

New Zealand Major Trauma Registry & National Clinical Network

Annual Report 2016-2017





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Contents

Foreword	2
Executive Summary	3
Introduction	6
National Clinical Network Activities	17
Conclusions	18
Appendix A: Regional trauma network updates	19
Glossary	21
References	21





Foreword

This is the second annual report from the Major Trauma National Clinical Network. Over the period of time since the first report the Network has matured and most of the hospitals that were unable to enter data into the Major Trauma Registry in 2015-16 can now do so. As a result this second report presents a more comprehensive overview of major trauma incidence, process of care, and outcome in New Zealand. Over the past year the Network has also achieved a number of milestones in relation to systems of care and these are outlined in the second part of the report.

The work reflected in this report is the result of input from a great many people in both the District Health Boards and central health governance and funding organisations. Specific acknowledgement is made of the sponsors of the Major Trauma National Clinical Network, the Accident Compensation Corporation (ACC) and the Ministry of Health (MoH). Without the work undertaken in the DHBs and the support of the sponsors this report would not be able to be produced. Our collective understanding of the quality of trauma care in NZ is growing as the Network is maturing and with it the ability to make changes that will improve outcomes for all those suffering injury .

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7 December 2017



Executive Summary

In this second Annual Report of the Major Trauma National Clinical Network (“the Network”) we present the 2016-17 key findings from the NZ – Major Trauma Registry (NZ-MTR) as well as the highlights of the four regional networks and the national network.

NZ-MTR data is collected on all major trauma patients admitted to hospital with major trauma (ISS \geq 13). This definition implies a serious, potentially life-threatening injury to one or more parts of the body and includes those who died in hospital as a result of their injury regardless of its anatomic severity.

There has been full collection of all acute hospitals in the North Island, and, for the first time, Christchurch, Timaru and Southland Hospitals in the South Island. A number of ongoing initiatives provide assurance around the accuracy and consistency of coding and data collected.

2016-17 results

The key findings for major trauma patients show:

Incidence	The incidence rate of 35.5 per 100,000 population is within the expected range, however there are significant regional differences ranging from 28 – 52 per 100,000 population.
Age	Two 15-year age cohorts (15-29 years and 45-59 years) account for 50% of all major trauma The 65+ age group accounts for only 6.6% of all trauma but has the highest incidence as a proportion of their age cohort. Eight hospitals see more than 30% of their trauma cases aged 65+. Evidence suggests the older groups have better outcomes in hospitals where higher percentages of these patients are admitted.
Maori	The incidence for Maori is 52/100,000 population compared to 31/100,000 for non-Maori. Work is underway to provide detailed analysis of the aetiology and outcome for this vulnerable population.
When injury occurred	Friday, Saturday and Sunday are days when injury is most common. December is the peak month for all regions.
Cause of injury	<ul style="list-style-type: none"> • Road traffic crashes – 52% • Falls – 26% • Other – 13% • Assault – 9% <p>There are significant regional differences in cause of injury. Northern has the most pedestrian and assault injury, Midland has the highest rate of RTC, and Central and South Island have the highest rate of falls.</p>
Case Fatality Rate	9% consistent across regions, and in line with similar jurisdictions but not as good as the best. The 75+ age group has the highest mortality of all age groups. Falls are associated with the highest mortality. Medium size hospitals (with bed numbers between 200 - 400) have a higher CFR (12%) than small hospitals (CFR 6%) or large hospitals (CFR 9%).
Road Traffic Crashes	<p>For this reporting period we have combined the road toll¹² and NZ-MTR data:</p> <ul style="list-style-type: none"> • 284 people died at scene (road toll data, but may differ from the official results as we have excluded those who die in hospital) • 875 people with serious injuries from road traffic crashes were admitted to hospital, of whom 60 subsequently died within 30-days of admission • 1,159 people died or were seriously injured on New Zealand roads in 2016-17 <p>These results suggest that the transport system is unforgiving in the event of a crash. However if a person survives and is transported to hospital, their chance of survival is reasonably good. There is a significant population burden from death and injury due to RTC.</p>
Body regions injured	<p>Traumatic Brain Injury (TBI) (AIS \geq3) occurs in 38% of major trauma patients (26% isolated, 12% complex with other significant injuries). On-scene intubation rate is surprisingly low for those in a coma, but the 18 – 20% Case Fatality Rate (CFR) is much higher than the average CFR of 9% for major trauma as a whole.</p> <p>Thoracic injuries occur in 43% of major trauma patients. Most (91%) have injuries to other body parts. CFR is 8%. Thoracotomies were performed on 15 patients (5 subsequently died).</p>
Process Indicators	<p>Variable results in the Northern and Midland Regions for key process indicators such as number of transfers to reach definitive care, time to CT, and blood alcohol collection compared to last year. The Central Region has shown consistent improvement against the same three indicators (but started from a low base).</p>

These results provide us useful information about the patterns of trauma across New Zealand, how well we manage this complex group of patients, and key outcomes. Over the subsequent years we will continue to build on this data to provide longitudinal analysis showing trends over time, and benchmark performance.



The Network

The four regional trauma networks are the backbone of the trauma system. The relatively new trauma networks in the Central and South Island Regions have consolidated their membership and are starting to build strong foundations for the future.

The Network has substantially achieved the three initial priorities identified when it was first established five years ago. These priorities were to:

1. Establish a formal trauma system: A national network and four regional networks are established, and supported by a governance group with ACC and the MoH as sponsors. A website has been created as a repository of information about the Network. Education and training symposiums have been held in 8 locations this year as well as routine trauma training courses. The ACC Incentive Fund has been an important enabler by funding training opportunities for nurses and allied health.
2. Establish a national registry: The NZ-MTR is established and data collectors collect data from the 22 acute hospitals around the country. The MoH has a requirement for all DHBs to collect and enter data, and ACC pays for the data uploaded on a pro rata basis to the regions. Training of trauma data collectors in AIS and use of the registry has been undertaken. Policies are published which outline our comprehensive approach to assure the privacy of patient data, and a Data Governance Group reviews all requests for national aggregate data to ensure the use of NZ-MTR data is ethical and appropriate.
3. Develop nationally consistent guidelines: The out-of-hospital destination policy has been implemented and comprises the triage policy that supports ambulance personnel in identifying major trauma, destination policies to indicate which is the most appropriate hospital in each region, and staging guidelines.

As we look to the future we are in an excellent position to drive changes and ultimately realise our aim of fully implementing a contemporary trauma system in New Zealand. Two key areas have been identified which will help us over the next five years, quality improvement to assure an excellent level of care across the trauma pathway, and the establishment of a national trauma research centre. The work undertaken in 2016-17 and preceding years provides a good foundation for us to realise the full benefits.

Introduction

This is the second Annual Report of the Major Trauma National Clinical Network (“the Network”). Here we present the 2016-17 key findings from the NZ – Major Trauma Registry (NZ-MTR) and the highlights of the four regional networks as well as the national network.

The Network is charged with ensuring the NZ trauma system delivers optimal trauma care and provides those who do not die immediately from their injury the greatest chance of uncomplicated survival. Our goal is to establish a contemporary trauma system in New Zealand which brings us up to international best practice and delivers the benefits to trauma patients, the population, and achieves efficiencies across the health system.

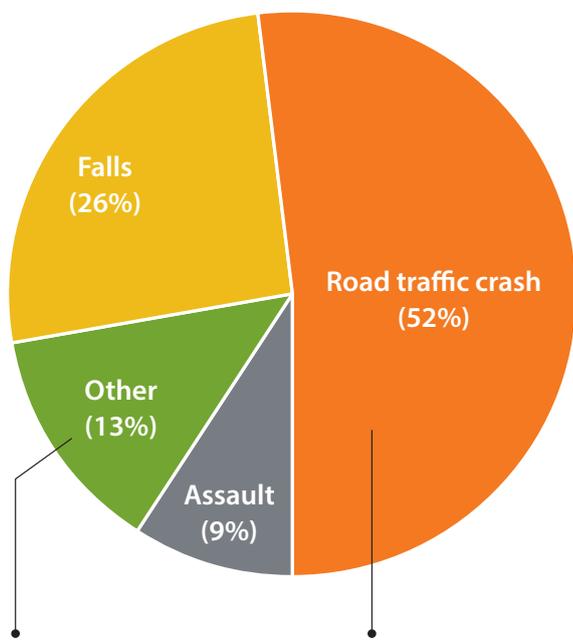
Significant progress has been made this year toward achieving this goal with the emerging view we gained in the first year. This year’s results continue to consolidate the pattern of trauma and outcomes in New Zealand.

