worsen' indicates the opposite. A mixed change indicates that a participant has improved and worsened in different domains. A classification of 'no problems' indicates that participants report no problems on the EQ-5D-5L at both 6 and 12 months. The Pareto classification does not tell us anything about the magnitude of change in health state.

The consistent proportion of people who report only worsening in one or more quality-of-life domains indicates the importance of understanding the various personal, clinical and system factors that may contribute to a worsening quality of life for a significant number of major trauma survivors.

Table 21: The Pareto classification of health change for the major trauma cohort between 6 and 12 months and 12 and 24 months, number (percent). Note: only those who responded at both time points are included.

Period	Improved	Mixed	No change	No problems	Worsened
Between 6 and 12 months	246 (33)	241 (32)	41 (5)	56 (7)	167 (22)
Between 12 and 24 months	239 (34)	194 (27)	47 (7)	60 (8)	170 (24)

World Health Organization Disability Assessment Schedule (WHODAS) level of disability

The WHODAS is an assessment instrument developed by the World Health Organization to measure health and disability. The 12-item survey covers six domains of functioning: cognition, mobility, self-care, interacting with others, life activities and participation in activities. As with the EQ-5D-5L, participants respond to survey questions on a five-point Likert scale (none, mild, moderate, severe and extreme/cannot do) to identify the amount of difficulty they have had in these areas in the past 30 days. Level of disability is calculated by converting the sum of an individual's 12 WHODAS responses to a percentage. A total WHODAS score in the bottom 25 percent indicates mild and in the top 25 percent indicates severe; scores between those percentages can indicate moderate or high.

Figure 10 shows the movement of respondents between reported levels of disability over the three time periods. There is a significant amount of movement between disability levels and many patients who report high/severe disability moving to non-response.

