2022

Auckland City Hospital

Trauma Registry Report

Te Whatu Ora
Health New Zealand
Te Toka Tumai Auckland

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The Northern Region Trauma Network

The Northern Region includes Northland, Waitematā, Auckland and Counties Manukau districts.

Auckland City Hospital (ACH), Starship Children's Hospital (SCH) and Middlemore Hospital (MMH) are Tertiary Major Trauma hospitals. Whangārei, ACH, SCH and MMH are designated within the Northern Region to receive patients with major trauma whereas North Shore Hospital (NSH) is not. Patients defined as status 1 and 2 (unstable) by St John Ambulance within the Waitematā and Auckland regions are transported to either Auckland or Starship Hospitals (under 15year olds to Starship) whereas in the Counties Manukau district 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: Te Whatu Ora Health Regions

Executive summary

- 2022 was a year with COVID Traffic Light management system; there has been a return to pre-COVID numbers of trauma admissions
- Major trauma patients represent an increasing proportion of the trauma load and have increased 30% since 2018
- Despite the percentage of Māori admitted to ACH with major trauma decreasing, Māori continue to be overrepresented in admission statistics for the Auckland health region population in both all trauma and major trauma.
- 24% of the trauma patients admitted to ACH are 65 years of age and over.
- Most trauma deaths at ACH are a result of serious traumatic brain injury.
- The ratio of direct admissions to transfers of major trauma patients remains unchanged since 2018
- The number of patients admitted to ACH with self-harm from trauma has dropped in 2022 for the first time in 5 years.
- The use of Critical Care beds by trauma patients continues to rise with an increase of 10% in 2022; this reflects the greater number of major trauma patients admitted.

Auckland City Hospital Trauma Registry

The Auckland City Hospital Trauma Registry was established in December 1994 and as of 31st December 2022 has 41082 patients recorded.

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. When 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 15years. 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 are using version 5 and the Abbreviated Injury Scale (AIS) version 2005; 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 AIS 2005 major trauma is defined as those patients with an ISS score of 13 or greater. This means every patient with an AIS 4 score, two AIS 3 scores or an AIS 3 score together with one AIS 2 scores or more is classified as major trauma.

All trauma and major trauma admissions over the last 5 years

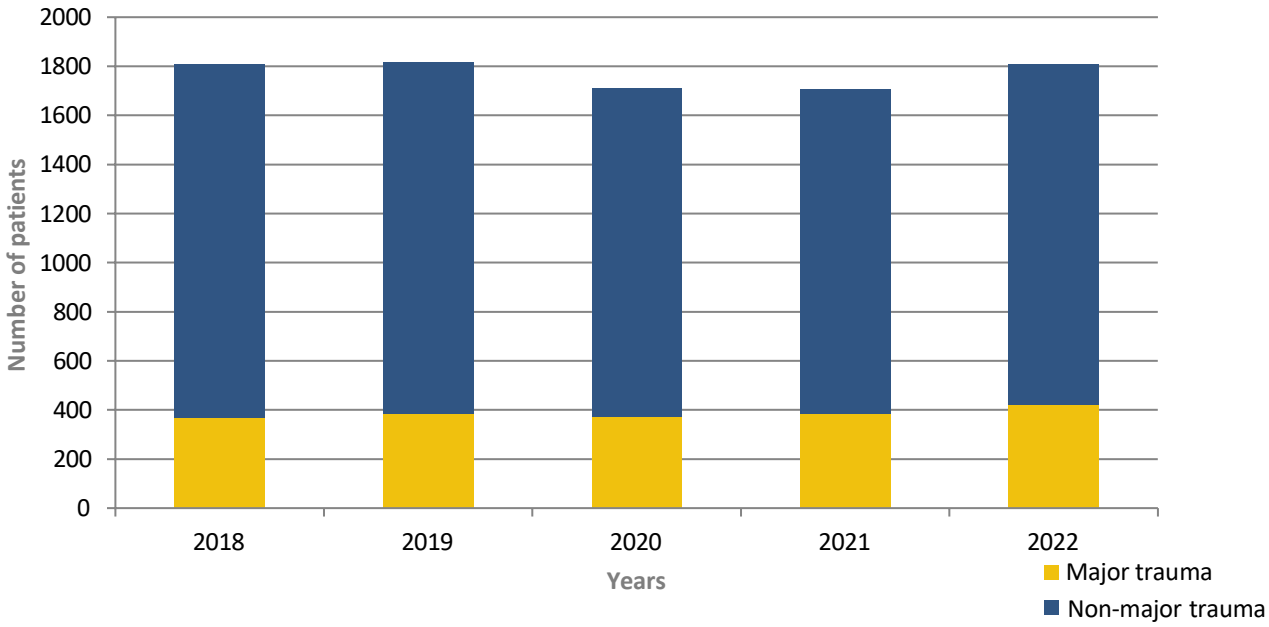

Figure 2: All trauma and major trauma admissions over the last 5 years

The number of trauma patients admitted to Auckland City Hospital has returned to that of pre-COVID times. 2022 has the largest number of major trauma patients coming to our hospital in the last 5 years.

Age and gender distribution for 2022

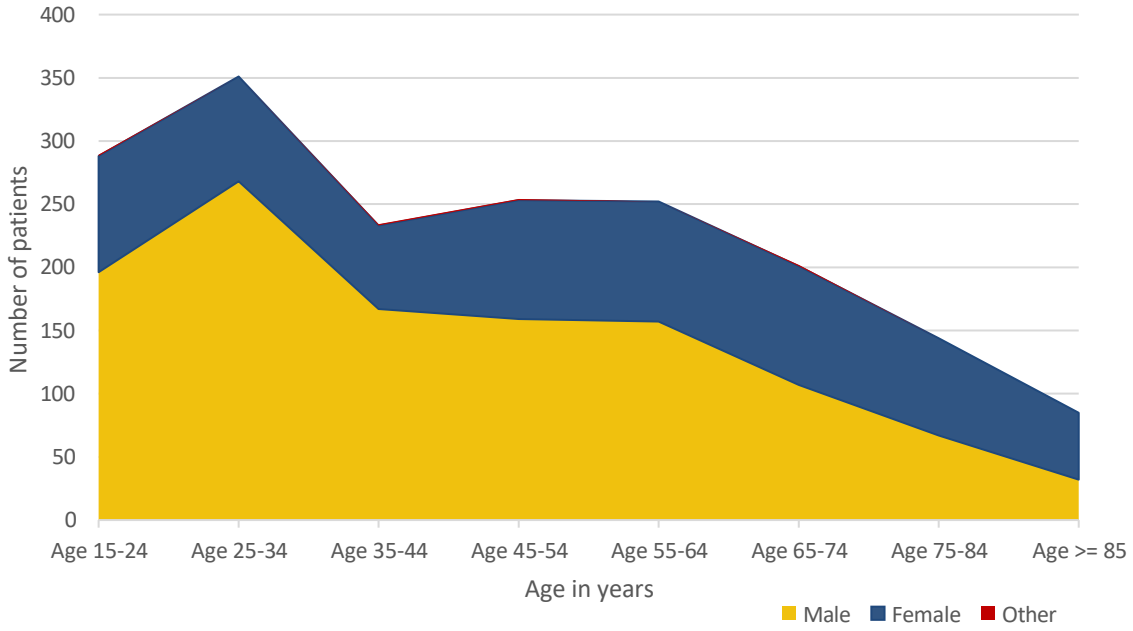

Figure 3: Age and gender distribution for 2022

The age and gender distribution is comparable with previous years. Males continue to dominate in the younger decades of life.

Trauma admissions of the older patient 2022

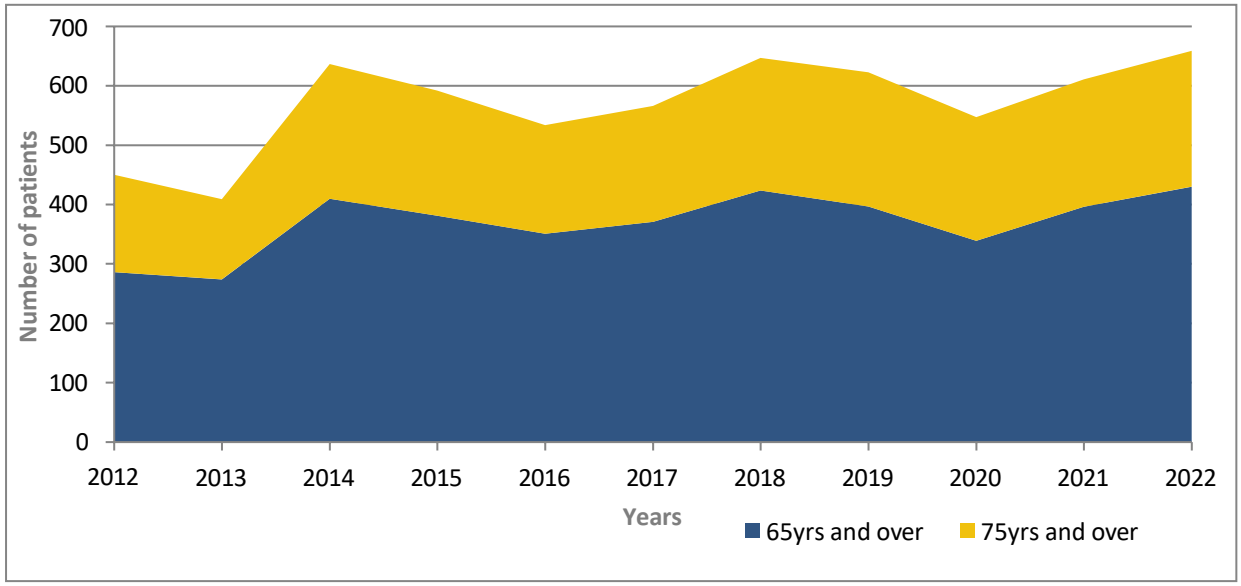

Figure 4: Trauma admissions 65 years of age and over

The number of patients admitted over the age of 65 has risen in 2022 following a slight drop in admissions during 2020 likely due to COVID and the associated restrictions on activity.

