2019

Auckland City Hospital
Trauma Registry Report

Trauma Services

Contents

Figures

Tables

Abbreviations

ACH	Auckland City Hospital
ADHB	Auckland District Health Board
AIS	Abbreviated Injury Scale
ALOS	Average Length of Stay
CNS	Central Nervous System
DCCM	Department of Critical Care Medicine
ISS	Injury Severity Score
MMH	Middlemore Hospital
MOF	Multi-organ failure
TBI	Traumatic Brain Injury

Trauma Services

The Northern Region Trauma Network

Auckland District Health Board (ADHB) is part of the Northern Region Trauma Network.

Auckland City Hospital (ACH) and Middlemore Hospital (MMH) are tertiary major trauma hospitals. Whangarei, ACH, Starship and MMH are designated within the Northern Region to receive patients with major trauma whereas Waitemata is not. Within the Auckland metropolitan region patients defined status 1 and 2 (unstable) by St John Ambulance within the Waitemata and Auckland DHB regions are transported to either Auckland or Starship Hospitals (under 15 year olds to Starship) whereas in the Counties Manukau DHB area status 1 and 2 patients are taken to MMH.

ACH provides neurosurgical and cardiothoracic services for the entire region while MMH provides burns, plastic surgical, maxillofacial and spinal cord injury services.

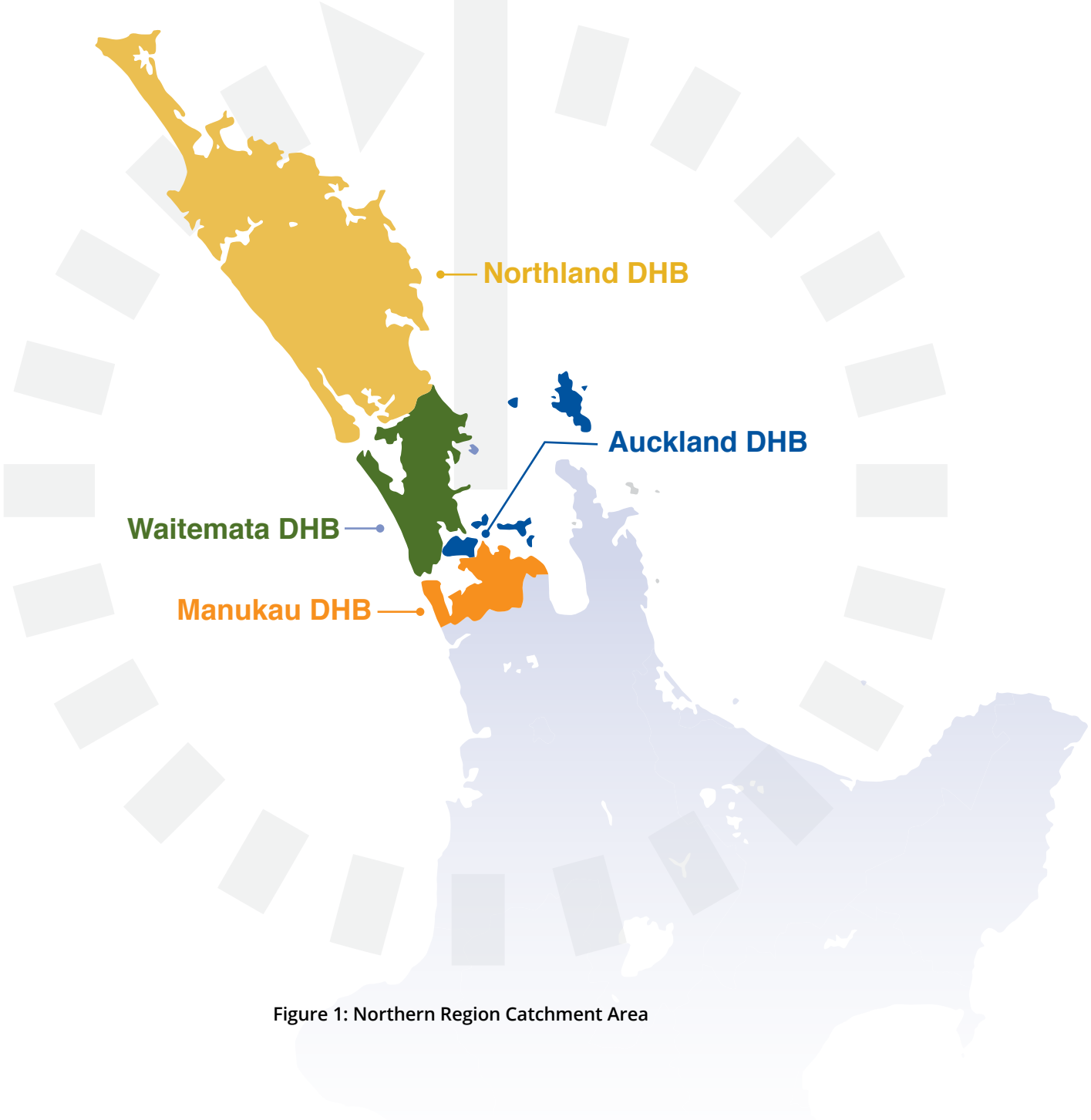


Figure 1: Northern Region Catchment Area

Executive Summary

The total number of trauma presentations has continued to increase in 2019.

2019

saw minimal growth in overall trauma admissions but the 4.6% growth in major trauma admissions continuing a trend which has seen

an increase of 40% in major trauma admissions over the last 5 years.

Overall mortality from major trauma patients is

12.5%,

down from 13.3% in 2018.

Most deaths are a result of serious traumatic brain injury.

Reductions in haemorrhage deaths and multiple organ failure suggest improvements in early trauma care.

The "Code Crimson" protocol (www.trauma.co.nz/guidelines.html#part3) and effective use of the massive transfusion protocol are likely factors.

Major trauma patients represent an increased proportion of overall trauma load, increasing gradually from

17% in 2016

through to

21.2% in 2019.

The ratio of

Direct admissions and transfers of major trauma patients has not changed since 2018.

Stabbing is the most common form of physical self-harm

requiring admission to hospital.

The total use of Critical Care beds by trauma patients has increased annually.

This reflects the steady increase in the number of major trauma patients admitted.

Māori are overrepresented

in admission statistics in relation to DHB population for both all trauma and major trauma.

Admission of patients > 65 years old

has doubled in the last 10 years.

Auckland City Hospital Trauma Registry

The Auckland City Hospital Trauma Registry was established in December 1994 and as of 31st December 2019 has 35,821 patients in the registry.

Entry criteria

Data is collected on all patients admitted to Auckland City Hospital (ACH) following injury with the following exceptions:

- Injuries that are the result of pathological conditions.
- Late trauma transfers. Where a patient is transferred from another hospital where his/her initial treatment was expected to have been definitive.
- Admission for injuries that occurred one week or more prior to the time of presentation to hospital.
- Hanging and drowning.
- Elderly patients who sustain femoral neck fractures for simple falls or other minor injuries when admission is primarily related to an associated co-morbidity.
- Patients under the age of 15 years. These patients will attend Starship Hospital.

Data collection

Data is extracted from patient charts during the daily ward round and recorded on a data collection form which is regularly reviewed and updated while the patient is in hospital.

Collector® is the software used for the registry. We use the Abbreviated Injury Scale (AIS) version 1990 updated 1998, this determines our Injury Severity Score (ISS).