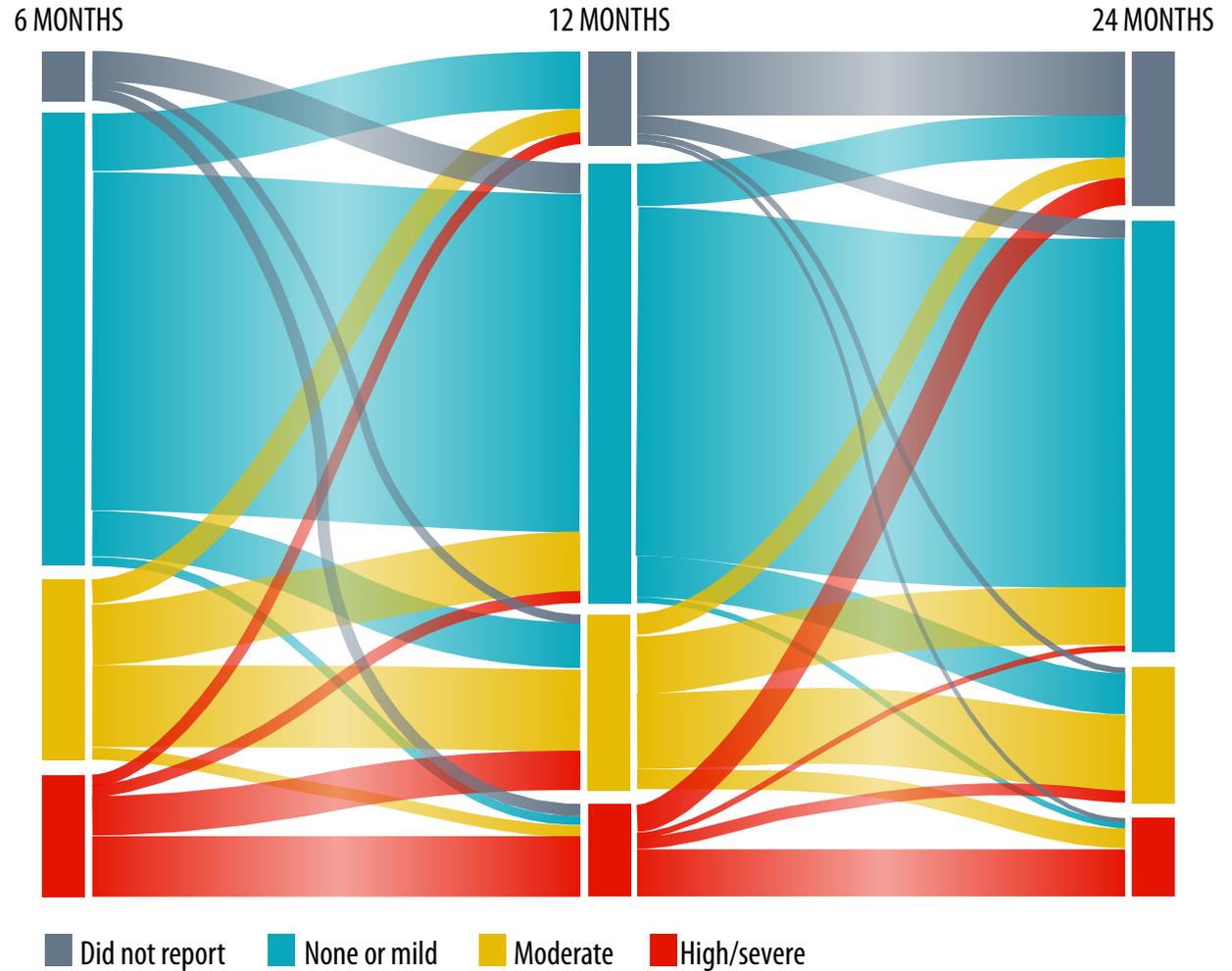


Figure 10: Movement between WHODAS disability levels

Figure 10 and Table 21 demonstrate that recovery from major trauma can be complicated. Many factors are likely to contribute to these outcomes. Specifically, it is necessary to understand the population of people who worsen in the health-related quality-of-life domains or experience consistently moderate to high levels of disability. This may help us determine the services or supports that need investment to enable our trauma system to optimise quality of life for major trauma survivors.

Part 3: Network Reports

National Trauma Network

The aims of the Network are to reduce mortality, improve the level of disability of those who survive and create system efficiencies. The focus of the Network is on pre-hospital care, acute hospital care, rehabilitation and informing injury-prevention initiatives. This report describes the progress made against the four areas described in the Strategic Plan 2017/18–2022/23.

Governance

This is the final Network annual report under a contracted leadership model. Supported by members of the governance committee, the Network has built a contemporaneous trauma system for Aotearoa that has saved lives, improved the consistency of care and increased the visibility of trauma services across Aotearoa.

From 1 July 2023, Te Whatu Ora became the lead agency for the National Trauma Network. As the governance of the network evolves with the national clinical network model, we acknowledge the contributions of all clinical leaders involved in the governance (and delivery) of the trauma network and that their leadership will enable a strong foundation for the future.

Service excellence

An admitting trauma service is key to the delivery of optimal care in a tertiary trauma centre. This element is an essential part of the Royal Australasian College of Surgeons (RACS) verification of a Level 1 centre. Christchurch has worked hard to maintain their service, but Wellington does not yet have an admitting trauma service. The central region will undergo RACS trauma verification in February 2024.

The National Trauma Research and Audit Committee continues to develop its role. Post-traumatic stress disorder and sTBI are major areas of health loss associated with trauma and have historically been poorly understood. With the increasing emphasis on sTBI in the quality improvement programme and the introduction and reporting of a data element in the national trauma registry, post-traumatic stress disorder is a more challenging area and may be an area to explore in future.

Enablers

The national trauma registry continues to enable local, regional and national conversations around network priorities. Te Tāhū Hauora has worked closely with the national and regional networks to build fit-for-purpose business intelligence tools. These data visualisation dashboards support the translation of registry data into information through publication of a range of measures. Continuing to refine these dashboards will be vital to ensure equal access to information around areas of national priority.