Mode of transport from the scene to hospital 2022

Ambulance Services bring most patients to hospital from the scene. A small group of patients go home first, present to a GP/Accident & Medical Centre or arrive later. These patients are in the 'not applicable group'.

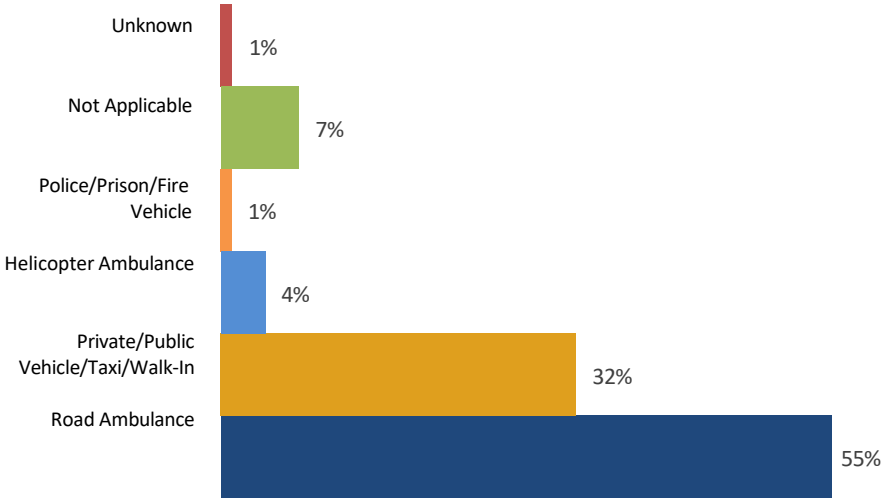

Figure 5: Mode of transport to hospital for all trauma admissions

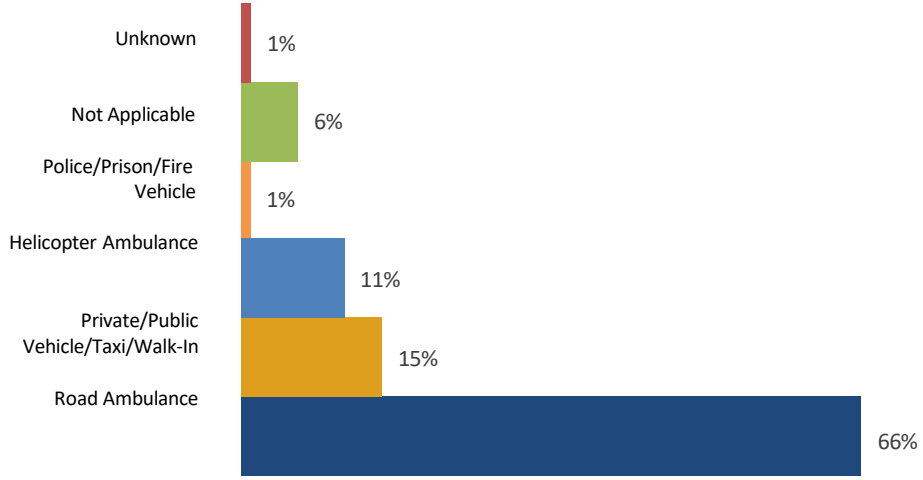

Figure 6: Mode of transport to hospital for major trauma

Direct admissions and transfers of major trauma 2022

Auckland City Hospital is the default destination for all patients triaged by pre-hospital services as having a potential major trauma and injured in both the Waitematā and Auckland catchment regions. Specialty expertise offered at ACH means other patients are transferred from within the region and elsewhere for care. The percentage of major trauma patients transferred from another hospital remains similar to previous years.

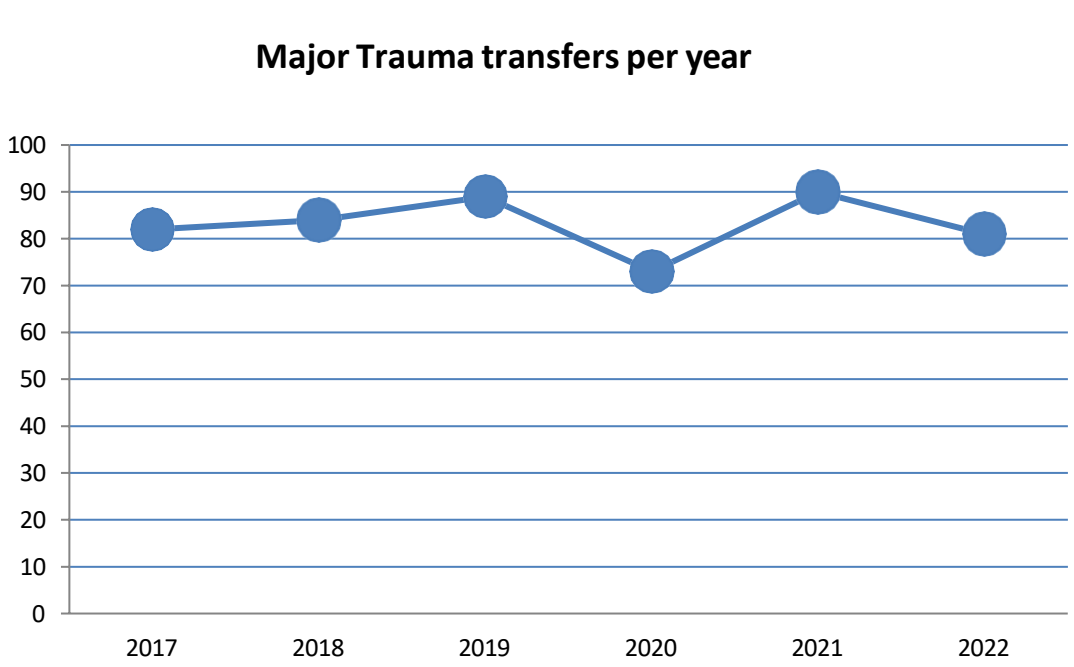

Figure 7: Major trauma transfers to ACH

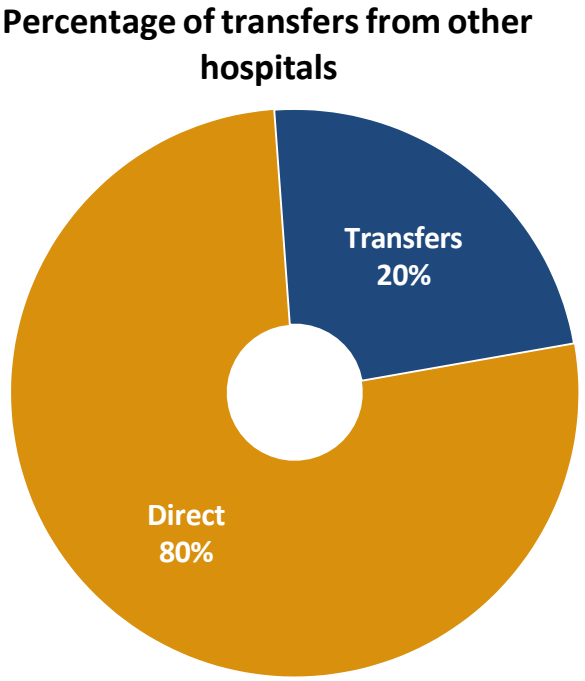

Figure 8: Percentage of transfers from other hospitals

Number of transfers from other hospitals 2022

As usual most transfers are from Middlemore Hospital. Transfers include patients with major trauma, head trauma and those transferred because of domicile.