New Zealand – Major Trauma Registry

The NZ-MTR began on 1 July 2015 as a single web-based system to provide a comprehensive population based registry for the country. This year 1,666 patients have been entered into the NZ-MTR, and brings us to a total of 2,967 for the two years since the NZ-MTR began^{1,2}. With collection now in place in all DHBs, by next year we anticipate around 2,000 patients will be entered each year.

The inclusion criteria for the NZ-MTR are all patients admitted to hospital with an ISS score of ≥13 or who died in hospital as a result of injury.

Cases in this report are grouped according to mechanism of injury and these are:



This includes all other mechanisms of injury apart from the other three categories specified here

This group includes vehicle occupants, motorcyclists, cyclists and pedestrians

Data quality and coverage

By the end of 2016-17 all DHBs had full data collection in place however the data capture has not been complete for the full year in some DHBs. The areas where there are gaps are:

- **Northern region:** Waitemata DHB for 6 months
- **South Island:** Nelson-Marlborough and West Coast DHBs, and Dunedin Hospital for 11 months.

(Southland Hospital which is part of the Southern DHB together with Dunedin Hospital submitted data in 16-17)

These gaps impact on the population-based results. In the Northern Region the analysis was not altered to compensate for the gap in data from Waitemata as the numbers are relatively small and are unlikely to have a material impact on the key results. In the South Island some adjustment has been made on specific parameters to include Canterbury and South Canterbury results and population, and exclude the rest of the South Island. Canterbury and South Canterbury comprise 55% of the region’s population. We have noted whether the two DHBs data or all available data is used for each analysis.

A number of initiatives are in place to provide assurance of the quality of the data particularly around the inclusion and exclusion criteria and coding of the injuries. This is a priority as around 20 relatively new trauma data collectors are working in isolation; and it is an on-going process. The veracity of information in elderly patients who have had a fall is a challenging area because they are included if they died as a direct result from their injuries, but excluded if their death is secondary to other mainly medical causes. It is not always clear which is the case.

The overall quality of data has significantly improved in its completeness and accuracy compared to last year, as a result of the data collectors being more familiar with their work and the quality assurance initiatives outlined above. In some analysis the improved accuracy has altered the trend since last year’s results and these are noted where applicable.

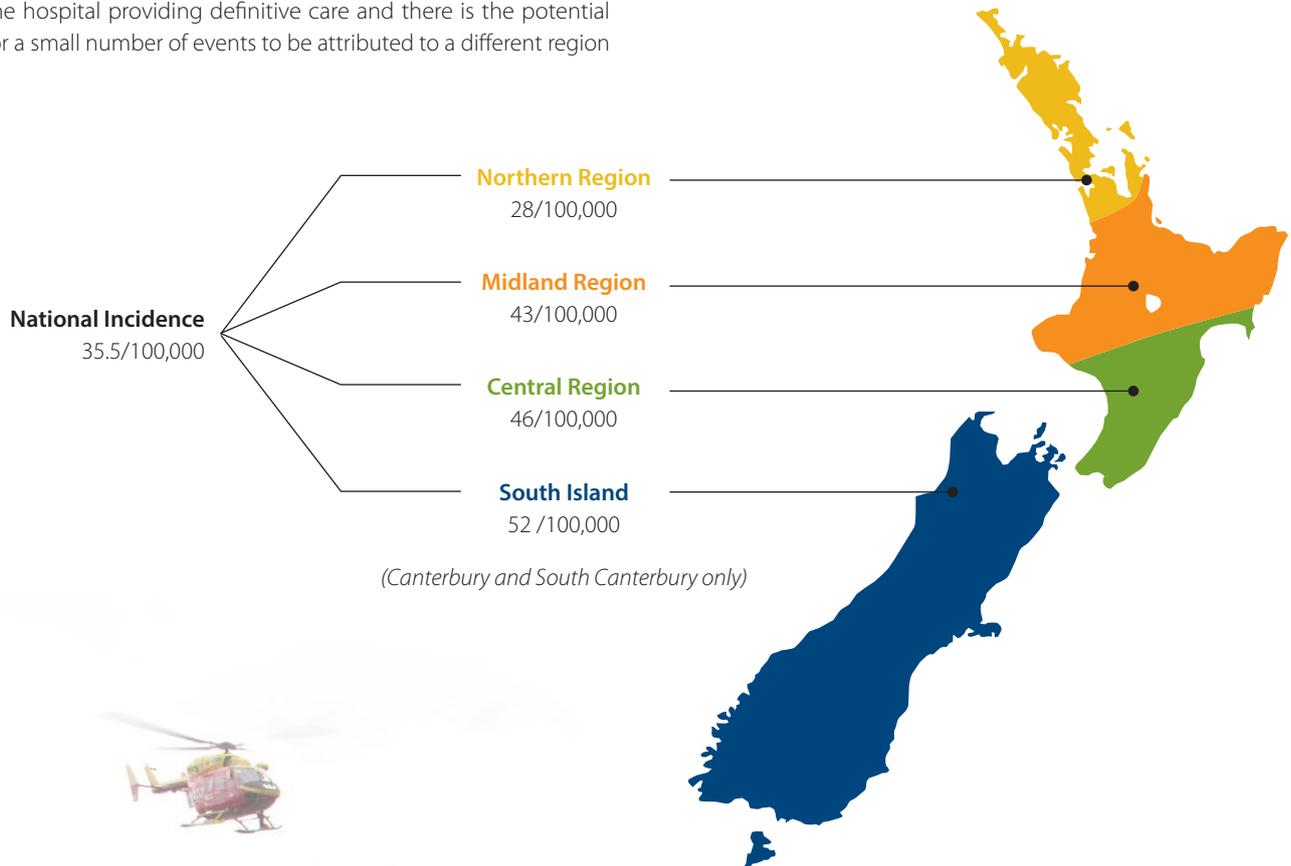
Incidence

There is no “normal” rate of major trauma but countries similar to NZ, where the incidence of major trauma and the outcomes have been measured show incidences of around 40 cases/100,000 population^{3,4,5,6}. One of the first findings from the NZ-MTR therefore relates to the incidence of major trauma in NZ.

A different methodology has been used this year whereby cases are attributed to the first hospital the patient presents to rather than the hospital providing definitive care and there is the potential for a small number of events to be attributed to a different region

than would have been the case last year. This would only be the case if a patient was transferred from a first hospital in one of the four health regions to a definitive care hospital in another region.