Workforce

Building a multidisciplinary team approach to trauma care has been a priority across the Network, especially within the quality improvement programme. Under the leadership of Kat Quick, the clinical lead for rehabilitation, the engagement of an allied health workforce in trauma care continues to grow. This growth has supported the delivery of quality improvement projects in sTBI and rehabilitation and resulted in increased contribution to national and regional allied health committees.



Kat Quick, clinical lead, rehabilitation

The capacity of the trauma nurse workforce across the country continues to improve, but the resource-to-caseload ratio continues to vary widely. This is concerning because the lower-resourced hospitals cannot undertake the necessary case management and quality improvement activities. Enabling our trauma teams to foster a multidisciplinary approach to trauma care has been an integral part of Network activities.

Research

Members of the Network continue to contribute to the growing body of trauma research in Aotearoa. For details of the publications, see Appendix B.

This year, the research programme continued to support the Study of Road Trauma Evidence and Data (SORTED), which links data across multiple health and transport datasets to provide an accurate and comprehensive view of road trauma in Aotearoa. Importantly, it identifies the gaps in current understanding, particularly around motorcycle and bicycle injuries, making an important contribution to injury prevention initiatives.

The patient-reported outcomes measurement project approached its conclusion and will continue to provide important insights into the longer-term impacts of major trauma on the quality of life of survivors. Although this work is, by definition, a quality improvement programme, it will offer some intelligence to the wider patient-reported outcome measurement community across Aotearoa.

Investments into a major trauma research programme for Aotearoa were also strengthened when ACC announced their commitment to fund an annual major trauma research grant beginning in the 2024 academic year. This programme will be supported by the National Trauma Research and Audit Committee and the Network research lead, Belinda Gabbe.

Awards

In 2021, the Network submitted its 2020/21 annual report to the Plain English awards and were delighted to receive the prize for best annual report. The 2021/22 report received an award of distinction. Public-facing reports such as the annual report of the Network and Registry must be presented in language easily appreciated by lay readers, and these awards reflect that achievement.



NetworkZ

Trauma NetworkZ is a well-established multidisciplinary training programme that has been rolled out to emergency departments across Aotearoa. The programme includes a bank of scenarios for emergency departments to use according to their learning needs. In 2022/23, 332 participants were trained despite record high hospital occupancy, winter staff shortages and high workloads.

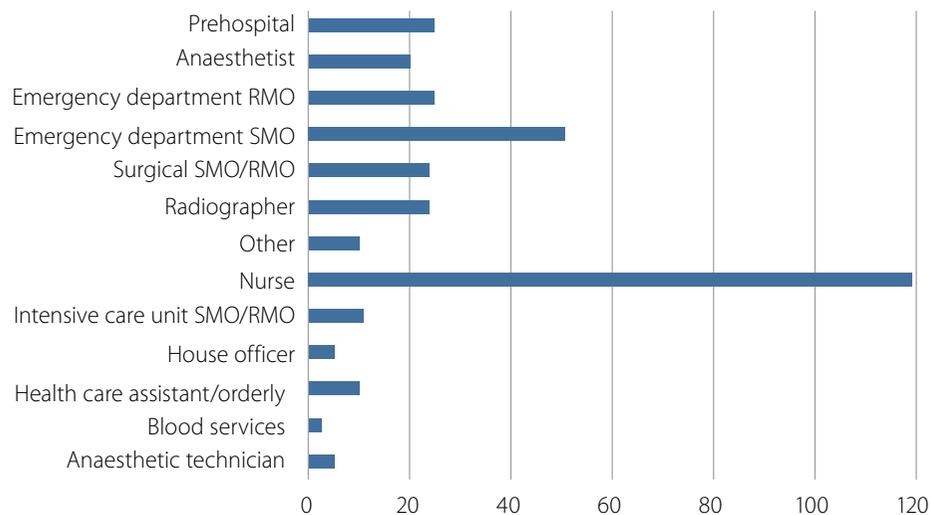


Figure 11: Roles trained using NetworkZ scenarios from 1 July 2022 to 30 June 2023. RMO = resident medical officer, SMO = senior medical officer

Feedback from participants and hospitals has been positive, with many asking for more simulation training and for it to be extended to include the entire hospital journey.