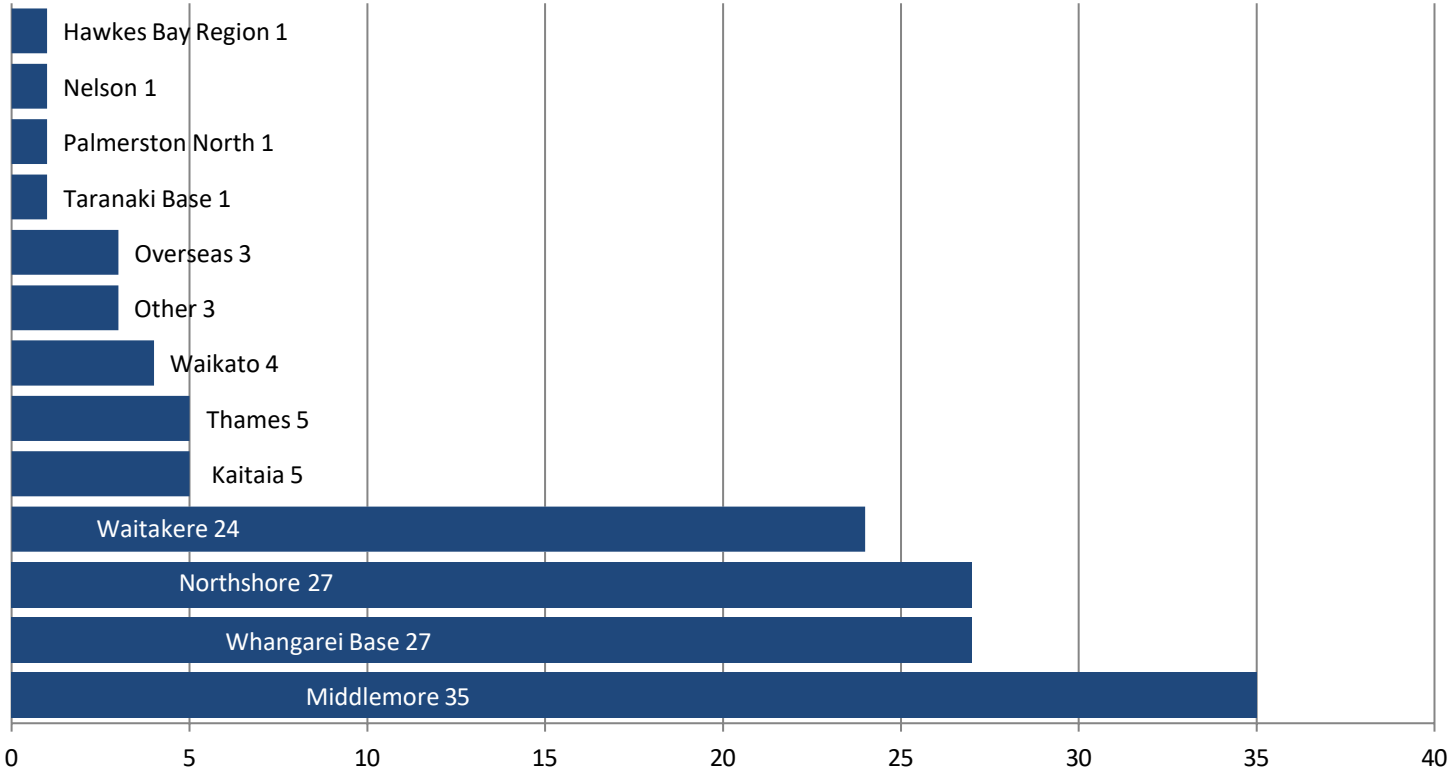

Figure 9: Hospital of origin

Cause of injury

Mechanism of injury shows a stable pattern over the last 5 years. Falls remain the most common cause of injury; these patients have fallen from a range of heights. As injury severity relates strongly to the amount of energy involved in causing the injury, road related trauma patients have higher predominance in major trauma. The number of patients with gunshot wounds has been increasing since 2015. There was an increase of almost 50% from 2021 to 2022.

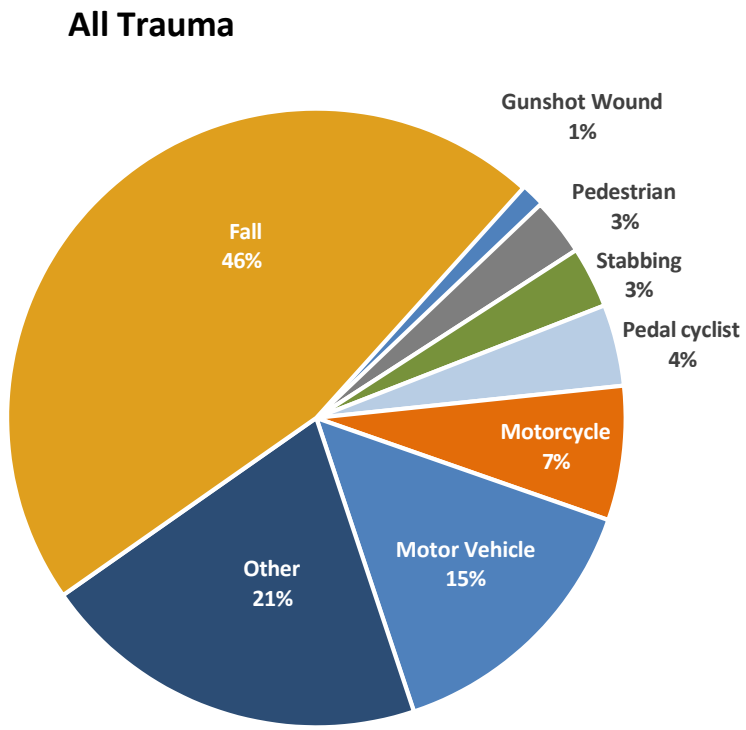

Figure 10: Injury cause - all trauma

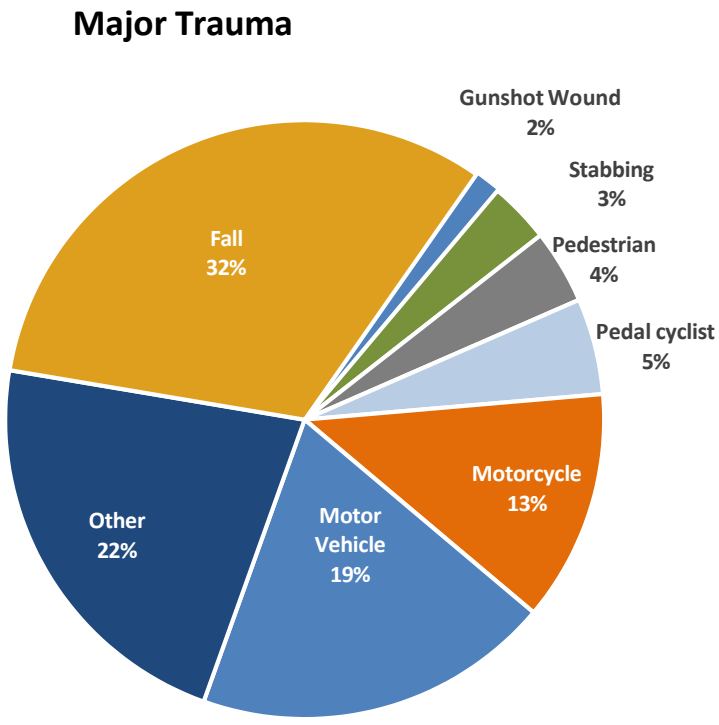

Figure 11: Injury cause - major trauma

Gunshot injuries

The numbers of patients admitted with gunshot injuries show a sharp increase for 2022. These patients are overwhelmingly male, representing 80% of the gunshot admissions in the last 5 years.

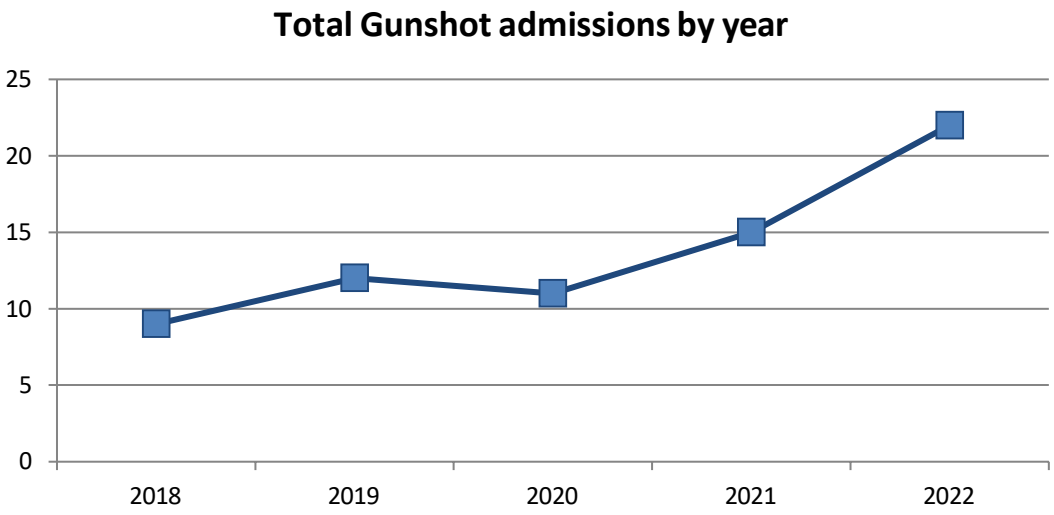

Figure 12: Gunshot admissions per year

Gunshot admissions by year and gender

	2018	2019	2020	2021	2022
Female	3	1	2	2	6
Male	6	11	9	13	15
	9	12	11	15	21

Table 1: Gunshot admissions per year by gender

Injury Intention

The ACH Trauma Registry contains 'Intention' data associated with mechanism of injury. This is 'unintentional' or 'intentional'; 'intentional' is separated into 'self-harm' and 'by other'. The majority of patients are admitted from unintentionally caused trauma and are comfortable disclosing how it occurred. The range of injuries caused by self-harm often have less information regarding location and mechanism, some of this can be gleaned from witnesses at the scene, ambulance staff and the injury itself. Trauma related self-harm has been highest during the 2 years in which COVID was a feature of daily life. A decrease in the number of patients admitted from physical self-harm was seen in 2022. The frequency of penetrating injury is 61% to 39% blunt. 'Falls' here are predominantly jumps from a height, some of which are attempted self-hanging; 'Stabbing' includes superficial lacerations and deeper stab wounds; 'Gunshot' injuries include nail guns.