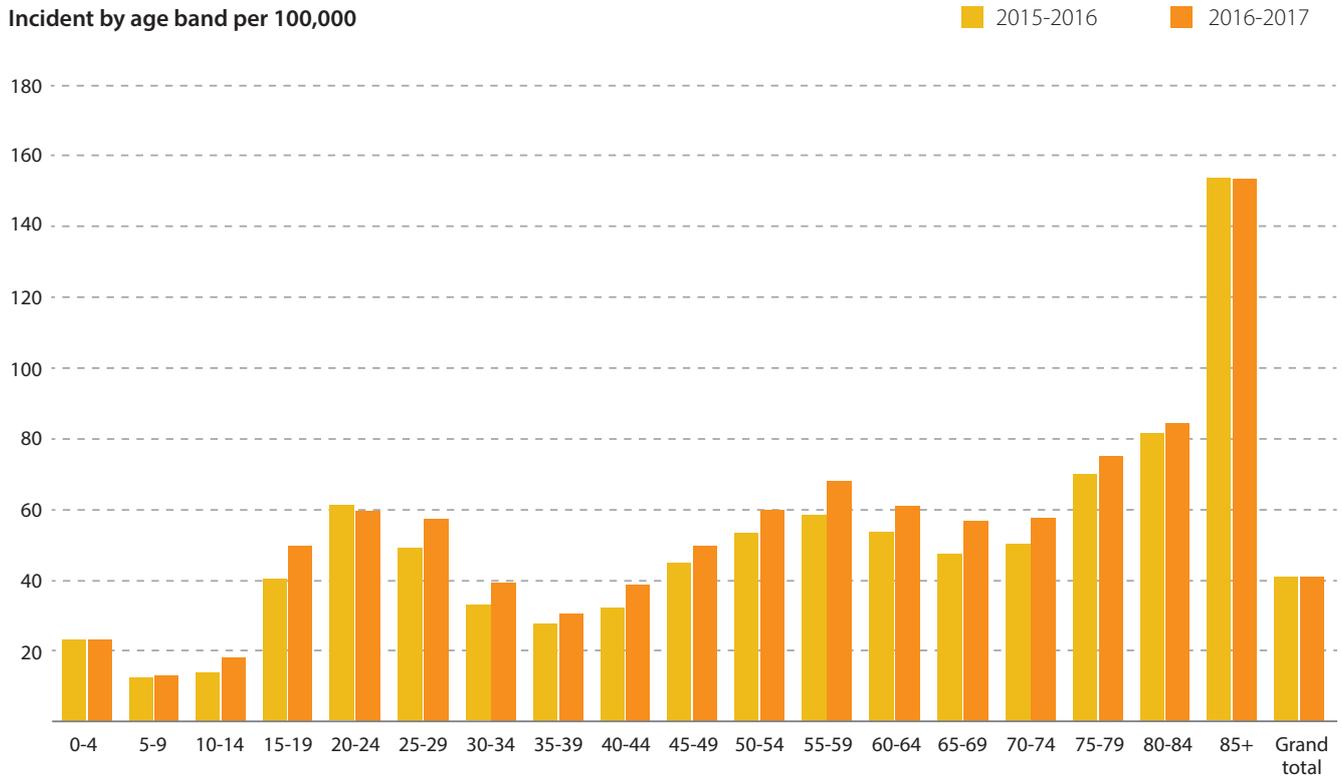
The incidence in the Central and South Island (Canterbury and South Canterbury only) regions is relatively high compared to the national average. Trend analysis in subsequent years will show if this is sustained and provide insight into the reasons.



Age

Traditionally the burden of injury is on the young and indeed in most regions of the world it is the leading cause of death in those under 44 years of age. The three age peaks observed last year are seen this year, but are more pronounced.

Incident by age band per 100,000



All available South Island data.

While the 85+ age group accounts for 6.6% of all major trauma, it has the highest proportion of injury for its age group.

We grouped the age bands into 15-year groups with similar social cohorts which showed:

- 15-29 year and 45-59 year age groups (a total of 30-years) account for nearly half all trauma
- 0-14 year group has the lowest incidence at 7% of all trauma
- Remaining 15 year groups age bands account for around 15% each

The two cohorts with the highest incidence of major trauma (15-29 and 45-59 years) is evidence of the burden of trauma on our society. These are the most productive years of a person's life and a serious injury can have enduring impact on the individual, their families, and societal costs of rehabilitation and loss of earnings.

We also looked at trauma events in the 65+ years age group to reflect the research by Zafar et al⁷ which found older patients were 34% less likely to die if they presented at centres treating a high versus a low proportion of older trauma. Our results showed:

Proportion of major trauma patients aged 65+

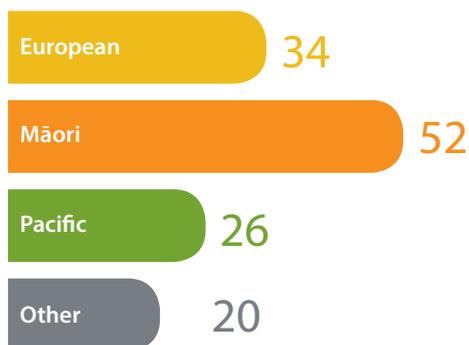
- National average 23%
- Northern 22%
- Midland 23%
- Central 27%
- South Island (all DHBs) 25%

Nearly a quarter of all major trauma patients are 65+ years, and the proportion seen in individual hospitals ranged from 13% to 43%. Only 6 of our 21 (adult) hospitals have the 30% proportion of patients aged 65+ observed by Zafar to be associated with a reduced mortality rate. We would benefit from understanding how we can share the attributes of quality trauma care in the elderly across all hospitals regardless of the proportion of elderly patients they admit.

Event rate by ethnic group per 100,000 population

In many health indicators Maori are over-represented, and it is the same for major trauma. When the rates of major trauma are denominated by the ethnic population numbers the high burden of trauma on Maori is evident.