- AIS assigns a numerical value of between 1 and 6 according to the severity of injury (1 least, 6 most) for injuries in each region of the body. ISS takes the scores from the three regions with the highest AIS score, squares them and adds them together. ISS can range from 1 (least and not usually requiring admission to hospital) and 75 (most and usually fatal). ISS is not normally distributed and is non-ordinal in that not every score between 1 and 75 is possible.
- The dataset is specifically configured to the requirements of ACH. Data is entered into the registry from the collection form after the patient has been discharged from hospital.
- The Trauma Registry assists in the study of trends in the region and injury prevention.

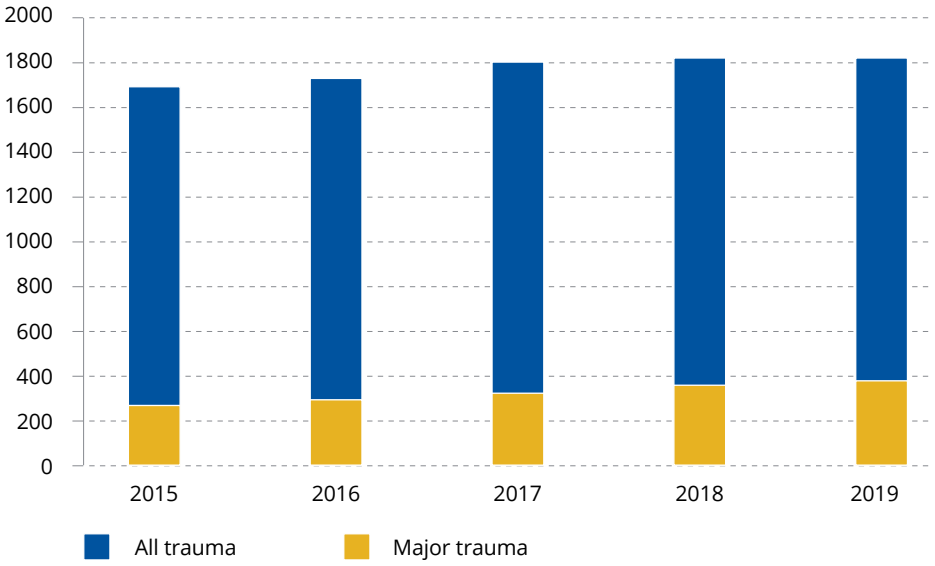
Major Trauma

Using AIS1990/98 major trauma is defined as those patients with an ISS score of 16 or greater. This means every patient with a single AIS 4 or 5 score qualifies as having suffered major trauma. In addition the ISS≥16 criteria are met by a patient with two AIS3 scores or an AIS 3 score and 2 AIS 2 scores.

Trauma Registry Report 2019

Total Trauma and Major Trauma admissions over the last 5 years

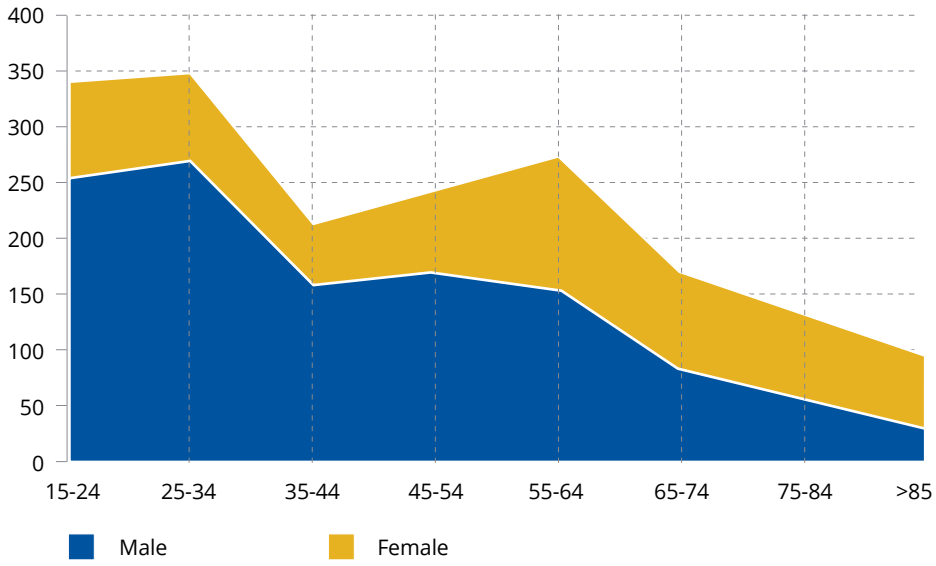
Figure 2: Total Trauma and Major Trauma admissions over the last 5 years



The number of trauma patients admitted has increased each year over the past five years. Between 2015 and 2019 there was a 6.6% increase. With regard to major trauma however the change from 2015 (273 patients) to 2019 (384 patients) represents a 40% increase. A number of factors could explain this increase in major trauma relevant to all trauma admissions. It is unlikely that the proportion of major trauma patients relevant to all trauma is increasing but much more likely that effective use of the St John prehospital destination policy has seen more major trauma patients preferentially being transported to ACH. Changes in interhospital transfer numbers with ACH increasingly being referred patients for treatment of serious traumatic brain injury and complex thoracic injuries also a factor.

Age and Gender distribution for 2019

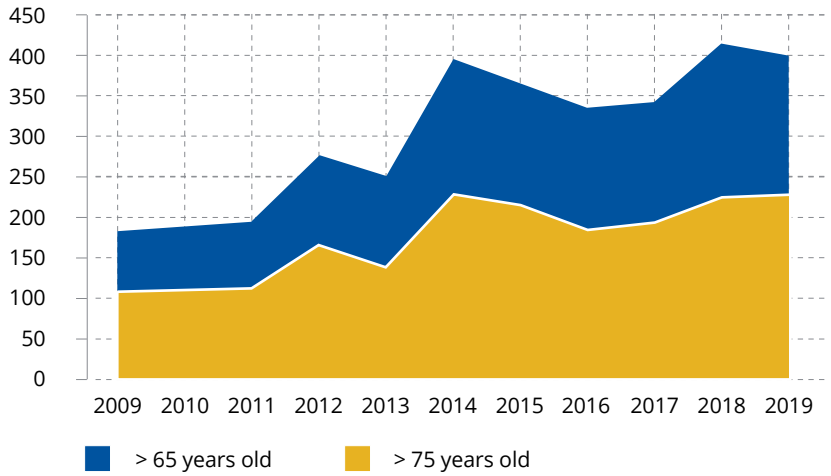
Figure 3: Age and Gender Distribution for 2019



The age and gender distribution in 2019 are comparable to previous years' distributions, with males dominating in the younger decades of life. After the age of 65 females predominate. This is despite the ACH Trauma Registry excluding femoral neck fractures and other injuries related to co-morbidity. This age breakdown for trauma incidence is common and largely related to longer female life expectancy rather that any particular behavioural predilection for women to sustain injury.

Trauma Admissions

Figure 4: Trauma admissions over 65 years



The number of patients admitted over the age of 65 remains high in 2019. With aging of the population the number of patients in the older age groups is increasing and this is reflected in the age distribution of those suffering injury.