The New Zealand Blood Service has worked with NetworkZ to highlight areas for improvement in the ordering, transfusion and conservation of blood products in the trauma setting. This relationship has continued with the national implementation of the Massive Haemorrhage Pathway and Code Crimson in 2022/23.

NetworkZ has consulted with Māori advisory groups within both the University of Auckland and Te Toka Tumai to ensure the programme maintains a focus on equitable outcomes for both course participants and patients.

NetworkZ aims to identify situations that could lead to adverse events. A prospective study of the latent safety threats identified in post-course reports is now under way and will include staff interviews to better understand the barriers to and facilitators in addressing such threats. The research team will produce a list of recommendations that could improve patient safety.

Local emergency departments are using the post-course reports to highlight the latent threats to health service quality and to influence improvement. Themes such as logistics, processes of care and communication have been identified and led to changes in processes, equipment training and ergonomics. An example of this is pictured, with a leader vest introduced to enhance communication within the trauma team.



Taranaki emergency department, October 2022



Leader vest in Tauranga emergency department, April 2023

Northern region

The Northern Regional Trauma Network (NRTN) supports the entire patient journey. It has well-established and broad representation from pre-hospital, acute, rehabilitation and population health. This ensures equity and Te Tiriti principles are considered in all work undertaken by the NRTN.

The northern region has the highest caseload of major trauma in Aotearoa: 44 cases per 100,000 population, a total of 847 cases per year.

The regional work programme consists of permanent workstreams supporting NRTN's core functions that seek to ensure seamless regional trauma services for all patients. Biennial workstreams are also identified that target priority issues and areas of high need. Ad hoc quality improvement that supports both local and regional pathways to improve patient outcomes is continuous.



Permanent workstreams are supported by bimonthly Network meetings that host regional clinical case audits and quarterly clinical case reviews for potentially preventable major trauma deaths, including all those due to haemorrhage and pre-hospital deaths attended by ambulance services.

Permanent workstreams also include: maintaining a minimum standard of care through implementation, monitoring and continuously refining key practice guidelines and policies; consistently capturing regional registry data; and aligning with priority national initiatives.

The region identified the following biennial workstreams progressing throughout 2021–23.

Improving outcomes for patients with moderate brain injury through implementation, auditing and continuous improvement of the 'regional neurosurgery communication and follow-up' pathway between regional hospitals without neurosurgery and the tertiary neurosurgery service. In addition, work continues to monitor and audit the 'management of moderate traumatic brain injuries in a non-neurosurgical centre' pathway.

Improving the quality of rehabilitation by taking part in a regional major trauma rehabilitation working group. This involves liaising with key stakeholders to draft a major trauma rehabilitation model of care that complements the major trauma rehabilitation core standards rolled out the previous year, with a focus on supporting the early intervention of rehabilitation services at the onset of trauma care.

Standardising and developing e-trauma forms has progressed with the development and implementation of an e-tertiary survey across the region's trauma services.

Standardised data captured electronically will now be used for audit and measuring patient outcomes with a strong equity lens that will target local patient populations for quality improvement opportunities.

Quality improvement projects undertaken in 2022/23 include:

- Supporting Hato Hone St John with their revised destination policy to implement region-specific changes. A stakeholder group of senior medical officers representing regional hospitals was facilitated to reach a consensus on the proposed policy.
- Supporting the regional registrar trauma forum for trainees interested in trauma services and enabling research opportunities with a regional scope.
- Refining the 08004TRAUMA single point of contact for regional inter-hospital definitive care transfers to better enable timely and equitable service delivery.
- Establishing a regional working relationship with the local coroner's office to better support learning opportunities through clinical case audits.
- Revising the regional adult trauma guidelines to include severe facial bleeding, the extremity trauma – Gustilo classification table and presenting the Prometheus pelvic splint following the lead of pre-hospital services adopting and using this equipment.