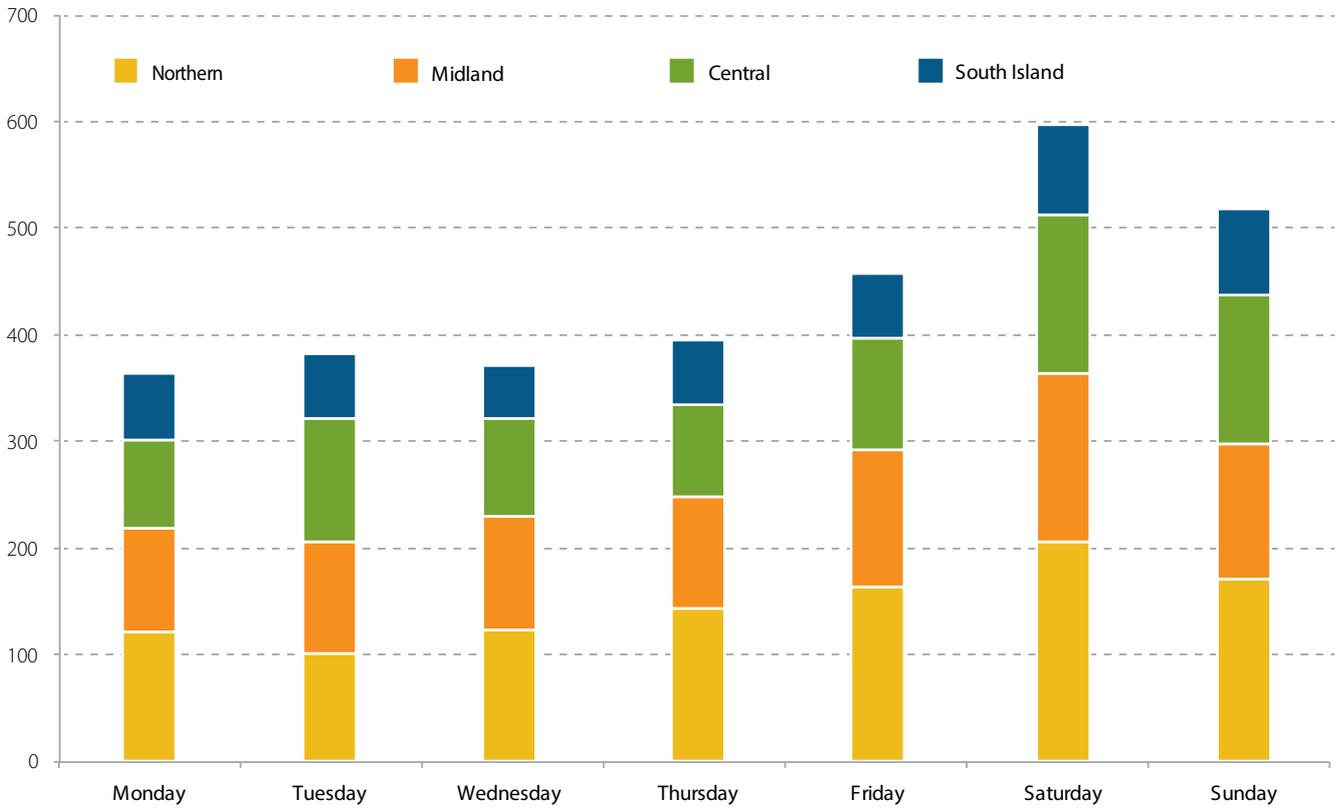
Incidence per 100,000



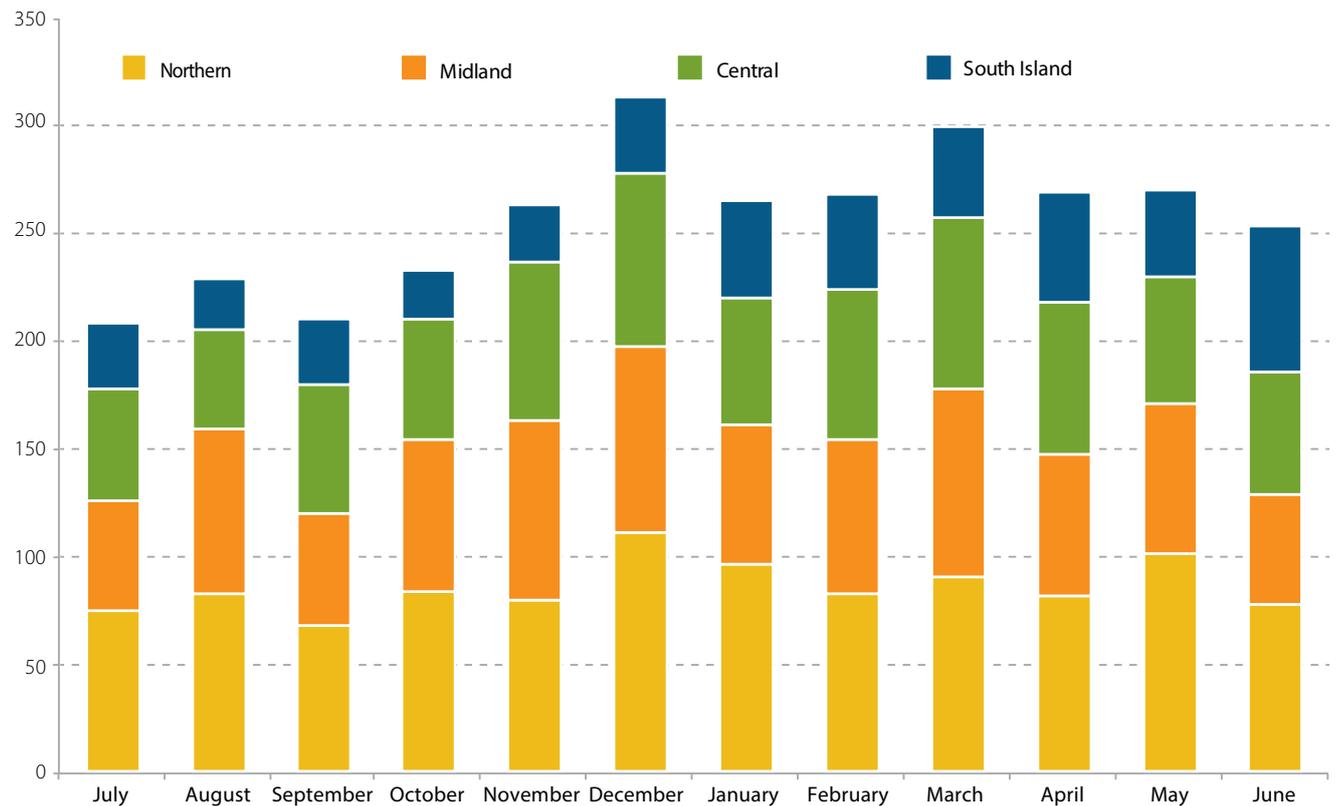
Analysis excludes South Island

Injury by day and month

Injury occurs most frequently on Saturday and Sunday, a pattern which is consistent across all regions. Two years of events are shown by day of week



The month of the year injuries occur in is reasonably evenly spread across the year with the national aggregate ranging from 7 – 10% of all major trauma in any given month. All regions reported peaks in December but aside from this there was no noticeable pattern between regions or between months.



All South Island DHBs included in South Island data.



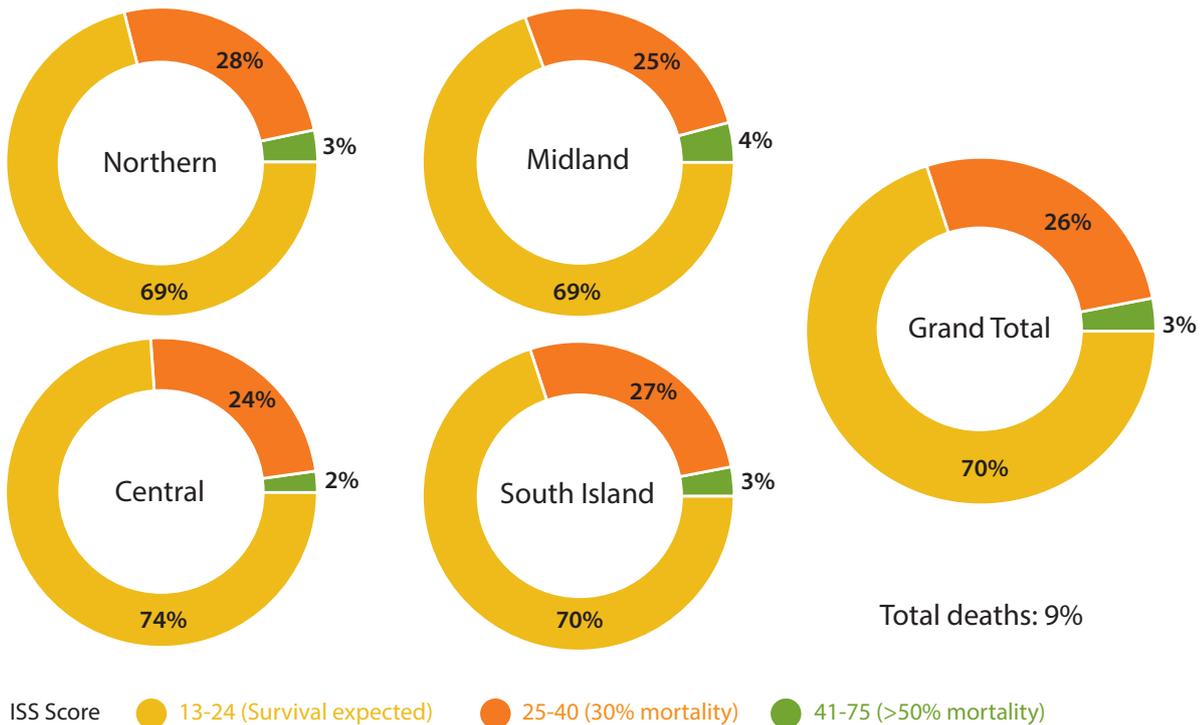
Injury Severity Score

Injury Severity Score (ISS)⁸ is a numerical way of grading severity of injury that occurs in different body areas. Each injury is given a grade as described in the Abbreviated Injury Scale (AIS) between 1 to 5, with 1 being minor, 2 moderate and 3 or more being serious, severe or critical. The ISS sums the scores (when squared) for the three most severely injured body regions. A score of 13 or more implies either a serious injury in one body region, and/or lesser severity injuries in two or more body parts. The ISS can be directly correlated with a threat to life and to a lesser degree to complications, length of stay, and outcome. In line with the

Network's focus on the most severely injured patients, the NZ-MTR collects data on patients described as meeting the criteria of ISS of 13 or more.

We use AIS 2005 Version with 2008 revisions.

Major trauma as defined by ISS can be stratified into any number of specific groups. In this report three groupings have been used. One would expect the proportions of these three groups to be similar in every DHB and approximate the overall percentages which are (ISS13-24) 70%, (ISS25-41) 26% and (ISS>41) 3%.



All regions are within close range of the national aggregate.

All available South Island data.

Size of hospital

Hospitals were categorised as small, medium, and large based on the number of beds and adjusted for other factors such as whether it was a designated trauma hospital. All of the large hospitals offer tertiary services.



Caseload	7%	19%	74%
CFR	6%	12%	9%

Nearly three quarters of major trauma patients received definitive care in a tertiary hospital, and a further 19% in hospitals which provide a comprehensive range of secondary services. It is possible that a proportion of patients sent to small and medium hospitals may have better outcomes if they had been sent to a tertiary hospital. Risk adjusting the data would provide a more accurate reflection of the relationship between size of hospital and mortality.

Mortality

Pre-hospital

A comprehensive view of the pre-hospital mortality rate is available from the Ministry of Health but is not complete until two years post-date. Research is underway to understand the pre-hospital mortality rate and we look forward to this work being published to give us greater insight.