Mode of Transport to Hospital

Most patients are transported by ambulance with the proportion being transported by road or air ambulance increasing from 63% to 86% when considering major trauma as opposed to all trauma admissions

Figure 5 : Mode of transport to hospital for all trauma admissions

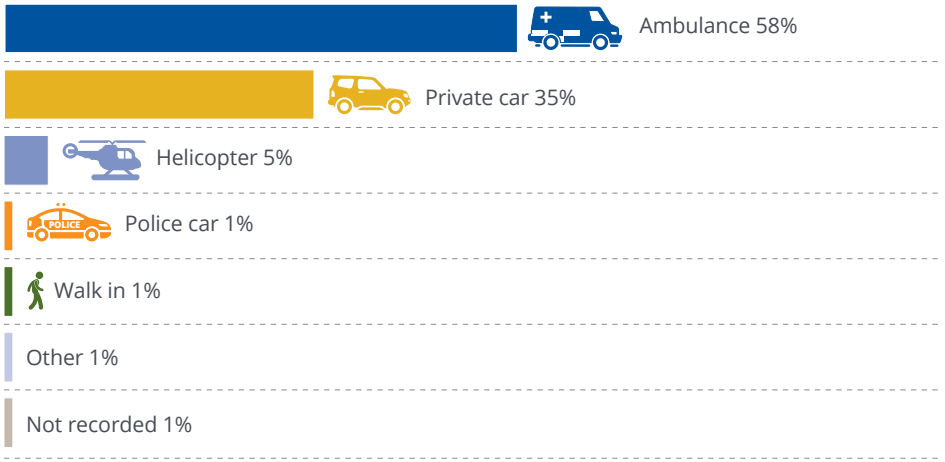
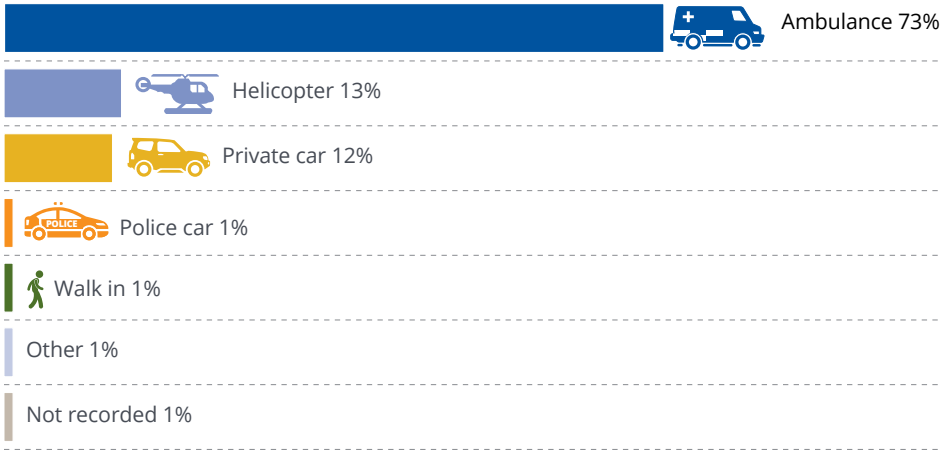


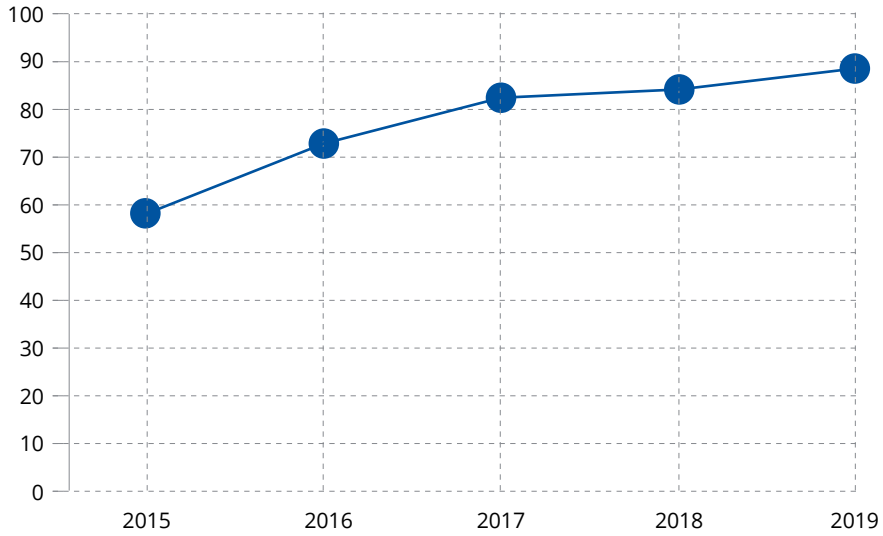
Figure 6 : Mode of transport to hospital for major trauma



Direct admissions and Transfers of Major Trauma

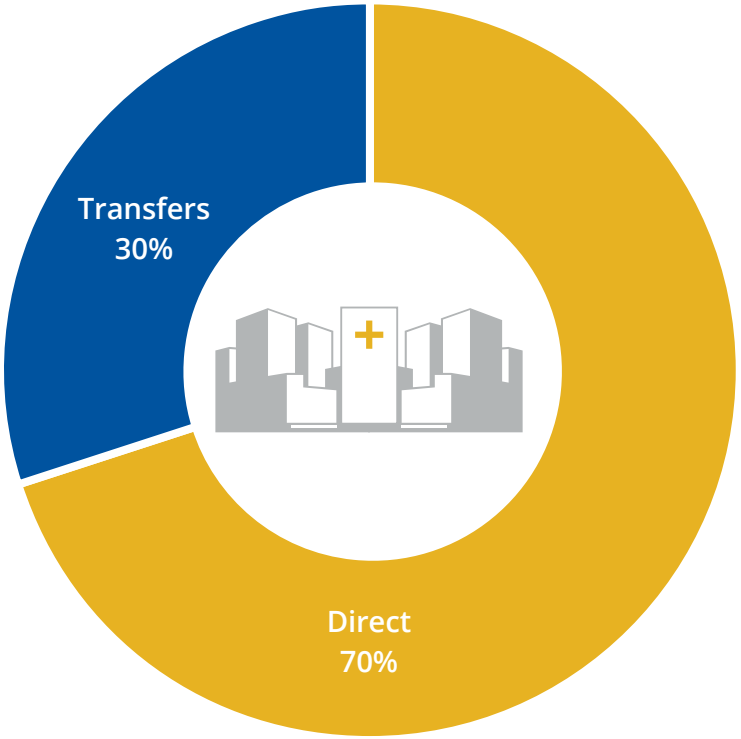
The number of major trauma transfers has increased annually since 2013. Since that time there has been a formalising of transfer/transport policies and guidelines which has assisted with the timely and appropriate placement of patients in hospitals throughout New Zealand. Auckland City Hospital has always been the default destination for all patients triaged by prehospital services as having potential major trauma injured in both the Waitemata and Auckland DHB catchment regions but increasing hospital specialisation has seen more patients transferred from within the region and elsewhere for the specific subspecialty expertise offered by ACH.

Figure 7 : Major Trauma transfers to ACH



Patients with less severe injuries are also transferred to ACH and the most common reason for this is that the patients' domicile is within the ADHB catchment.