Education

The NRTN consistently works to increase trauma team skills by creating education opportunities. The ACC Incentive Fund has supported nurse education, and multiple nurses have attended Trauma Nurse Coordinator Care and Emergency Management of Severe Burns courses and joined Te Manawa

Taki to take part in their locally hosted Trauma Care After Resuscitation course. A trauma clinical nurse specialist also attended and chaired sessions at the international Australia New Zealand Trauma Society annual conference. The NRTN sponsored the Starship paediatric trauma education evening for the sixth consecutive year. It continues to draw an audience of over 300 in-person and virtual attendances from across Aotearoa and Australia.

Looking forward

After reviewing local patient outcomes and international evidence, new biennial workstreams have been identified. These will continue to focus on addressing equity gaps and the 'postcode lottery' of care, including:

- improving pathways and outcomes for older people who experience a major trauma
- considering pathways to identify and support people experiencing psychological distress following major trauma
- developing a dashboard of major trauma key performance indicators that can identify equity issues, foster quality improvement and research opportunities and monitor outcomes of care. ●

Te Manawa Taki

The Te Manawa Taki trauma system admits more than 7,200 trauma patients to its facilities per year; 8 percent of these are major trauma patients. Our regional data shows that Māori are 33 percent more likely to be injured than non-Māori and highlights other inequities related to age and ethnicity, particularly Māori children and youth.

Quality improvement

Our trauma quality improvement and research programmes are identifying, understanding and working to reduce these inequities in partnership with other regional groups committed to the health and welfare of our communities.

We have focused on audits of process indicators, mortality reviews and inter-hospital transport policies. Quarterly reports for all of our facilities are produced from the regional registry so they can track trends and performance and ensure issues are identified and resolved.

Te Manawa Taki has been involved in national processes regarding major haemorrhage, severe TBI and rehabilitation pathways, and teams have actively participated in Te Tāhū Hauora quality improvement activities.

The Bay of Plenty team was the first to establish an allied health coordinator position to improve the transition of patients and whānau through hospital to community-based rehabilitation. This model has been successful, and we believe it should be adopted throughout the region.

A partnership between ĀKI Innovations, ACC and Waikato hospital ran a trial to improve the journeys of young Māori with TBI that is showing encouraging early results.

Education

The region ran three Trauma Care After Resuscitation courses this year. They were led by the clinical nurse specialist team, and staff acquired the knowledge and skills to care for trauma patients after the resuscitative stage in the emergency department. Feedback has been resoundingly positive, and we hope to continue with the support of ACC funding.

A regional webinar series devoted to trauma education, case presentation and review of local data was held over four evenings. These were well attended despite being 'after hours', and we will hold more as administrative support allows.



Regional registry upgrade

The regional registry contains approximately 80,000 patient events and provides an excellent platform for evidence-based service and system analysis. It forms the mainstay of our trauma quality improvement programme and provides population-based data for publications, presentations, prevention activities, education and training. More detail can be found at: www.midlandtrauma.nz/trauma-registry.

Discussions have been held to ensure we maintain use of this valuable data resource with the evolution of the National Clinical Network and the Data and Digital Directorates as they are embedded into Te Whatu Ora.

Research

Regional registry data continues to support research by helping to answer clinically relevant questions for our trauma patients and population. This year's published research included the following titles (see Appendix B for full references).

- Characteristics of patients hospitalised with TBIs.
- The "weekend effect" does not impact on outcome of trauma laparotomy – Experience from a level 1 trauma centre in New Zealand.
- Development of a standardized minimum dataset for including low-severity trauma patients in trauma registry collections in Australia and Aotearoa New Zealand.
- Surgical registrars' exposure to trauma laparotomy: A retrospective study from a level 1 trauma centre in New Zealand.
- Clinical decision making for abdominal stab wounds in high resourced but low volume centres require structured guidelines to be effective.
- Surgical registrars as primary operators have acceptable outcomes for trauma laparotomy.