In-hospital

Case fatality rate has previously been unknown in NZ but is expected to fall within a range seen in similar jurisdictions. It is challenging to compare like-with-like, however CFR in NSW is 10% with similar criteria⁹, 5.3% in Victoria from the hospitals which receive major trauma¹⁰ and Western Australia based which has a higher ISS threshold of >15 and a CFR of 12%¹¹.

We have recognised there has been some inconsistency in the deaths with an ISS score below 13, particularly in the older age groups. In order to make a meaningful comparison we have not counted the 38 deaths which occurred in patients over 70 years of age with an ISS below 13, as it is challenging to differentiate whether their demise was related to the injury or co-morbidity. We have counted the eight deaths which occurred in the 0 – 69 age group as it is more likely their death was related to the trauma. In the future, case reviews will be done on all deaths with an ISS<13.

There were 147 in-hospital deaths with a national CFR of 9%.

- Northern 9%
- Midland 9%
- Central 10%
- South Island 9%
(Christchurch, Timaru and Invercargill Hospitals only)

It is reassuring that our Case Fatality Rate is within range of similar jurisdictions, but still remains not as good as the best performers.

Further analysis of the CFR showed:

CFR outliers

Three hospitals had higher than average CFR ranging from 14% to 19%, and accounted for 27 deaths (18% of all deaths). Further work is signalled to understand the circumstances of these.

CFR and age

The risk of death increases with age. The CFR ranges from:

- 6% in younger age groups (0 – 39)
- 8% in the 40 – 59 age group
- 12% in the 70+ age group

Cause of injury

Falls account for 46% of all deaths, followed by all road traffic (29%), other (16%), and assault (9%).



Cause of Death



Medical deaths include those related to comorbidities rather than directly as a consequence of the injury. Haemorrhage refers to cases where bleeding resulting in hypovolaemia and its consequences caused death. In general this occurs in thoracic, abdominal and pelvic injuries. Cerebral bleeding results in neurological rather than hypovolemic death.

While prompt and effective prehospital care, neurosurgical intervention where indicated, and brain oriented intensive care will reduce the morbidity and mortality of traumatic brain injury, much is irreversible and the outcome determined at the moment of injury.

In contrast all haemorrhagic deaths are potentially preventable with the determining fact being how quickly the patient gets effective treatment for this consequence of injury (haemostatic resuscitation, interventional radiology, and surgery).

Cause of injury

Most injuries (52%) are caused by road-related accidents, followed by falls (26%), other types of accident (13%) and assault (9%). 'Road-related injuries' are those resulting from the use of vehicles such as cars, motorbikes, bicycles and off-road quad bikes, as well as injuries to pedestrians.

	Northern	Midland	Central	South Island	National
Fall	25%	20%	31%	29%	26%
Assault	11%	7%	9%	7%	9%
All RTC	51%	62%	48%	50%	52%
Car occupant	28%	35%	24%	30%	29%
Motorcycle	9%	16%	12%	9%	11%
Pedestrian	8%	4%	4%	8%	6%
Pedal cyclist	5%	5%	7%	2%	5%
Quad bike	1%	2%	1%	1%	1%
Other	13%	11%	12%	14%	13%

There are marked regional differences in cause of injury:

- Northern region has high rates of pedestrian injuries, and injury from assault
- Midland region has high rates of road traffic related injuries (vehicle occupant and motorcycle riders)
- Central and South Island regions have high rates of falls

These findings are consistent with last year.

Road Traffic Crashes

For this reporting period we have combined the road toll¹² and NZ-MTR data:

- 284 people died at scene (road toll data, but may differ from the official results as we have excluded those who die in hospital)
- 875 people with serious injuries from road traffic crashes were admitted to hospital, of whom 60 subsequently died within 30-days of admission
- 1,159 people died or were seriously injured on New Zealand roads in 2016-17

These results suggest that the transport system is unforgiving in the event of a crash. However if a person survives and is transported to hospital, their chance of survival is reasonably good. There is a significant population burden from death and injury due to RTC.

Body parts injured

Injuries to the Thorax and Head and Neck are the most common body parts injured.

Traumatic Brain Injuries (TBI)

TBI patients were identified if they had an Abbreviated Injury Score (AIS) of three or more to the head region. This implies a moderate or severe injury and one which would be expected to be associated with a short term risk of death and a longer term expectation of a need for rehabilitation.

TBI occurred in 38% (n: 630) of all major trauma patients. The TBI group are split into two categories:

- Isolated TBI where the head is the only body part with a significant injury (no other injury greater than AIS 2)
- Complex TBI where there is a head injury and a significant injury to another body region (an injury with an AIS score of 3 or more).

All TBI	38% of major trauma (n: 630) (Major TBI as a percentage of major trauma by region: North: 45%, Midland: 31%, Central:41%, South Island: 37%)	
	Isolated TBI	Complex TBI
Isolated or complex (as proportion of all major trauma)	26% (n:435)	12% (n:195)
TBI patient subset with GCS ≤9 at scene	21% (n:92)	36% (n:71)
And of this group, were intubated prior to arriving at hospital	2% (n:8)	18% (n:13)
TBI patient subset taken to hospital with no neurosurgery on site	40% (n:175)	26% (n:50)
Case Fatality Rate	20%	18%

There is wide regional variance in the incidence of TBI in its contribution to major trauma ranging from 31-45% and we need to understand the correlation between TBI and other parameters such as cause of injury, geographical location, and age.

The TBI subset not associated with another major injury represents the majority of TBI cases (69%) of all cases, and it is noteworthy that 40% were transported to a facility without neurosurgery services. However only 2% of isolated TBI patients were intubated by ambulance personnel although nearly a quarter were in a coma (GCS<9). The case fatality rate for the isolated TBI group is double the overall average major trauma mortality.

The complex TBI subset comprise 12% of all major trauma, however 26% were taken to a facility with no neurosurgery facility despite 36% being in a coma at scene. The 18% intubation rate is significantly higher than that for isolated TBI. The 18% case fatality rate is lower than the isolated TBI rate but still greater than the 9% average.

With the introduction of the out of hospital destination policy¹³ which triages a motor score less than 5 to a hospital with neurosurgical capability (where feasible) we would expect a higher proportion of isolated and complex TBI patients to be managed in a tertiary trauma care hospital with neurosurgery. Further analysis of the pre-hospital and hospital data is expected to identify if and how care for TBI patients could be improved.

Thoracic injuries

Injuries to the thorax (AIS ≥ 3) occur in 43% (n=727) of all major trauma patients. The majority of patients with thoracic injuries (91%) also have injuries to other parts of the body, with an 8% CFR slightly lower than overall average for major trauma.

Most of these patients have rib fractures and identifying a common clinical pathway for these patients is one of the objectives of the Network to drive best practice and optimal outcomes

Isolated thoracic injuries are relatively rare accounting for only 9% of all thoracic injuries, but the mortality rate of 14% is significantly higher than the overall average.