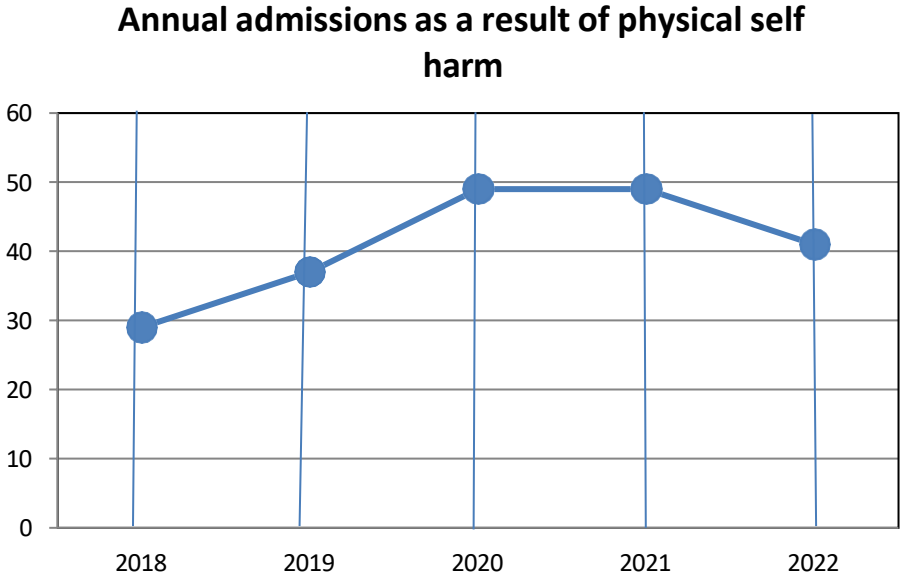

Figure 13: Admissions as a result of physical self-harm

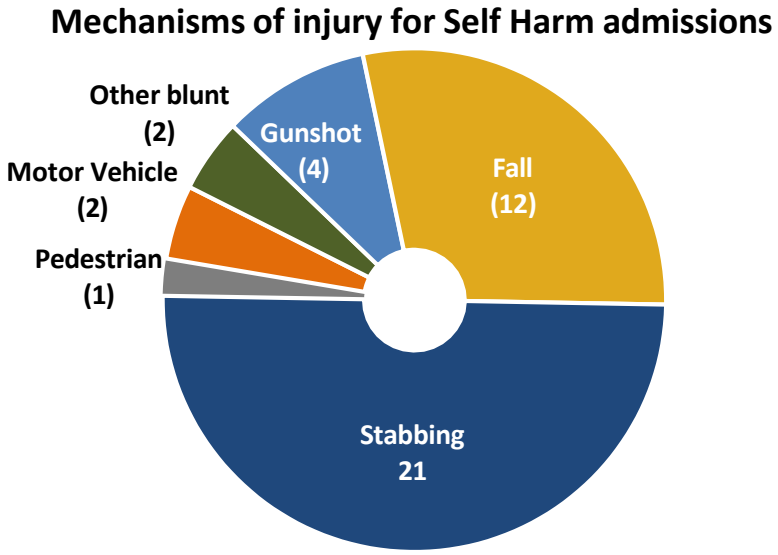

Figure 14: Mechanism of injury for physical self-harm admissions 2022

Assaults / Inflicted by Other

While there have been small fluctuations in the total number of trauma patients during the previous 5 years, injuries caused 'by other' has increased every year. Unsurprisingly patients admitted following an assault can be reluctant to disclose any details so commonly are recorded in the database as 'injuries involve an 'unspecified' person'; a number of assaults involve multiple assailants.

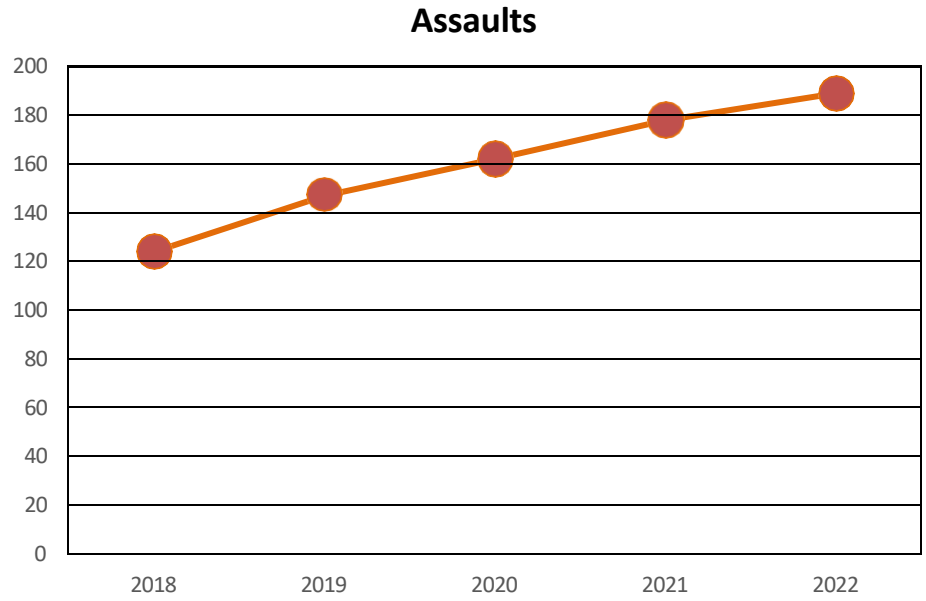

Figure 15: Number of admissions from assault per year

Alcohol and other drugs

Over 50% of all trauma patients are tested for alcohol, just over 20% of patients are tested for other drugs.

A small percentage of all trauma patients have a blood alcohol level above the legal driving limit,16%. This percentage is much larger in assault victims, 46%.

Alcohol dependence presents a challenge to clinical management of the trauma patient.

Ethnicity

Māori continue to be overrepresented in all trauma admissions and major trauma admissions. This reflects national data.