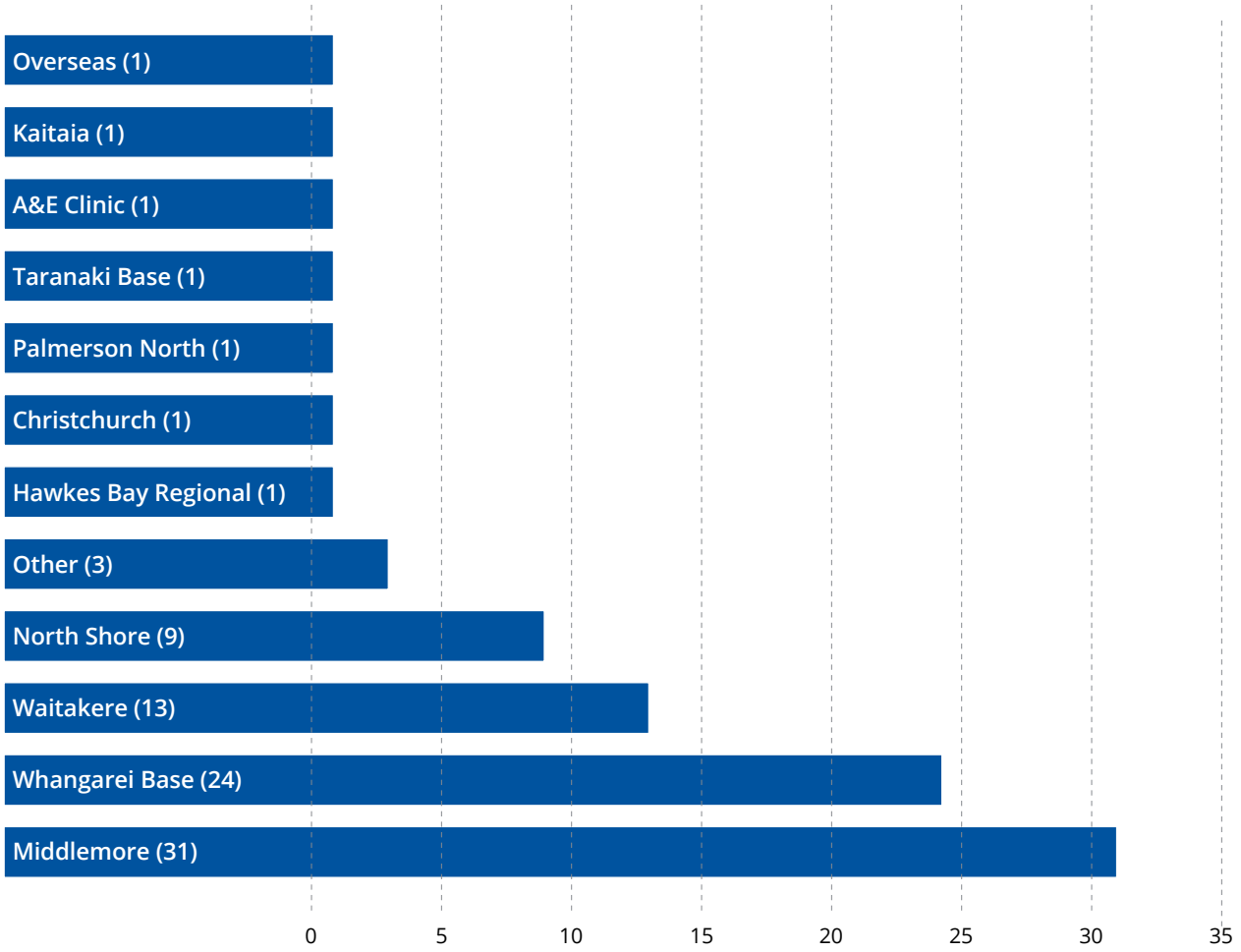
Figure 8 : Percentage of transfers from other hospitals



This has not changed from 2018.

Numbers of patients from each originating hospital

Figure 9 : Originating hospital



Most transfers continue to be from Middlemore Hospital.

Cause of injury

Mechanism of injury shows a stable pattern over the last 5 years. Falls are the most common case of injury followed by road traffic related injuries (motor vehicles occupants, cyclists and pedestrians). “Other” mechanisms are largely made up by various forms of assault.

Major trauma has a higher predominance of road related trauma and a smaller proportion of falls as a whole. This is because injury severity relates very strongly to the amount of energy involved in causing the injury and road related mechanism are associated with higher speeds and energy patterns than other forms of injury.

The percentage of major trauma patients injured in road traffic crash (motorcycle and motor vehicle) for ADHB is 32%, much less than the national average, 52%. In comparison with other DHB catchments ADHB has far fewer open high speed roads and although road crash is still a common mechanism of injury, unlike Waikato and Canterbury DHBs for example, these less frequently cause major trauma in the ADHB catchment as they are associated with lower speeds

Figure 10: Injury Cause – All Trauma

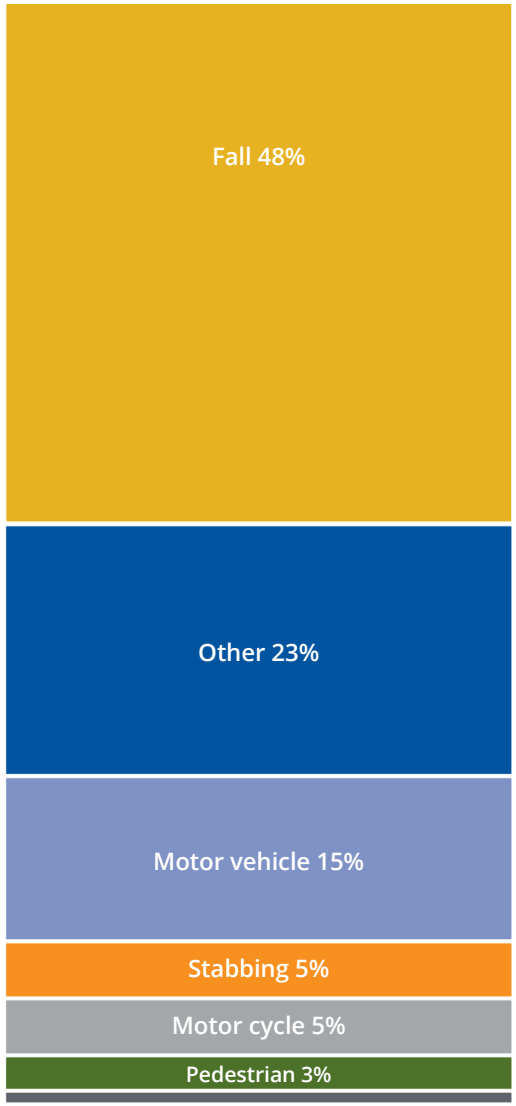
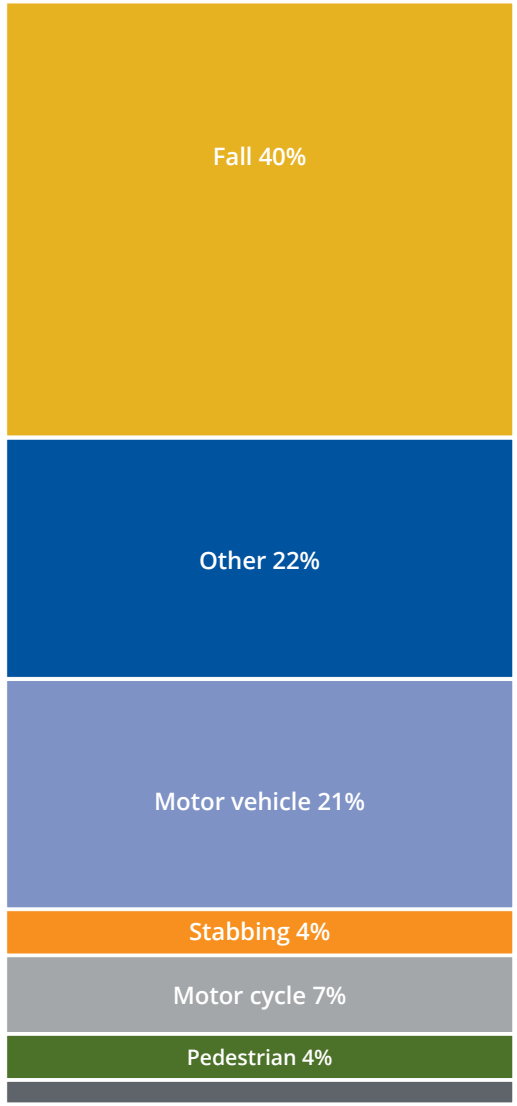