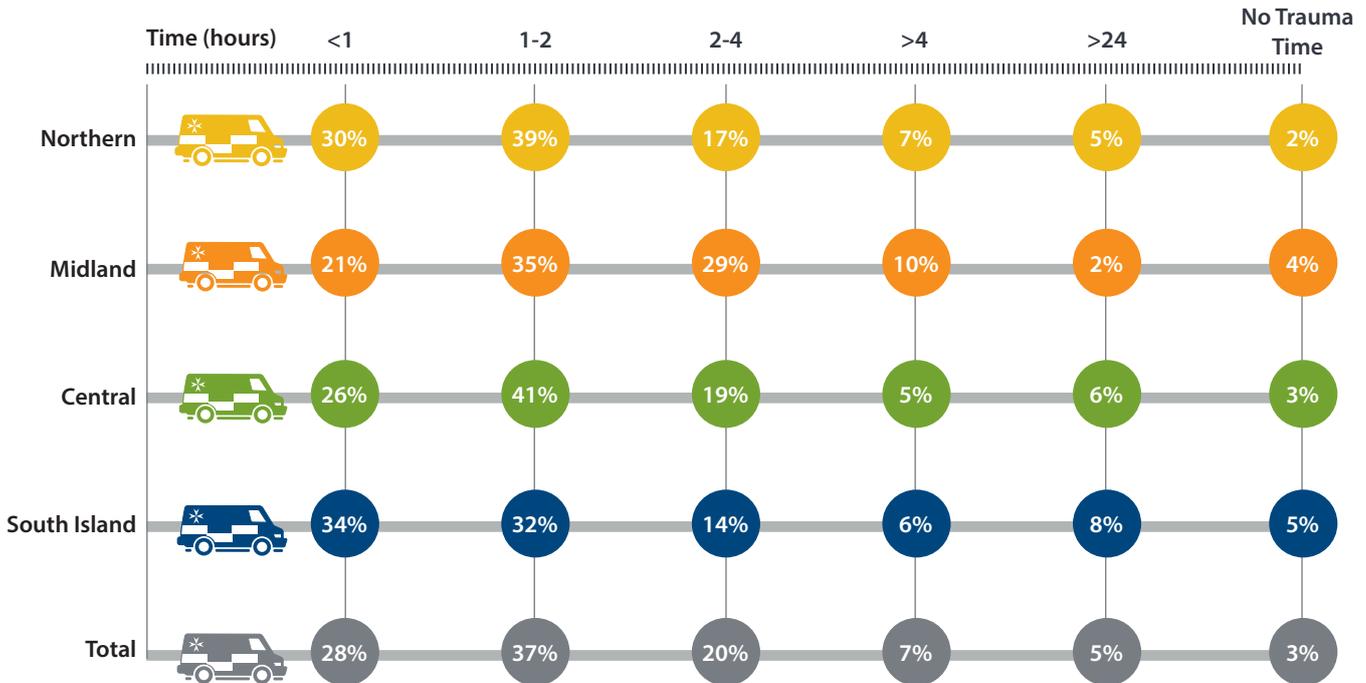
Thoracotomies were performed on 15 patients, of whom 5 subsequently died.

Process markers

Pre hospital - Time from scene to first hospital

From the time R Adams Cowley¹⁴ first coined the term “The Golden Hour”, time has been recognised as an important variable in patient survival. Numerous studies have shown that the sooner patients get to the hospital that can provide definitive care the better the chance of survival. The Australian Trauma Registry¹⁵ has shown that patients can arrive at a major trauma hospital under 2 hours in most States and given our smaller but more challenging geography whether that figure was also relevant for NZ was unknown.

Nationally 65% of patients were transported from scene to the first hospital two hours, with some differences between the regions.



Includes all South Island data.

These results show a longer ‘scene to first hospital’ transfer time compared to last year’s result. The long transfer times may be attributed to a number of reasons including:

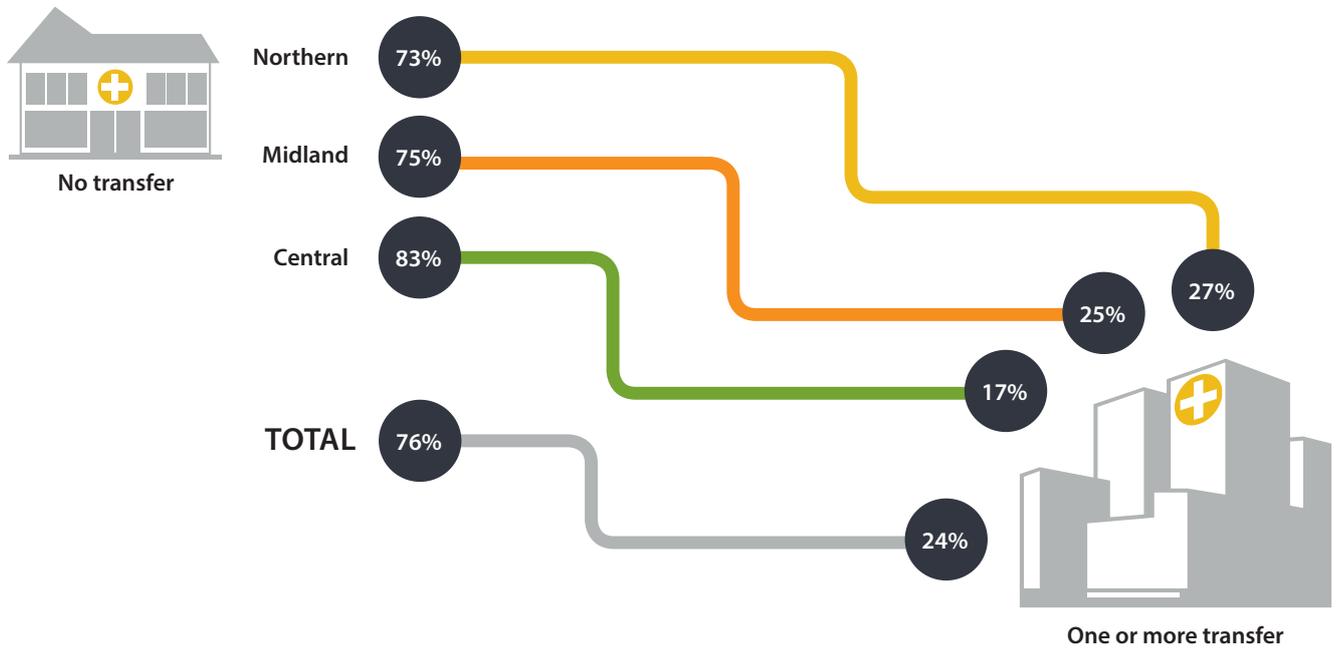
- More accurate time stamping as a result of the introduction of the electronic Patient Report Form across much of the country.
- New destination policies for major trauma including burn and Acute Spinal Cord Impairment patients where the nearest hospital may be bypassed.
- Geographical isolation and weather
- The consequences of trauma may not be immediately apparent, particularly if drugs and alcohol are involved. In these cases patients, particularly those with brain or thoracic injuries, may become unwell in the 24 hours after suffering injury and present to hospital with injuries that meet the major trauma definition. Common injuries that result in this outcome are subdural haematomas and haemothoraces

Pre hospital - Number of hospitals patient went to before receiving definitive care

One of the goals of an effective trauma system is to get the patient to the hospital that can provide them definitive care directly. Any patient who has to be transferred from one hospital to another (or from two hospitals to a third) represents an opportunity for destination policy to be refined so that patients get to a hospital which could care definitively for their injuries directly. In each of the regions between 16-27% of patients were transferred for definitive care within 72 hours and some of these patients would likely represent a sub-group who could have had their care trajectory improved.

In March 2017 the Out of Hospital Destination Policies were introduced across New Zealand, with the intent to provide updated triage criteria for ambulance personnel to identify major trauma, and destination hospitals in each region which have the capacity to provide definitive care. As this occurred 9 months into this reporting period the impact of the policies would only be for 3 months. The results for the full year are within range of last year’s results. By the next reporting period we expect the transfer rate to decrease if the policy is working effectively.

Number of hospitals patient went to before receiving definitive care

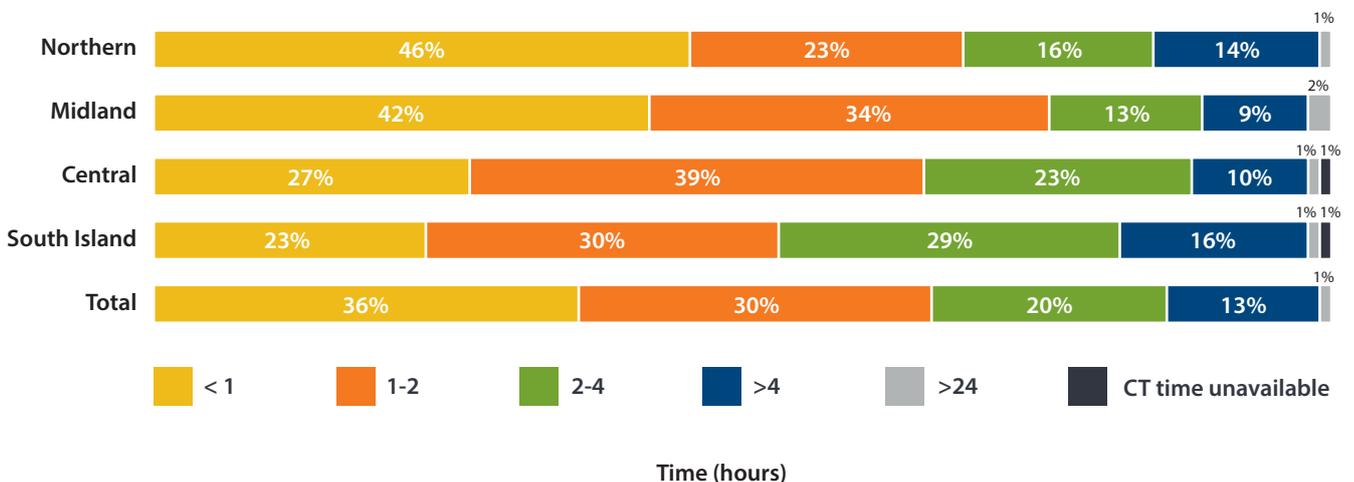


The South Island is excluded from this analysis as the two recording hospitals for the full year will by nature have fewer transfers than if all five hospitals were measured.