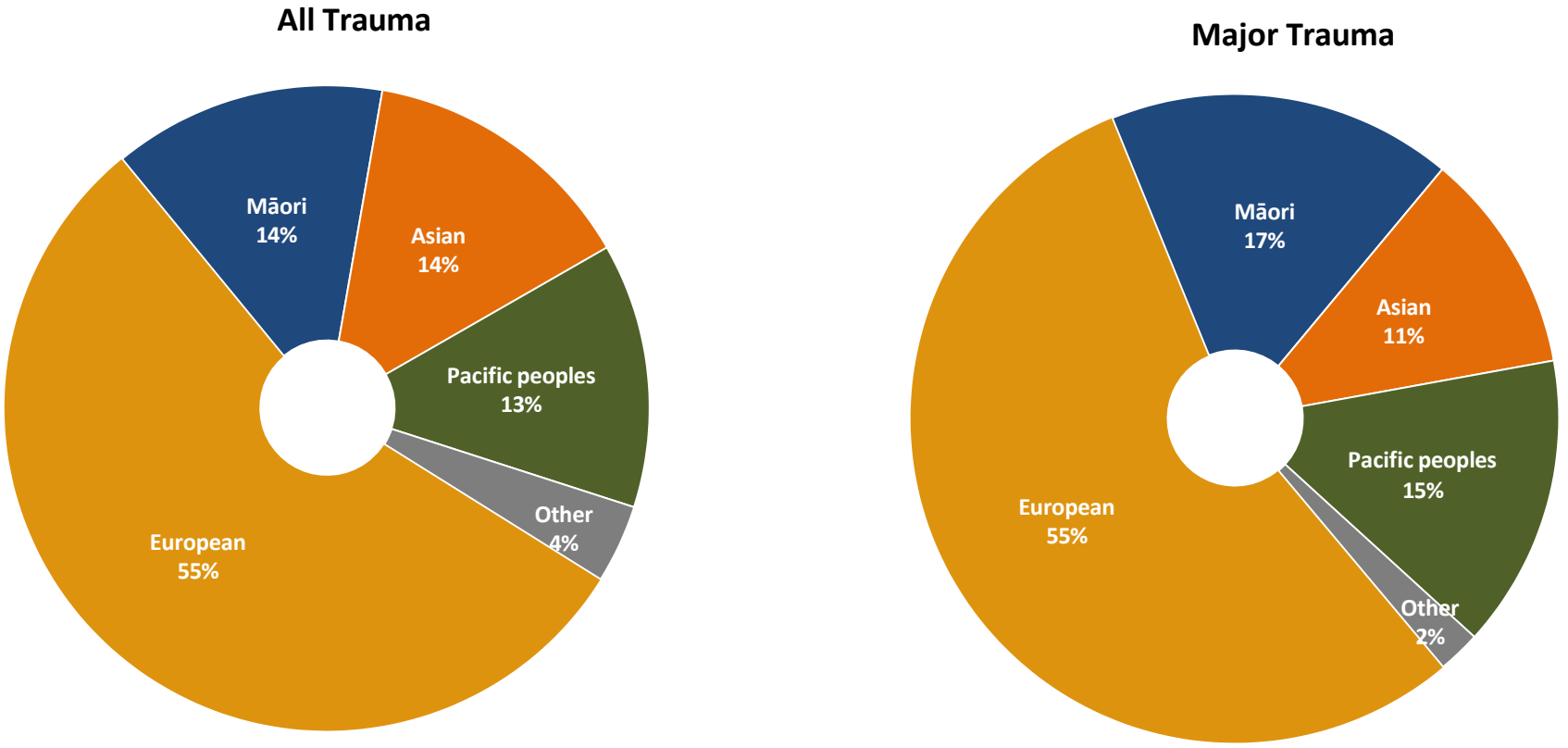

Figure 16: Ethnicity - All trauma and Major trauma

Population distribution by region 2022

The percentage of Māori in the ACH catchment is just under half the national average. The percentage of major trauma admissions of Māori has reduced for the first time. (From DHB population profile 2018-2028)

	For New Zealand	Northland	Waitematā	Counties Manukau	Auckland	ACH admissions major trauma	ACH admissions all trauma
Māori	16.1%	34.9%	9.9%	15.8%	7.9%	17.2%	13.7%
Pacific	6.6%	2.3%	7.1%	21.3%	10%	14.6%	13.3%
Other	77.3%	62.8%	83.0%	62.9%	82.1%	68.2%	73%

Table 2: Population distribution by region and ACH admissions

Length of stay

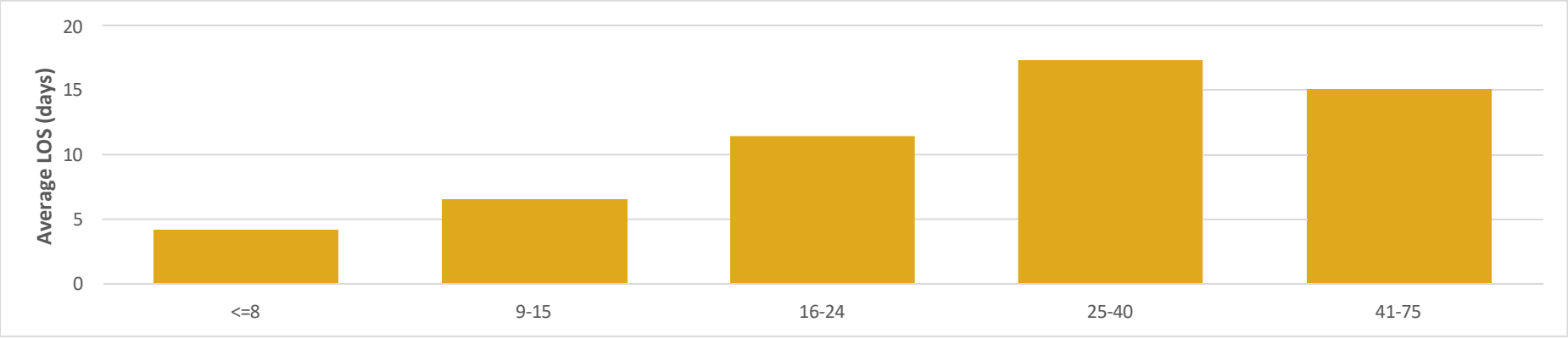

Figure 17: Average length of stay per ISS grouping

A higher Injury Severity Score usually correlates with length of stay. Average and median length of stay remains stable for all trauma and major trauma.

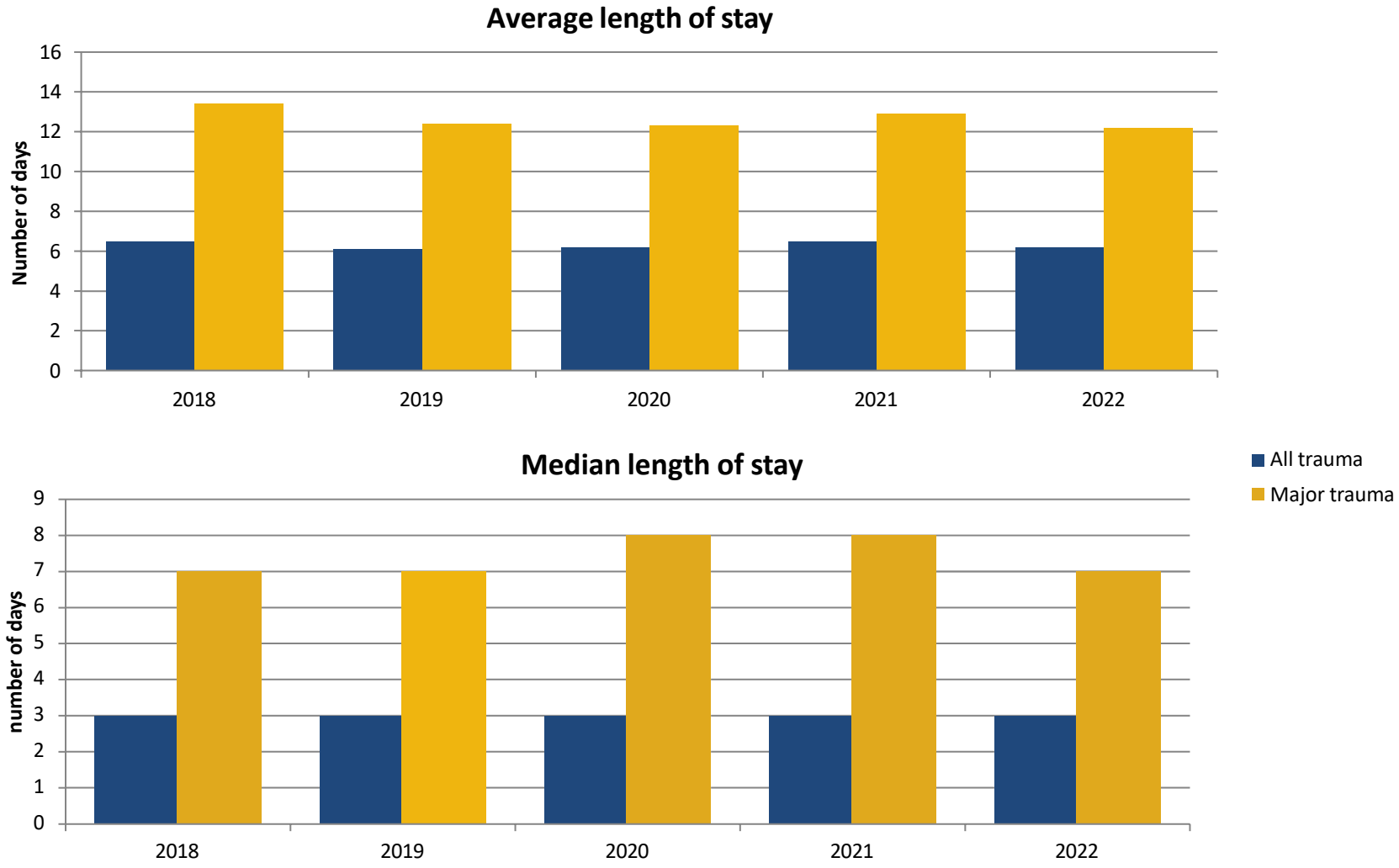

Figure 18: Average length of stay and median length of stay

Department of Critical Care Medicine (DCCM) bed utilisation

Trauma patients' use of Critical Care beds has increased over the past five years. This matches the increased number of trauma patients admitted and the higher proportion of major trauma patients. The number of patients with admitted with a traumatic brain injury has also increased.