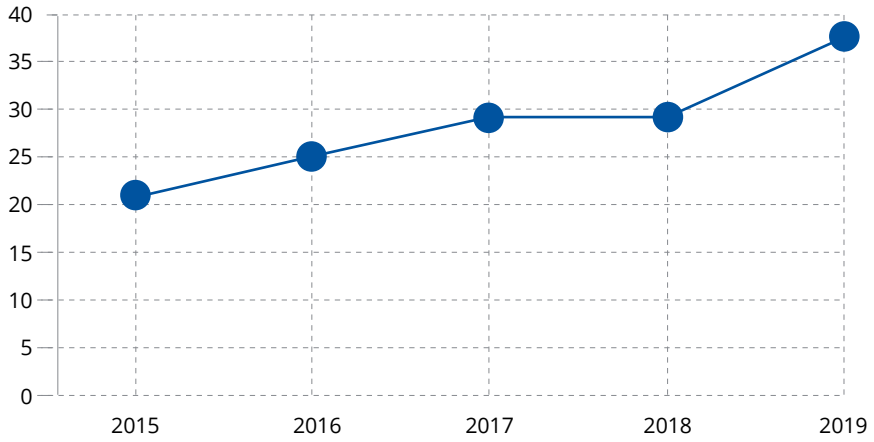
Figure 11: Injury Cause – Major Trauma



Self-Harm

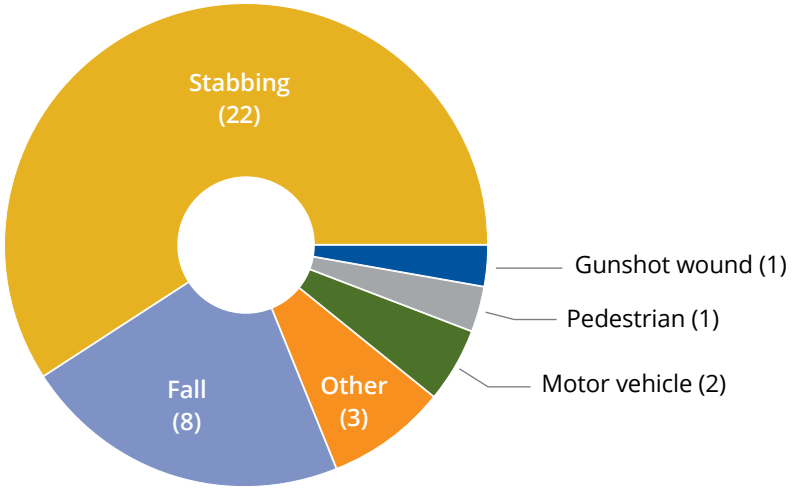
There has been an increase in number of patients suffering physical self-harm going from 21 admissions in 2015 to 37 in 2019. Patients with minor physical injury requiring treatment by Plastic Surgery would be transferred to MMH and would not be included in these numbers.

Figure 12 : Admission as a result of physical self-harm



60% of self-harm admissions to Auckland City Hospital are due to self-inflicted stabbings.

Figure 13 : Mechanism of injury for physical self-harm admissions 2019



There have been two deaths from self-harm in 2019, one from stabbing and one from a high fall.

Ethnicity

The ethnic breakdown of Auckland District Health Board population show Māori are over represented in all trauma admissions and major trauma admissions. This reflects national data. It can also be noted that ACH receives admissions from other DHBs within the Northern region, which makes analysis of admitted trauma numbers against a denominated population difficult.

Figure 14 : Ethnicity - All Trauma

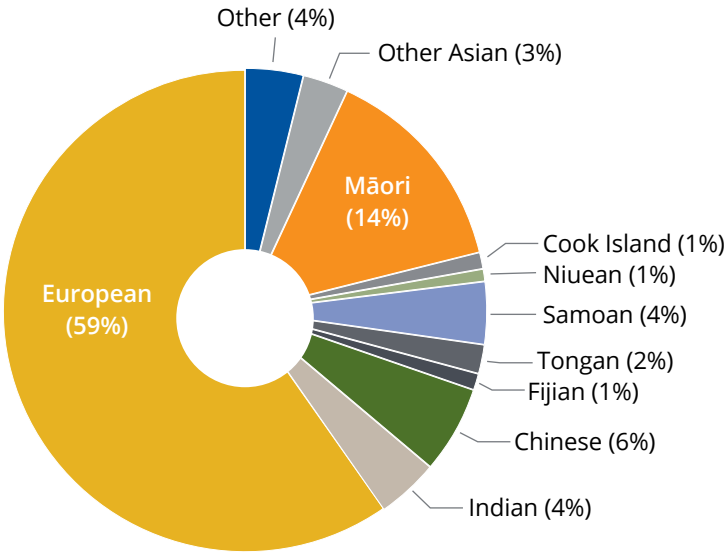
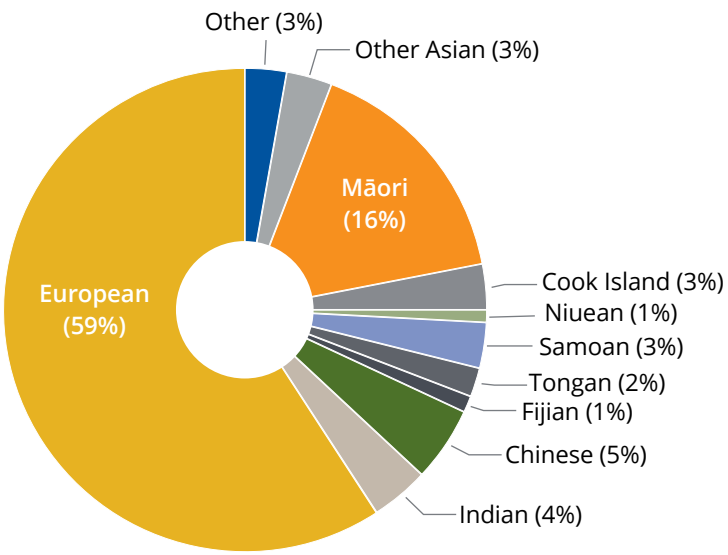


Figure 15 : Ethnicity - Major Trauma



Population distribution ADHB 2019

Table 1: Population distribution Auckland District Health Board 2019

	For New Zealand	ADHB catchment	Admissions Major Trauma	Admissions All Trauma
Māori	16.5%	7.9%	16%	14%
Pacific	8.1%	10.3%	11%	10.2%
Other	75.4%	81.8%	73%	75.8%

The percentage of Māori in the ADHB catchment is less than the national average.