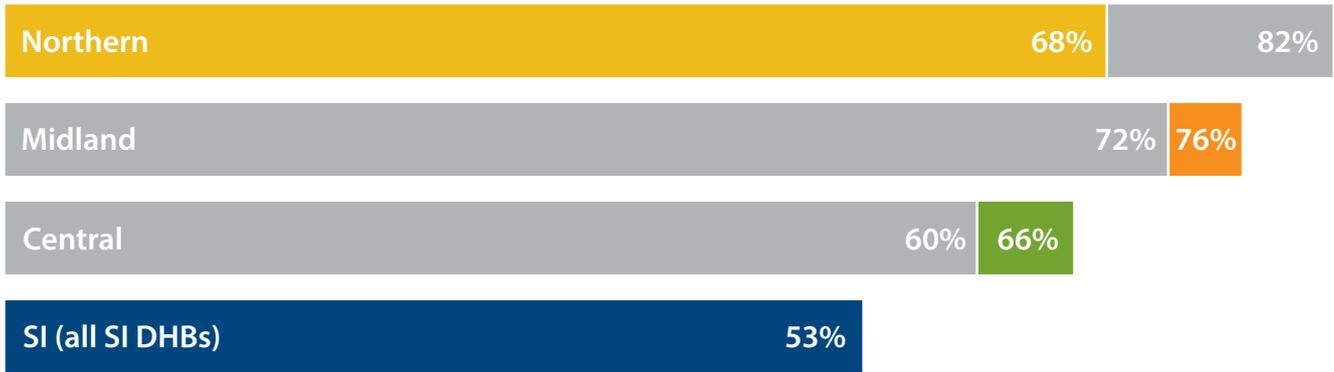
The 24% of patients transferred to more than one hospital is an increase on last year's result (21%). Next year will be a critical point because by then the new out of hospital destination policy will be embedded across the country.

Hospital – time to diagnostic imaging

Once a patient arrives in hospital, one of the important process of care markers is time to first CT as evidence of effective in-hospital systems. Most major trauma patients need a CT of at least one body region and therefore this indicator is an important marker of the process of care of trauma patients.



Time to CT → <2 hours



2015-2016

The time to CT in the Northern Region has deteriorated compared to last year, while the result for Midland and Central Regions has improved. These results suggest that the guidelines and systems of care are probably different between the regions leading to more prompt radiological evaluation of major trauma patients' injuries in some hospitals compared to others. Further evaluation of the Northern Region result is planned to determine whether some or all hospitals in the region are taking longer to get patients to CT scan.

Blood alcohol (as measured by Ethanol Levels (ETOH))

Alcohol is an important association with major trauma. While there are legal limits applied to driving and blood alcohol levels, many other forms of trauma such as falls and assaults are also associated with alcohol intoxication. Before being able to suggest interventions that might be relevant in the different forms of trauma it is important to know the blood alcohol levels of injured patients. Various aspects of clinical care can be affected by elevated blood alcohol so having blood alcohol levels recorded on major trauma patients is evidence of an effective process of care and one of the recognised KPIs.

% Blood alcohol level recorded



*All available South Island data.
Analysis excludes children <15 years of age.*

The collection rate in the Central Region is a significant increase from 14% from last year. The major hospitals are progressively introducing ETOH collection as part of the routine trauma blood screen which should increase the percentage of coverage.

National Clinical Network Activities

What we have achieved so far

When the Network was first established in 2012 it identified three priorities. In 2016-17 the Network substantially completed these priorities to provide a foundation from which we can drive quality improvement in trauma across the country. The highlights of this work are

1. Establish a formal trauma system: A national network and four regional networks are established, and supported by a governance group with ACC and the MoH as sponsors. A website has been created as a repository of information about the Network. Education and training symposiums have been held in 8 locations this year as well as routine trauma training courses. The ACC Incentive Fund which pays \$80K per annum to regions pro rata based on number of entries to the NZ-MTR has been a significant support to increasing the capability of trauma care through funding training opportunities.
2. Establish a national registry: The NZ-MTR is established and data is collected from the 22 acute hospitals around the country. The Ministry of Health has a requirement for all DHBs to collect and enter data, and ACC pays for the data uploaded on a pro rata basis to the regions. Training of trauma data collectors in AIS and use of the registry has been undertaken. Policies are published which outline our comprehensive approach to assure the privacy of patient data, and a Data Governance Group reviews all requests for national aggregate data to ensure the use of NZ-MTR data is ethical and appropriate. Initiatives to improve data quality have been introduced such as quarterly tests and question and answer sessions.
3. Nationally consistent guidelines: The out-of-hospital destination policy has been successfully implemented.

There has been more research activity this year with a publication on the NZ-MTR¹⁶ which will be useful in future publications. In addition there have been publications or submissions on patient experience following discharge¹⁷, the cost of trauma care, characteristics of trauma in older patients, and trends in splenic injuries in Christchurch¹⁸.

Relationships have been established and strengthened with other agencies including the New Zealand Transport Agency, Automobile Association, Australasian Road Safety College, Australian Trauma Registry, and university research groups.

Other parts of the trauma system have also seen change. In February 2017 the Single Air Desk was implemented to coordinate primary air ambulance operations, and ACC and the MoH commenced sector engagement on a co-design project for the future air ambulance system.

Where we are heading

Work began this year to develop a new strategic direction which will build on the foundation and help the Network achieve its goal to implement a contemporary trauma system in New Zealand. The core features of this direction are to implement performance improvement initiatives across the trauma pathway and develop a robust research framework to improve our understanding of the burden of trauma.

Key priorities for 2017-18

National consistency

To implement further initiatives that support the consistency of coding, including training, audit, review, pathways, and quality assurance of the data.

Sustainability

To support a more sustainable funding model for the network and work with DHBs to progressively implement sufficient FTE allocation for trauma staff

Research

To develop a business case for a national trauma research centre to provide high quality analytics and research and to maximise the value of the data collected.

Quality Improvement

To initiate quality improvement across the trauma pathway, using research and training to identify local areas of concern and change the parts which need improving.

Conclusions

This has been a year of consolidation. The initial three priorities the Network identified five years ago have been largely achieved and we are looking to a sustainable future. The data provided in this report has identified several areas where more detailed work is required to inform injury prevention and continuing quality improvement across the trauma system. There are significant regional differences in the cause of injury, the body parts injured, and who gets injured which also warrant further investigation.

There has been some variability in results for the process indicators in the Northern and Midland Regions with regards to the number of transfers to reach definitive care, time to CT, and blood alcohol collection. The Central Region has shown consistent improvement against the same three indicators.

We look forward to next year when we will be able to include all of the South Island to obtain a truly national, population based view of trauma. Longitudinal analysis with three years of data will potentially show trends. Benchmarking with comparator hospitals across Australasia will enable us to assess our performance across a wider catchment.

We are progressing well on our journey to reap the full benefits of a contemporary trauma system, although this may take 5 – 10 years⁶ to fully realise. The inclusive and collaborative approach we have taken is providing us an excellent early insight into the patterns of trauma in this country.



Appendix A: Regional trauma network updates

A summary of the regional networks progress in the past year is outlined below.