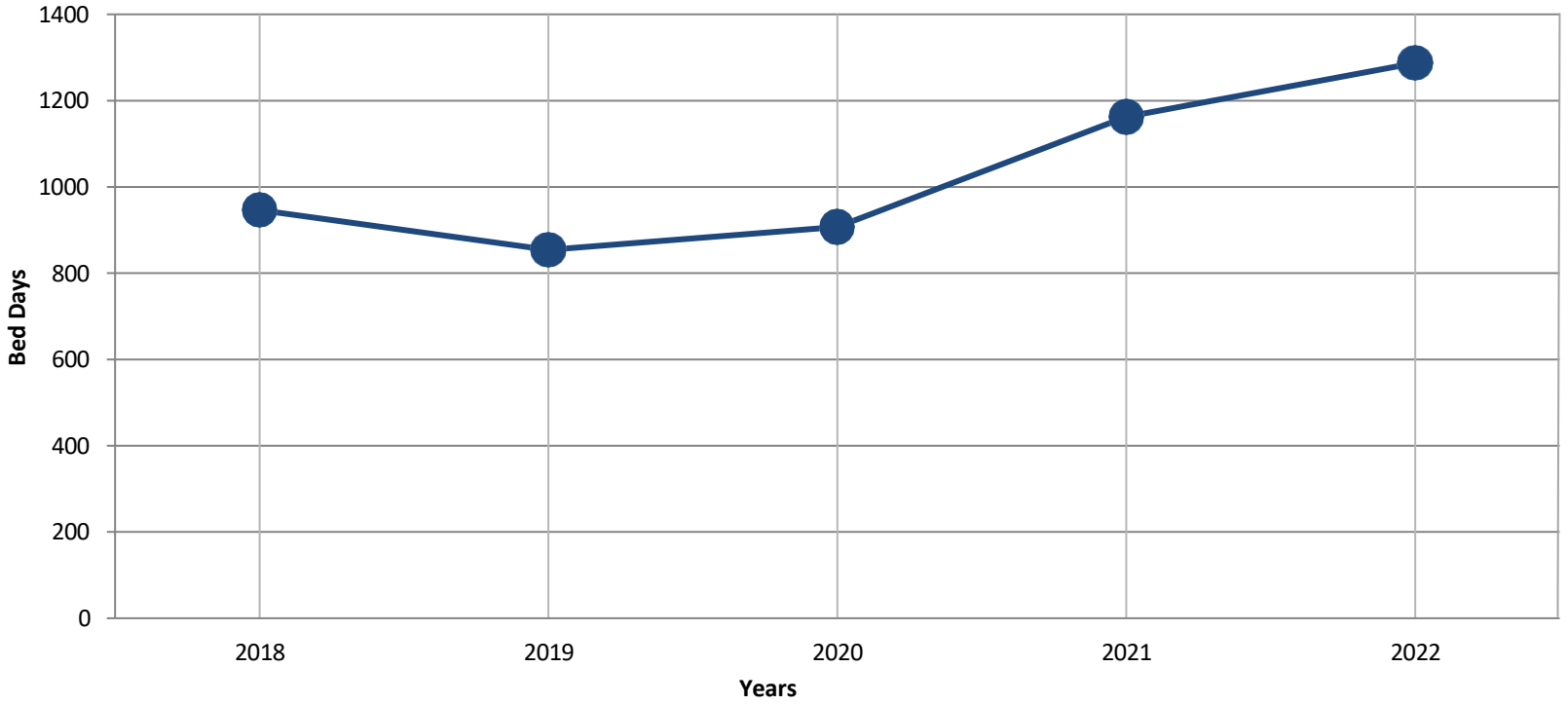

Figure 19: Total DCCM bed days used by trauma patients/year

Traumatic brain injury with AIS>2 admitted to ACH in 2022

(severeTBI or sTBI)

229	Patients were admitted to ACH in 2021 with a traumatic brain injury(TBI) AIS>2 These numbers exclude skull fractures without brain injury An AIS greater than 2 means the patient has a serious, severe, critical or maximal head injury
30%	Had a blood alcohol level over the legal driving limit
38%	Were admitted to DCC
14%	Were of Māori ethnicity
12%	Of the patients admitted died from their injuries

Table 3: Patients admitted with sTBI

ACH admission numbers with TBI AIS>2 reflect the national and regional destination policies and the growing subspecialisation within all hospitals and clinical services. Patients are transferred to a trauma service with a neuroscience centre or an intensive care unit supported by an in-house neurosurgical unit.
Of the major trauma admissions to ACH in 2022 65% had TBI AIS>2

125/229	Are patients injured in ACH catchment area
104/229	Patients came to ACH with their Traumatic Brain Injury as a result of the destination policy 55 were transfers from another hospital 49 were brought in by Road or Air ambulance directly bypassing other hospitals
68%	Of the patients in this group that died were admitted as a result of the destination policy

Table 4: Destination policy and sTBI

Discharge destination

There were no significant changes to discharge destinations in 2022. 'Unknown' includes patients who leave Against Medical Advice. A small number of patients admitted to ACH leave against medical advice, 3%. Of those (54 patients) 39% were admitted with a blood alcohol level greater than the legal driving limit or had illicit substances detected in their blood or urine.

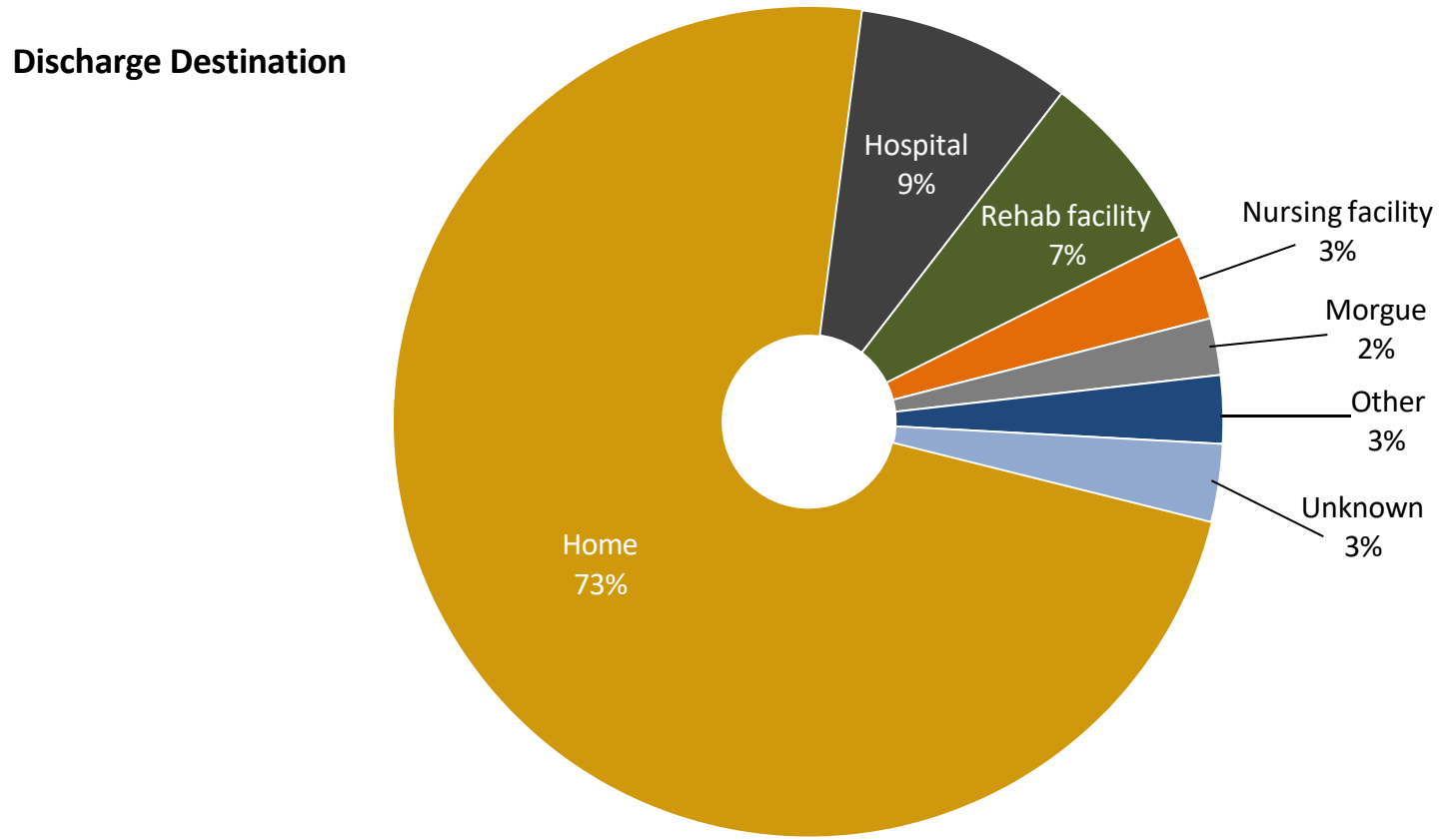

Figure 20: Discharge destination - All trauma

Patient outcomes: Major trauma

The overall mortality of major trauma patients has decreased from 13.0% to 9.4%. While this percentage is higher than the national average the ACH case mix has many more sTBI patients who have higher mortality. Using the mortality risk stratification methodology, the National Trauma Network reports indicate the Standardised Mortality Ratio for ACH is 1.0