Māori are over-represented in trauma admissions.

The percentage of all trauma admissions of Māori has increased by 2% in 2019 whereas the percentage of Māori admitted with major trauma has remained the same compared to 2018.

Length of stay

Length of stay is generally correlated with injury severity as is seen here. Apart from overall injury severity, specific types of injury are associated with longer lengths of stay. Examples would be pelvic fractures or bilateral calcaneal fracture where a prolonged period of bedrest is usually required after injury or after surgery. Some patients have prolonged stays waiting for rehabilitation availability and patients with psychiatric disorders as well as severe physical injury also take a prolonged period to discharge. Median length of stay for all admitted trauma patients, and for those with major trauma is stable at 3 days and 7 days respectively.

Figure 16 : Average length of stay per ISS grouping

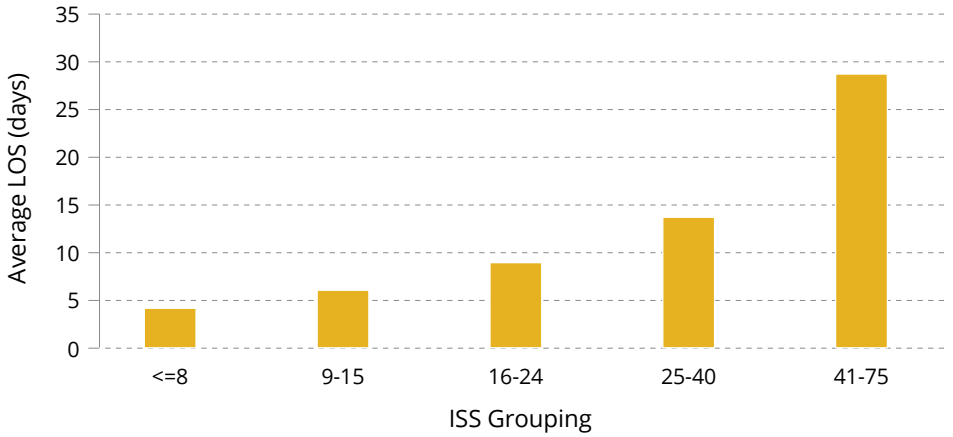
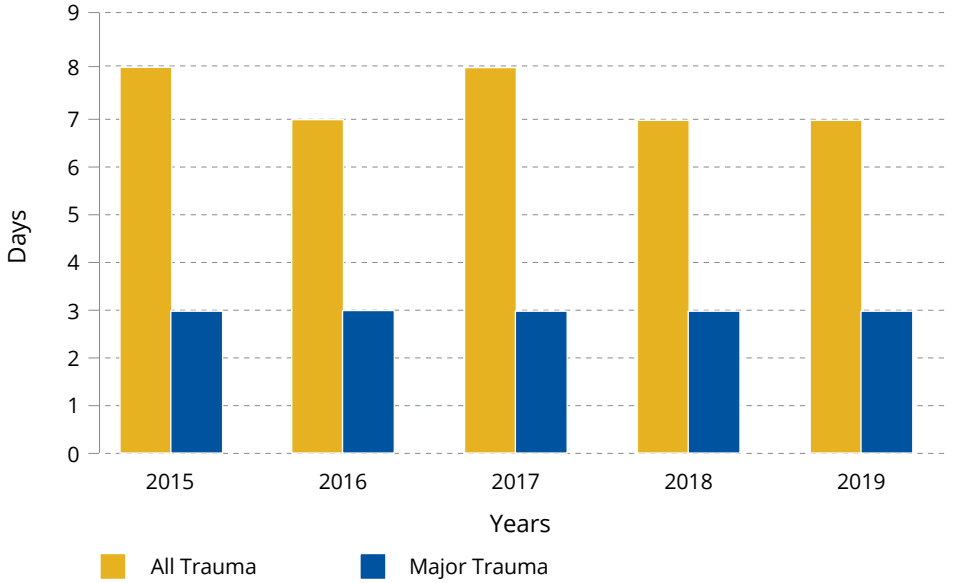
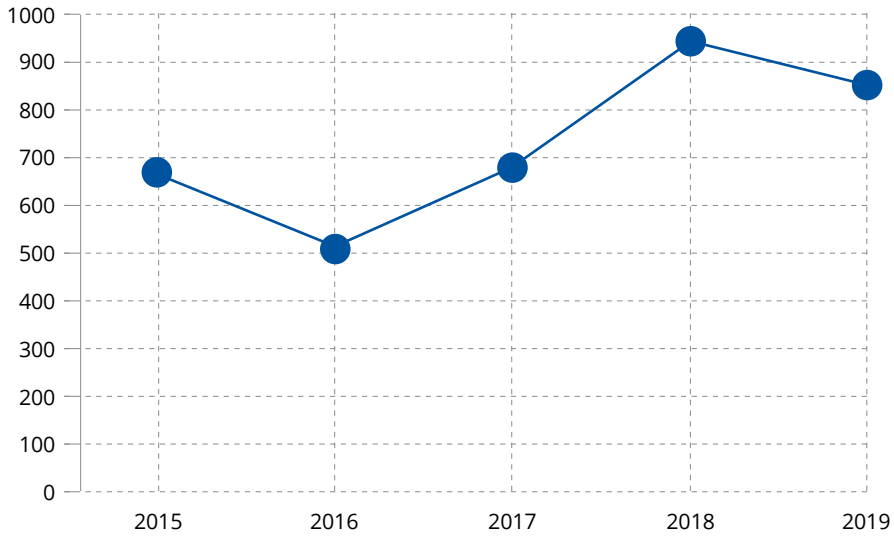


Figure 17 : Median length of stay



DCCM bed utilisation

Figure 18 : Total DCCM bed days used by trauma patients/year

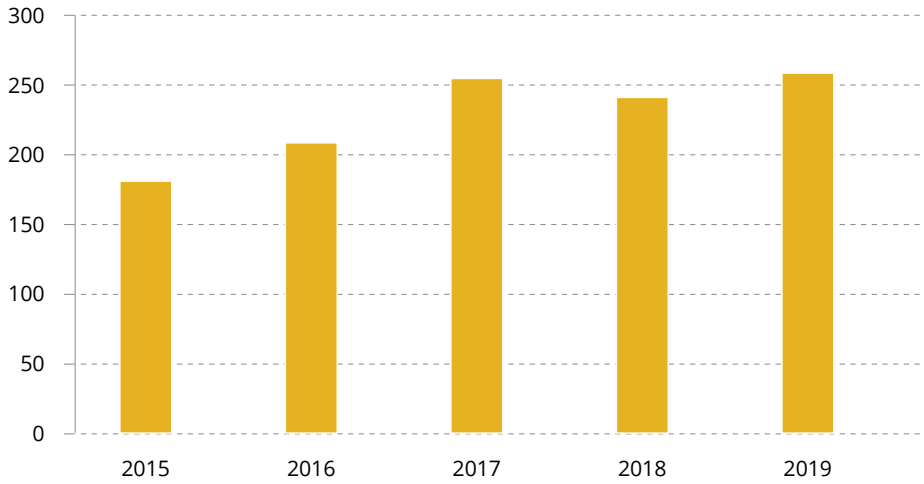


The total Department of Critical Care Medicine (DCCM) bed utilisation by trauma patients has increased over the past 6 years. This matches the increased number of trauma patients admitted to ACH and the higher proportion of major trauma patients, many of whom require ICU admission. The number of patients with head injuries has also increased annually.