The Te Manawa Taki network is extremely grateful for the ACC funding and uses it to support facility staff with education, audit, networking and presentation opportunities. In the last

year, ACC funds helped with delivering the Trauma Care After Resuscitation and Trauma Nursing Core Courses, enabling allied health and trauma nurse attendance and participation in national quality improvement programme events and supporting and sponsoring local trauma study days and local trauma audits. ●

- ▶ National Trauma Network
- ▶ Northern region
- ▶ Te Manawa Taki
- ▶ Central region
- ▶ South Island

Central region

In our 2022/23 central region trauma network annual summary, we reflect on a year of dedicated efforts and positive developments in trauma care across our region.

Our operations group remained busy throughout the year, leading quality improvement projects aimed at enhancing trauma care. We were pleased to see clinicians from the Te Pae Hauora o Ruahine o Taranaki MidCentral and Capital, Coast and Hutt Valley health districts participating in a national major trauma rehabilitation collaborative. Their projects emphasised the valuable role of our allied health staff in trauma patient care. We also made efforts to increase allied health representation on our district trauma committees and the regional operations and strategic groups.

We continued our work to standardise clinical care guidelines across the region, focusing on areas such as cervical spine clearance, major trauma radiology and major pelvic injuries. In the field of injury prevention, we identified falls among older individuals as an important area to address. Our trauma nursing team collaborated with older person health services to design a targeted audit, which will be undertaken in 2023/24.

A significant milestone was gaining approval and funding to undertake a region-wide trauma verification process with the RACS, which is now scheduled for early 2024. This review will cover all aspects of trauma patient care and the broader trauma systems and processes. We are enthusiastic about the opportunity to showcase our progress and gain insights for improvement. Preparing for the review has been a major focus of our work this year.

Lastly, we express our gratitude to all the dedicated members of our trauma teams across the region. We especially acknowledge Kendra Sanders for her exceptional work as our regional programme manager. Kendra has embarked on a new national role, and we are delighted to continue including her as part of our extended trauma whānau. ●



South Island

After the South Island Alliance removed their support for the major trauma workstream, the Network was re-formed and met in August 2022. The Network has been expanded to include most engaged trauma clinicians, relevant managers and transport providers.

Discussions to solidify this newly formed network within Te Whatu Ora are in progress, and ensuring data collection and reporting for all admitted trauma patients remains a top priority. Minimising manual entry and freeing trauma nurses to focus on increasing their clinical input, assisting skill development and embarking on substantial quality improvement initiatives is important.



Changes to the structure of health care across Aotearoa have coincided with ACC reviewing its funding support for both national and regional networks in the form of the ACC Incentive Fund. In 2022/23, the South Island network used approximately \$57,000 of this fund: to attend conferences (\$19,000) and to undertake educational activities, such as trauma nursing core courses (\$35,000) and Abbreviated Injury Score training (\$2,000).

Although some consider the South Island to be a single entity, in terms of trauma services it falls naturally and historically into three: Southern, comprising Southland and Otago; Canterbury/West Coast; and Nelson Marlborough, which feeds to both Christchurch and Wellington.

Southern

Over 2022/23, we have made a major effort to update and improve our mass casualty incident plans. We engaged in consultation to introduce the major haemorrhage pathway to both Otago and Southland hospitals, each of which have differing processes based on local resources, and this is nearing completion. This was combined with a review of overall fluid/volume administration in trauma to try to achieve more consistent practice.

Staffing turnover has been significant: key trauma nurse coordinators have either left (Fiona Thomas and Gordon Speed) or reduced their input (Rebecca Coats), and the trauma director (Mike Hunter) retired in November 2023. Efforts to improve the efficiency of data collection continue to be frustrating and limit our ability to undertake measurable quality improvement.