Patient outcomes 2022				
	Total	Died	Survived	Mortality
Blunt	400	37	363	9.3%
Penetrating	23	3	20	13.0%
Burn	1	0	0	0
Total	424	40	383	9.4%

Table 5: Patient outcomes - Major trauma

Trauma deaths 2022

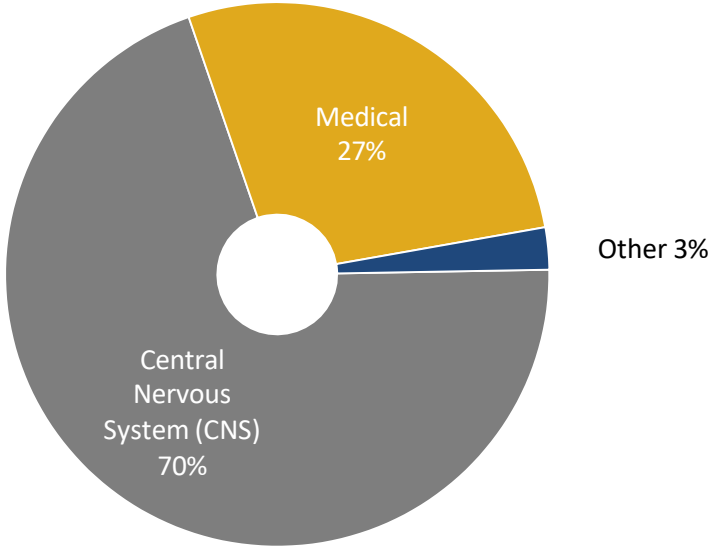

Figure 21: Death type

In contrast to prior years there were no Multi Organ Failure (MOF) or Haemorrhagic deaths in 2022.

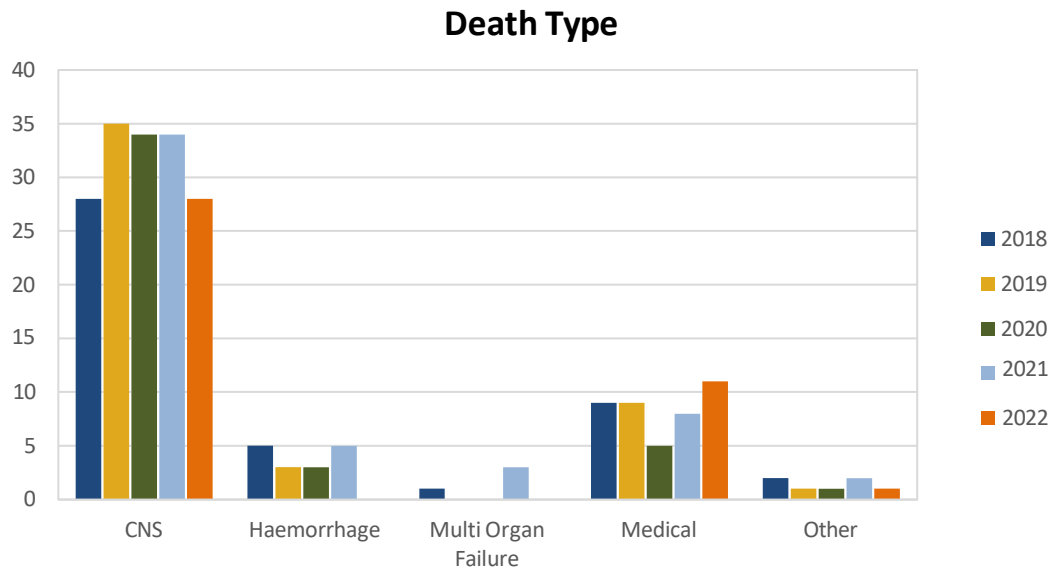

Figure 22: Death type 2018 - 2022

Mortality per ISS grouping

Mortality refers to in hospital mortality

ISS					
	1-8	9-15	16-24	25-40	41-75
No. Deaths	1/1115	3/418	6/150	24/107	6/21
Percentage	0.1%	0.7%	4.0%	22.4%	28.6%

Table 6: Mortality per ISS grouping

Mortality is associated with ISS, which is a threat to life score. Mortality for those patients who don't meet criteria for major trauma is usually related to underlying comorbidity.

Major trauma by ISS per year

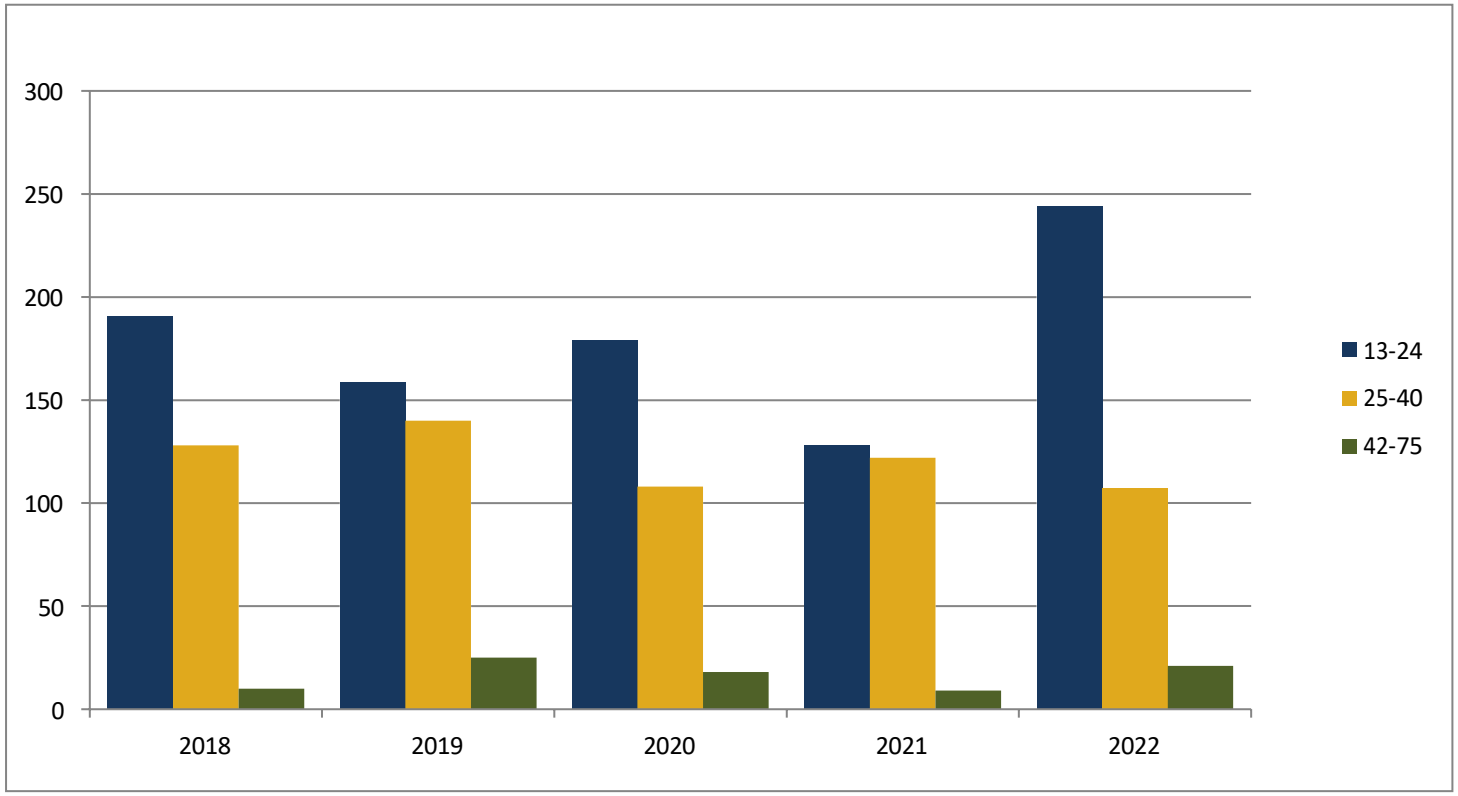

Figure 23: Major trauma and ISS

Rib fractures

Patients 65 years of age and over represent 24% of all trauma admissions to ACH. Blunt chest trauma with rib fractures is common in the elderly and leads to significant mortality and morbidity not seen in younger groups. These patients are admitted under the Trauma Service which continues to provide specific therapies, such as rib plating and surgical evacuation of fluid collections in the thoracic cavity. Chest wall injury is recognised as an injury pattern for which 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.