Traumatic brain injury with AIS>2 admitted to ADHB over the last 5 years

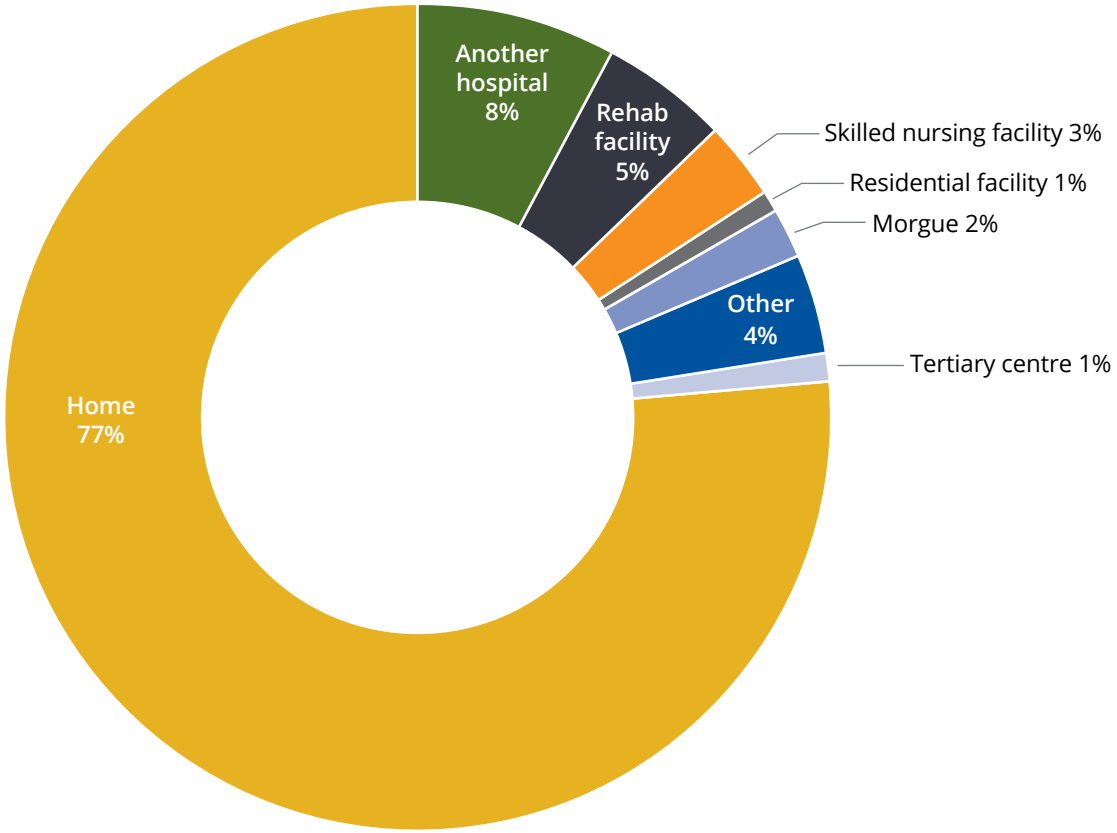
Patients with AIS greater than 2 for their head injury have a serious, severe, critical or maximal head injury. The increasing numbers of patients admitted to ACH with serious traumatic brain injury (TBI) is a reflection of the increased consideration given to both the national and regional destination policies and the growing subspecialisation within all hospitals and clinical services. Some of these patients would otherwise be cared for in intensive care units without the benefit of onsite neurosurgical services for interventions such as intracranial drains and shunts and others would be managed by general surgeons. Increasingly there is a desire to transfer patients either to a trauma service in a neuroscience centre or an intensive care unit supported by an in-house neurosurgical unit.

Figure 19 : TBI AIS>2



Discharge destination

Figure 20 : Discharge destination – All Trauma



There were no significant changes in the discharge destinations in 2019. Most patients are discharged home with only a small number (18%) discharged to another residential facility.

Patient outcomes: Major Trauma

Table 2: Patient outcomes – Major Trauma

Patient outcomes 2019				
	Total	Died	Survived	Mortality
Blunt	359	46	313	12.8%
Penetrating	23	2	21	8.7%
Total	382	48	334	12.5%

The overall mortality of major trauma patients was 12.5%. This is higher than the national average reported by the National Trauma Network for other hospitals in NZ. It is worth commenting however that the national figures largely relate to hospitals where all patients; adult, children, plastics, patients with burns and spinal cord injuries are admitted to the same facility. ACH admits a subset of the population and is underrepresented by those with low mortality like patients with minor plastic surgical conditions and paediatric trauma and overrepresented by those with high mortality like Central Nervous System (CNS) injury.

Trauma deaths

As with previous years, the predominant cause of death remains severe head injury. This is to be expected as ACH contains the regional neurosurgical unit. The percentage of medical deaths is the same as 2018, again likely be due to the number of elderly trauma admissions increasing and that these patients are more likely to have associated co-morbidities. Potentially preventable deaths from multi-organ failure (MOF) have not occurred in 2019 (this is below the national average). ACH deaths from haemorrhage have dropped from 11% in 2018 to 6% in 2019, which is below the national average of 9%. These data suggest that the approach taken to patients with critical haemorrhage is comparable with best practice and sees results which are consistent with international standards.

Figure 21 : Death type 2019

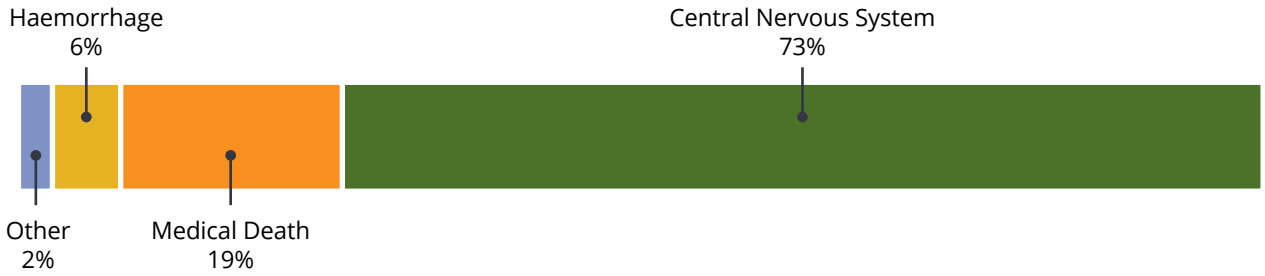
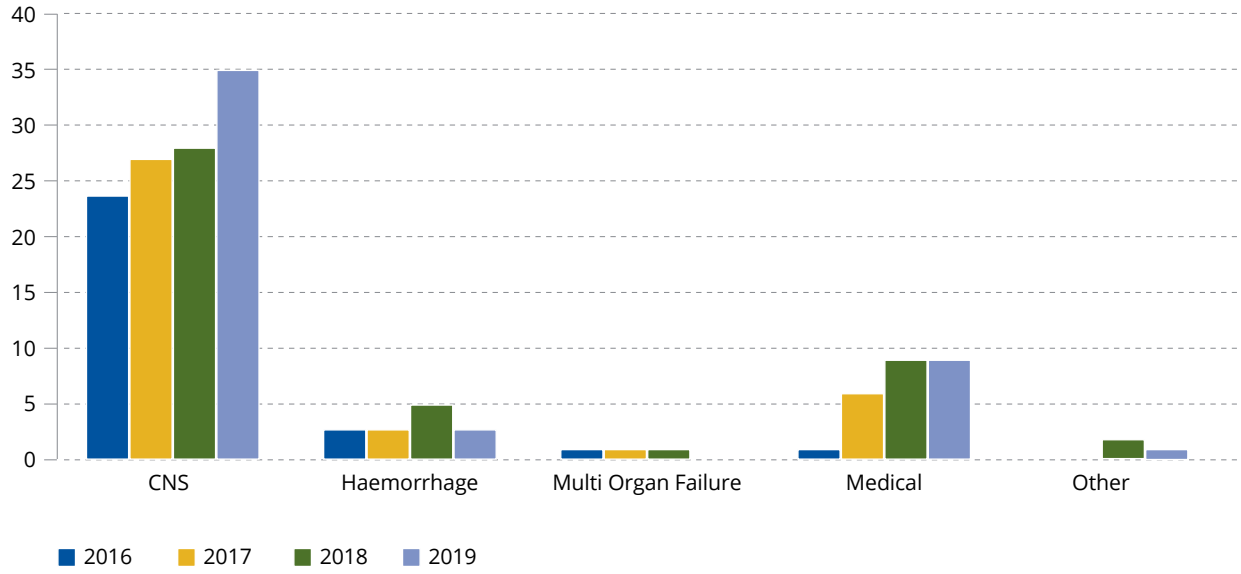