Canterbury/West Coast

Resource and staffing limitations continue to hamper the development of the trauma service in Christchurch. Although it now has an inpatient service, with a bed card, it is repeatedly unable to secure a house officer resource when staffing in the hospital is tight. The trauma nurse coordinator staffing has

returned to 2.0 full-time equivalents (FTEs) but should be around 5.0 FTE when compared with national levels. Administration support is scarce, which reduces the ability to collect, enter and process trauma data, severely hampering the development of useful quality improvement initiatives. Despite these challenges, the service continues to assist with national network priorities, such as the sTBI project, and undertake significant educational activities.

Nelson Marlborough

The Nelson Marlborough trauma service faces similar resourcing challenges, including having only one 0.5 FTE funded trauma nurse coordinator, the relative isolation, issues with transport to tertiary care and a lack of economies of scale. Nonetheless, the trauma committee has been active and has introduced quarterly morbidity and mortality meetings and has been finding ways to participate in and contribute to a number of national initiatives. The region has hosted NetworkZ trauma simulation training and promoted and delivered trauma educational opportunities, including a symposium, which it is aiming to make an annual event. ●

Appendix A: Royal Australasian College of Surgeons key performance indicators, 2022/23

Case fatality rate (ISS \geq 13), 2018/19–2022/23, number (percent)

2018/19	2019/20	2020/21	2021/22	2022/23
203 (8.6)	153 (7.2)	209 (8.2)	184 (7.6)	219 (8.3)

Median hours from incident to arrival at definitive care for those with ISS \geq 13 transported direct from scene, 2018/19–2022/23

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

Discharge destination following in-hospital stay, by region (percentage of patients with ISS \geq 13, 2022/23)

Discharge destination	Northern	Te Manawa Taki	Central	South Island	National
Home	58	69	54	66	62
Rehabilitation	17	16	11	18	16
Hospital for convalescence	13	7	19	8	11
Acute care facility	2	0	8	3	3
Left against medical advice	4	3	3	1	3
Residential aged care service or nursing home not usual residence	1	3	1	2	2
Other	2	1	1	1	1
Unknown	2	0	2	0	1
Special accommodation	1	0	0	1	1

Median hours to CT scan for patients with impaired consciousness (Glasgow Coma Scale ≤ 13 ; ISS ≥ 13), by region, 2022/23

Northern	Te Manawa Taki	Central	South Island	National
0.7	1	1	0.8	0.8

Percentage of patients (ISS ≥ 13) with blood alcohol concentration recorded at first hospital, by size of hospital, 2018/19–2022/23

Size of hospital	2018/19	2019/20	2020/21	2021/22	2022/23
Small secondary	17	23	35	36	45
Medium/large secondary	55	64	58	64	62
Tertiary	72	77	73	73	72

Percentage of patients with blood alcohol concentration recorded at first hospital by region, 2018/19–2022/23

Region	2018/19	2019/20	2020/21	2021/22	2022/23
Northern	77	79	69	74	73
Te Manawa Taki	68	76	76	72	68
Central	61	64	62	63	64
South Island	43	49	50	55	60
National	62	67	64	67	66

Median hours from incident to arrival at definitive care for those transferred, 2018/19–2022/23

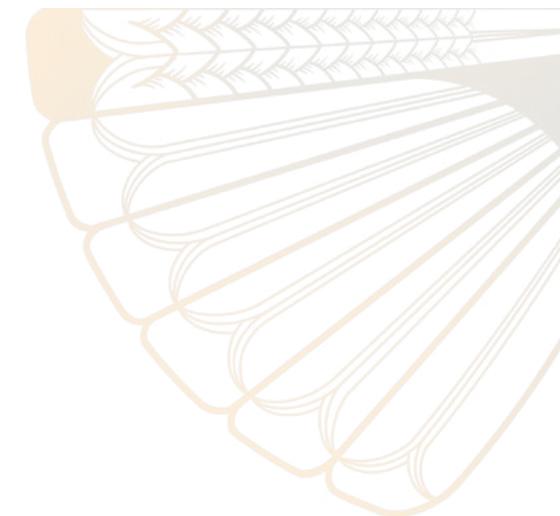
Region	2018/19	2019/20	2020/21	2021/22	2022/23
Northern	9.8	11.8	11.3	10.5	11.3
Te Manawa Taki	8.6	9.0	8.5	10.7	10.3
Central	15.3	10.9	16.1	13.7	12.1
South Island	17.0	19.1	13.9	11.2	14.8
National	11.1	12.6	12.0	11.2	11.8