Northern Region Trauma Network

The Northern Region Trauma Network has focussed on three key areas in 2016-17:

- Clinical Guidelines have been developed and endorsed for the region's hospitals. Implementation will begin late 2017 on a new interactive website.
- Education and training: In total around 500 clinicians have attended trauma symposiums and conferences in the region this year. Thirty nurses and allied health staff have accessed the ACC Incentive Fund to attend trauma conferences and courses. Trauma symposiums / conferences have been held in Whangarei, Auckland (adults) and Auckland (paediatrics) in addition to concussion and other courses held by specialist rehabilitation providers.
- Clinical audit: a routine process is undertaken to screen all patients and identify those where systemic or regional issues have occurred. This process has resulted in improved transfer of care of patients between hospitals through actions to improve communication and more clarity.

An emerging focus is to undertake more research to better understand the burden of trauma in the region. Northland DHB has led research on the cost of care and how this compares to Inter District Flow (IDF) payments, and patient experience post discharge, and other DHBs are looking at expanding their research portfolios.

Midland Trauma System

Key activities and milestones for the year include;

- Regional RACS trauma verification conducted at the end of February with delivery of completed full reports in October. These are now being worked into local DHB and trauma services action plans
- Promoting use of trauma data. With over 30,000 trauma events recorded on the Midland Trauma Registry since 2012 the MTS has been working through the Midland Trauma Research Centre to use the data to address areas of concern in its community. This has been done through:
 - Community events such as Fieldays targeting farming injuries, WINTEC Design hub looking at Quad bikes, Waikato University raising awareness on paediatric falls
 - Taking trauma data to the collecting DHB. In October of this year Lakes DHB held a trauma roadshow detailing their trauma statistics and areas of action
 - Research with a large number of research projects underway in collaboration with a range of tertiary institutions and safety organisations
- Strengthening the data management platform including the development of the TQUAL relational database; integration of multiple internal and external data sources to the database; development of potential online reporting processes; implementation of registry activity tracking; training on the NZMTR
- Delivery of Midland Trauma Symposium with guest speakers Belinda Gabbe, Gordon Smith and Kirsten Vallmuur. This was delivered in conjunction with a research development education day where participants developed their potential research topics of interest.



Central Region Trauma Network (CRTN)

2016-2017 has been a year of consolidation for the CRTN.

The pre-hospital destination policy was successfully implemented in March 2017. We are continuing to monitor the impact of the policy on patient flows to ensure that patients reach the most appropriate hospital in the minimum time possible.

The 4th annual Central Region Trauma Symposium was held at Wellington Hospital in late May and saw almost 120 health professionals from around the country attend to update their knowledge and network with their colleagues. We were lucky to have an outstanding group of invited speakers presenting on topics including neurotrauma, the role of interventional radiology, abdominal trauma in children, and an interesting session on leadership, communication, and teamwork.

2017 also saw our lead nurse, Renate Donovan awarded the Ellen Dougherty Award, the top award for nursing at Capital & Coast DHB in recognition of her work as a Clinical Nurse Specialist for Trauma.

We would like to acknowledge the work of Dr Peter Hicks who stood down as the regional clinical leader in 2017. Peter was instrumental in setting up the network and seeing it through its infancy. The CRTN has benefitted from Peter's wealth of experience in trauma and organisational development.

The major challenges ahead in 2018 include addressing the issues of adequate nursing FTE to carry out the important roles necessary to support the trauma programmes in the central region DHBs, as well as expanding the activities of the network into developing regionally focused clinical guidelines and patient care guidelines.

South Island Trauma Workstream

The South Island Region has made significant progress since the previous report and all DHBs are now entering data on the National Registry.

Trauma Nurse Coordinators have been appointed to roles in all South Island DHBs and have taken on responsibility for collecting and ensuring data is registered nationally.

All DHBs have identified Trauma Clinical Leads, although only Southern at this stage has made a formal appointment with hours assigned for the role.

Trauma Nurse Coordinators are supported in their training requirements by National and Midland colleagues in particular. They are also taking up training opportunities and drawing on the ACC incentive funds for this purpose. The region decided that the incentive funds will be used specifically for nurse training in the trauma sector.

The South Island Workstream (the Regional Network) remains strong and committed to improving trauma services in the region despite the challenges of working within limited resources. The South Island Alliance management has recognised that having two TNCs on the Workstream has provided further strength and the ability for all to work cooperatively on data collection and entry and organising and supporting a range of training opportunities and symposia within the region.

Glossary

ACC	Accident Compensation Corporation
AIS	Abbreviated Injury Score
CFR	Case Fatality Rate
DHB	District Health Board
ETOH	Ethanol Levels for blood alcohol concentration
GCS	Glasgow Coma Scale
ISS	Injury Severity Score
MoH	Ministry of Health
MTNCN	Major Trauma National Clinical Network
NZ-MTR	New Zealand Major Trauma Registry
RTC	Road Traffic Crash
TBI	Traumatic Brain Injury

References

1. Major Trauma Network. *Annual Report 2015-16*. February 2017. (http://docs.wixstatic.com/ugd/bbebf_b_28543150b-87246fd959b10af996bb1ac.pdf)
2. Major Trauma Network. *National Minimum Dataset*. July 2015. (http://docs.wixstatic.com/ugd/bbebf_b_208a9b8139584adddb166999428ee214.pdf)
3. Cameron P, Gabbe B, Cooper D, et al. *A state-wide system of trauma care in Victoria: effect on patient survival*. Med J Aust. 2008;189:546–550.
4. Gabbe BJ, Simpson PM, Sutherland AM, et al. *Improved functional outcomes for major trauma patients in a regionalized, inclusive trauma system*. Ann Surg. 2012;255(6):1009-15
5. Roberts, D.J., Ouellet, J. McBeth, P.B. et al. *The “weekend warrior”: Fact or fiction for major trauma?* Can J Surg. 2014 Jun; 57(3): E62–E68.
6. Gabbe BJ, Lyons RA, Fitzgerald MC, et al. *Reduced population burden of road transport-related major trauma after introduction of an inclusive trauma system*. Ann Surg. 2015;261(3):565-72.
7. Zafar SN, Obirieze A, Schneider EB, et al. *Outcomes of trauma care at centers treating a higher proportion of older patients: the case for geriatric trauma centers*. J Trauma Acute Care Surg. 2015;78:852-9.
8. Baker SP, O’Neill B, Haddon W Jr, Long WB. *The injury severity score: a method for describing patients with multiple injuries and evaluating emergency care*. J Trauma. 1974 Mar;14:187-96
9. NSW Institute of Trauma and Injury Management. *Major Trauma in NSW 2015*. Sydney: NSW Agency for Clinical Innovation, 2016. (<http://bit.ly/2CZD4N5>)
10. Victoria State Trauma System and Annual Report 2015-16. State of Victoria, July 2017. (<https://www2.health.vic.gov.au/about/publications/annualreports/Victorian-State-Trauma-Registry-Summary-Report---1-July-2015-to-30-June-2016>)
11. *Trauma Registry Report, 2015*. Western Australia State. (<http://bit.ly/2D25SEn>)
12. Ministry of Transport. *Road Toll; 1 July 2016 to 30 June 2017*. (<http://www.transport.govt.nz/research/roadtoll/>)
13. Major Trauma Network. *Out of Hospital Triage Policy and Destination Policy*. (<http://bit.ly/2msWUH1>) February 2017.
14. Cowley RA. *A total emergency medical system for the state of Maryland*. Md State Med J 1975;45:37-45
15. Australian Trauma Registry. *Consolidated Report 1/1/2013 – 30/6/2015*. (<http://bit.ly/ATSCR1315>)
16. Isles S, Christey G, Civil I, Hicks P. *The New Zealand Major Trauma Registry: the foundation for a data-driven approach in a contemporary trauma system*. N Z Med J. 2017;130(1463): 19-27
17. O’Leary K, Kool B, Christey G. *Characteristics of older adults hospitalised following trauma in the Midland region of New Zealand*. N Z Med J. 2017;130(1463):45-53.
18. Alamri Y, Moon D, Ay Yen D, et al. *Ten-year experience of splenic trauma in New Zealand: the rise of non-operative management*. 2017;130(1463):11-18



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