Figure 22 : Death type 2016-2019



Mortality per ISS grouping

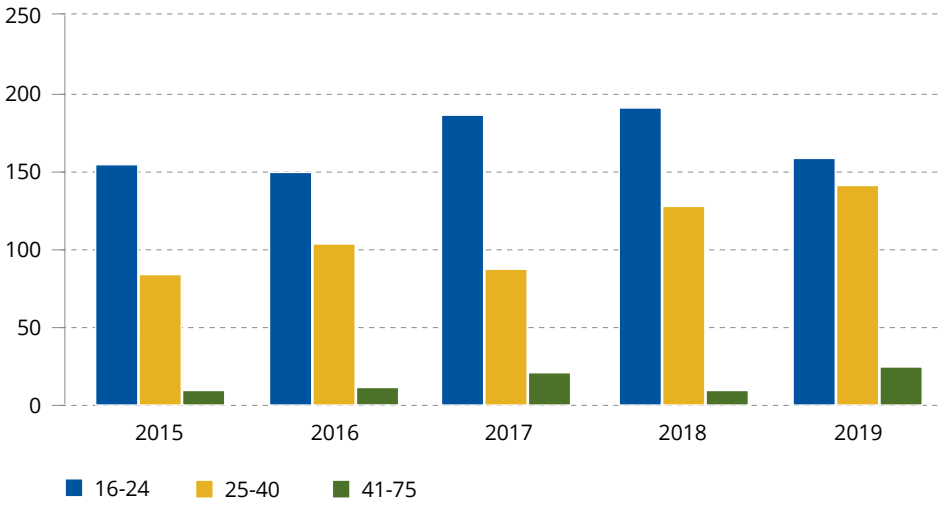
Table 3: Mortality per ISS grouping

	ISS				
	1-8	9-15	16-24	25-40	41-75
No. Deaths	6/1086	4/403	3/159	28/140	7/25
Percentage	0.1%	1.0%	2.0%	20%	28%

Mortality is strongly associated with ISS which is a threat to life score. Mortality for those not meeting the criteria for major trauma (ISS<16) have low mortality risk, usually related to underlying comorbidity.

Major Trauma and ISS

Figure 23 : Major Trauma and ISS

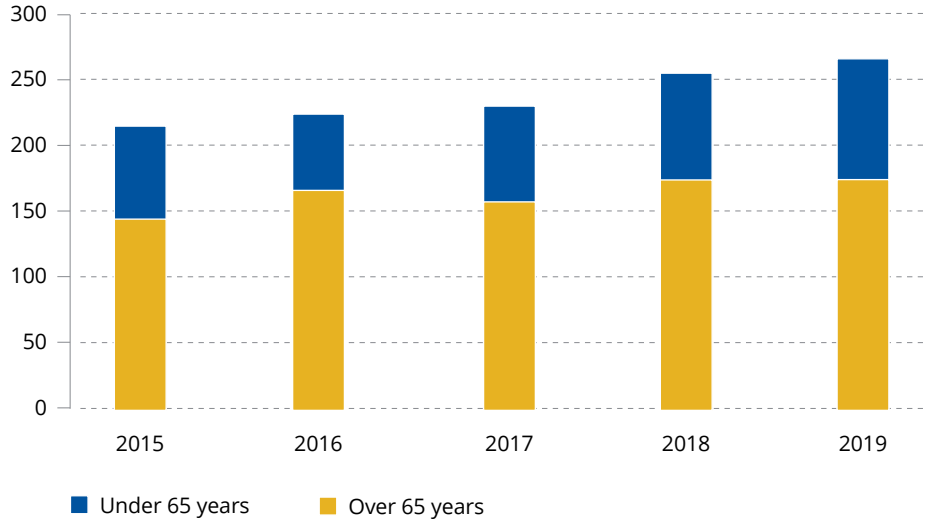


This chart shows the number and severity of major trauma admissions over the past 5 years. 2019 show an increase in severe trauma patients (ISS of 41-75), this is higher (28 patients) than the spike in 2017 of 22 patients.

Rib fractures

Patients aged >65 years old represent 11% of the ADHBs population, (national average 15%). Blunt chest trauma with rib fractures is common in the elderly and leads to significant mortality and morbidity not seen in younger age groups. Over recent years chest wall injury has increasingly been recognised as an injury pattern for which the Trauma Service can provide specific therapies (such as rib plating and surgical evacuation of fluid collections in the thoracic cavity) and patients who might previously have been admitted under a medical service are now admitted under the Trauma Service. The Trauma Service is also able to coordinate other supportive treatments such as those provided by the Pain Service and the Physiotherapy Department as described in the ADHB chest wall injury pathway.

Figure 24 : Number of patients admitted with rib fractures by age



Summary

2019 was a busy year for the Trauma Service at ACH. There was an increase in the number of transfers from other centres as well as an increase in local presentations. While overall mortality was higher than the national average, the number of deaths at ACH from preventable causes is below the national average. The trauma registry data highlights that, regardless of the increased volume and severity of admissions, trauma patients admitted to ACH are treated in an expeditious and appropriate fashion and the outcomes are consistent with best practice.

The clinical and administrative work of the Trauma Service is acknowledged as contributing to these outcomes.

Auckland City Hospital Trauma Service

Senior Medical Officers

Professor Ian Civil – Director

Mr Li Hsee – Surgeon

Dr Savitha Bhagvan – Surgeon

Mr Alex Ng – Surgeon

Mr Ashish Taneja – Surgeon

Dr Mark Friedericksen – Emergency Physician

Fellow

Yvonne Vun-E

Trauma Nurse Specialists

Pamela Fitzpatrick

Rochelle Morrow

Trauma Systems Co-ordinator

Sue Wilkinson

Database Administrator

Lynn Tucker

Report prepared by Susan Wilkinson

Trauma Services

Auckland DHB Trauma Services

Phone 09-307-8931

Email aktrauma@adhb.govt.nz

www.trauma.co.nz