Time in first hospital (hours), by region, 2022/23 (ISS ≥ 13)

Northern	Te Manawa Taki	Central	South Island	National
5.3	7.1	9.2	8.6	6.9

Time in emergency department in first hospital (hours), by region, 2022/23 (ISS ≥ 13)

Northern	Te Manawa Taki	Central	South Island	National
6.4	5.4	6.8	5.6	6



Appendix B:

Published research on injury in Aotearoa

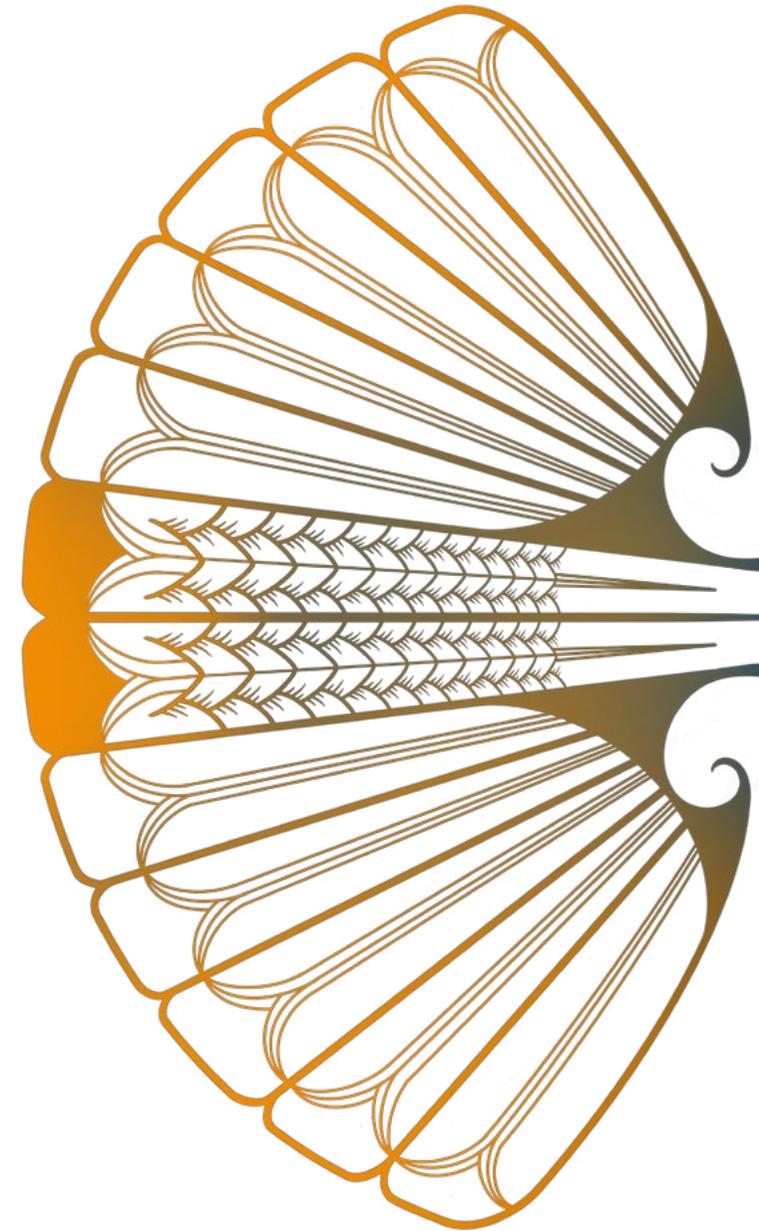
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