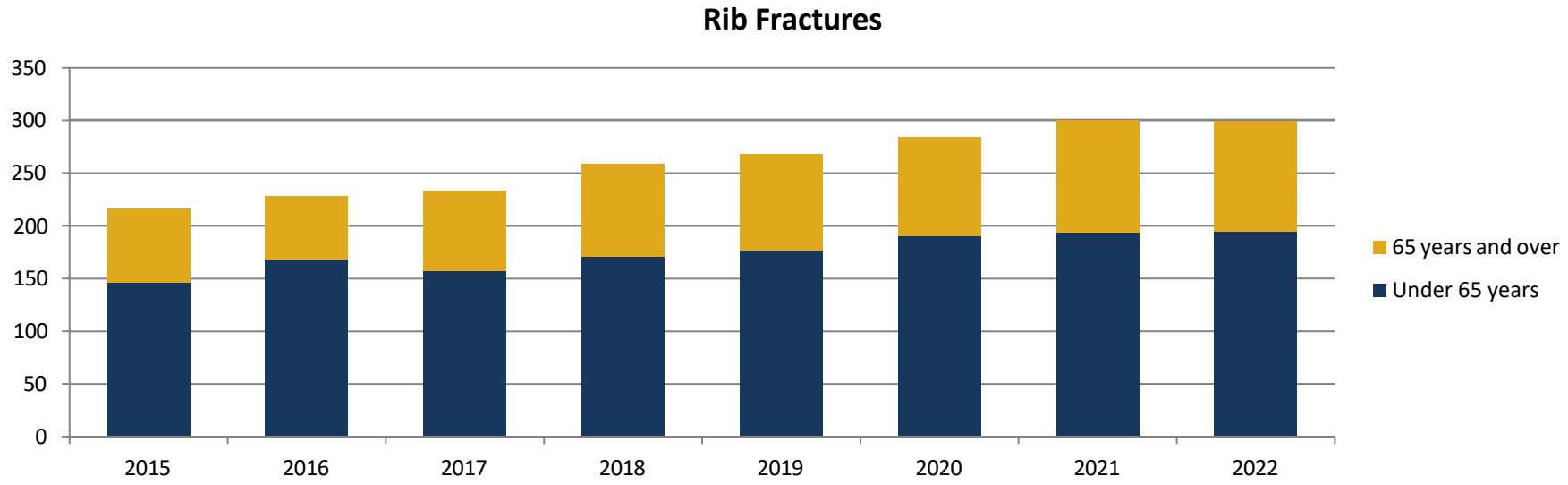

Figure 24: Number of patients admitted with rib fractures by age

Trauma related articles 2022

ACH Trauma Registry provides data for articles from a range of disciplines, these articles are trauma-related and peer-reviewed.

Pothiawala, S., Civil, I.
A rare case of penetrating intra-abdominal trauma by a fishing speargun
(2022) *New Zealand Medical Journal,* 135(1565), pp.113-119.

Weber, C., Andreassen, J.S., Isles, S., Thorsen, K., McBride, P., Søreide, K., Civil, I.
Incidence, Mechanisms of Injury and Mortality of Severe Traumatic Brain Injury: An Observational Population-Based Cohort Study from New Zealand and Norway
(2022) *World Journal of Surgery,* 46(12), pp. 2850-2857.

Gabbe, B.J., Isles, S., McBride, P., Civil, I.
Disability-Adjusted Life Years and cost of health loss of hospitalised major trauma patients in New Zealand
(2022) *New Zealand Medical Journal*, 135(1563), pp.62-69.

Pothiawala, S., Friedericksen, M., Civil, I.
Activating Code Crimson in the emergency department: Expediting definitive care for trauma patients with severe haemorrhage in Singapore
(2022) *Annals of the Academy of Medicine, Singapore*, 51(8), pp. 502-506.

Pothiawala, S., Miranda, R., Civil, I.
Not all post-traumatic swellings are haematomas: be alert to a Morel-Lavallée lesion
(2022) *The Lancet*, 400(10345), p. el.

Balasubramaniam, S., Civil, I.
Trauma system in New Zealand
(2022) *Emergency and Critical Care Medicine*, 2(2), pp.80-82.

Teo, K., Balasubramaniam, S., Civil, I.
Lockdown level 4 V2.0: different trauma patterns in Auckland in 2021?
(2022) New Zealand Medical Journal, 135(1554), pp. 73-79.

Civil, I.
Trauma, COVID-19 and healthcare investment
(2022) *New Zealand Medical Journal*, 135(1554), pp. 7-8.

Davie, G., Lilley, R., de Graaf, B., Dicker, B., Branas, C., Ameratunga, S., Civil, I., Reid, P., Kool, B.
Access to advanced –level hospital care: differences in prehospital times calculated using incident locations compared with patients' usual residence
(2022) *Injury prevention: journal of the International Society for child and Adolescent Injury Prevention*, 28(2), pp. 192-196.

Fischer, N. J., Civil, I.D.
Haemorrhagic death from severe liver trauma has decreased in the era of haemostatic resuscitation
(2022) *ANZ Journal of Surgery*, 92(1-2), pp.188-194.

Pothiawala, S., Balasubramaniam, S., Taib, M., Bhagvan, S.
Traumatic abdominal wall hernia: a rare and often missed diagnosis in blunt trauma
(2022) *World Journal of Emergency medicine*, 13(6), pp. 492-494.

Summary

New Zealand moved to the COVID 19 Protection Framework or Traffic Light System at the end of 2021. 2022 was the first year, since COVID arrived in New Zealand, to be unaffected by lockdowns.

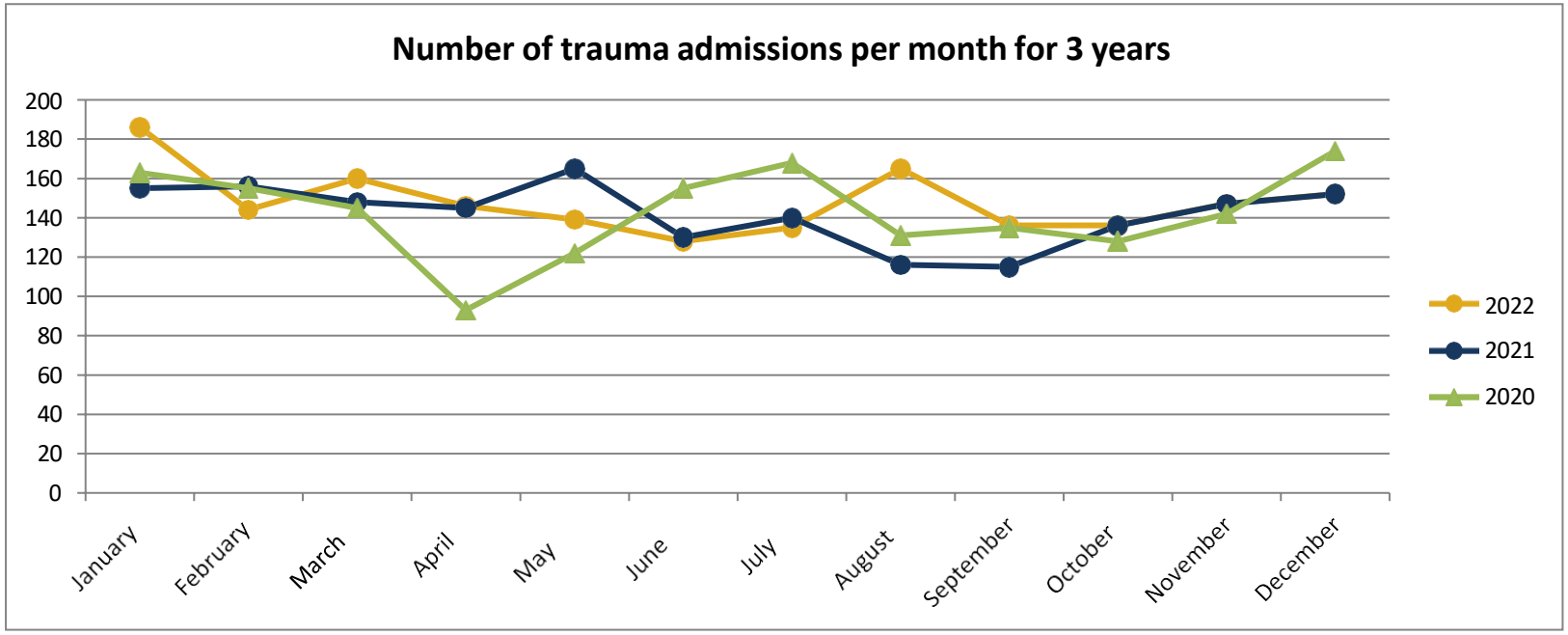

Figure 25: Trauma admissions per month for 3 years

The Trauma Registry data highlights that, regardless of the increased volume and severity of admissions, trauma patients admitted to ACH continue to be treated in an expeditious and appropriate fashion and the outcomes are consistent with best practice.

Auckland City Hospital Trauma Service

Senior Medical Officers

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Dr Li Hsee Trauma Surgeon

Dr Savitha Bhagvan Trauma Surgeon

Dr Rebecca Schroll Trauma Surgeon

Dr Mark Friedericksen Emergency Physician

Fellows/Registrars

Dr Sohil Pothiawala Emergency Physician

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Sue Wilkinson

Data Base Administrator Trauma Registry

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