

# 2023

# Auckland City Hospital: Trauma Registry Report



# Foreword

Auckland City Hospital is part of the Northern Region, comprising Northland, Waitematā, Auckland and Counties Manukau districts. The Northern Regional Trauma Network includes senior representatives from the ambulance services, hospital trauma clinicians, trauma nurse specialists, rehabilitation specialists and primary care. The focus is on improving health outcomes for trauma patients and whanau through clinical audits of cases, research, training and education. Northern is one of four regional divisions making up Te Whatu Ora, the others are Te Manawa Taki, Central and Te Waipounamu.

<https://www.northerntrauma.co.nz/>

Auckland City Hospital(ACH) is one of two tertiary hospitals who receive adults in the Northern region. ACH provides neurosurgical and cardiothoracic services for the entire region while Middlemore Hospital(MMH) provides, burns, plastic surgical, maxillofacial and spinal cord injury services. A destination policy and flowcharts describe the preferred major trauma hospital/s, based on the best descriptor of the patient’s clinical condition.

<https://www.majortrauma.nz/assets/Publication-Resources/Out-of-hospital-triage/3.-Major-trauma-destination-policy-Auckland-and-Northland-areas-Feb-2017.pdf>

The Trauma service at Auckland City Hospital has 1.5 full time equivalents(fte) surgeons, 2.4 fte Trauma Nurse Specialists, 1.0 fte Junior resident medical officers and 1.7 fte support staff. Our official working hours are 0800-1600, 5 days a week with after-hours cover from the Acute Surgical unit.





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# Summary

The Auckland City Hospital Trauma Registry was established in December 1994 and as of the end of 2023, contained 42782 patients. This annual report covers the dates between 1<sup>st</sup> January 2023 and 31<sup>st</sup> December 2023.

In 2023 ACH treated 1670 injured patients, 430 of these were severely injured, that is with an ISS >12. Severely injured patients' data is also entered in the National Trauma Registry which is part of the National Trauma Network.

In the severely injured group of patients, men were over-represented as were Māori. The greater number of these patients had transport related injuries at 45%. This includes patients in motor vehicles, on motorbikes, E-scooters, E-bikes, pedal bikes on the road and pedestrians hit by vehicles.

Most major trauma patients are transported directly from the scene to Auckland City Hospital, 23% were transferred from another hospital, the most common being MMH (Middlemore Hospital is the other tertiary hospital in the Northern region).

ACH is the definitive care hospital for 96% of the severely injured patients we look after. Trauma patients admitted via the Emergency Department spend a median time of 6 hours and 49 minutes there, with the median time for Major Trauma patients being 3 hours and 46 minutes.

There were 712 Trauma Team Activations in 2023. Mandatory Trauma Calls are made on the basis of an ambulance communication, physiology, transfer of major trauma, multiple casualties or types of injury. Discretionary trauma calls may be made by the Emergency Medicine SMO (Senior Medical Officer) or Registrar. Not all trauma calls result in an admission. Of the 430 major trauma patients 61% had a trauma call. Overall 33% of all patients had a trauma call.

Code crimsons were called 53 times during 2023. A Code Crimson at ACH identifies those patients at high risk of exsanguination, and gets them rapid access to urgent surgical or radiological intervention to control bleeding. The call is made by the Auckland Helicopter Emergency Medical Services (HEMS) or once the patient is in ED.

Over 50% of all trauma patients are tested for alcohol, 30% of those have alcohol in their system at the time of admission to hospital. Of those trauma patients who have alcohol in their system 87% are over the legal driving limit. This measure does not always capture the patients who have an issue with alcohol affecting their clinical management during the hospital stay.

The majority of all injuries are caused by falls at 48%. Most of these are over the age of 65 and in this group the mortality rate is 5%.

# Infographic Summary

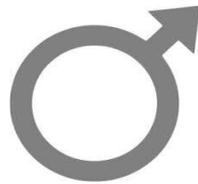
## PATIENT

**1670 total patients**



Median Age **49**

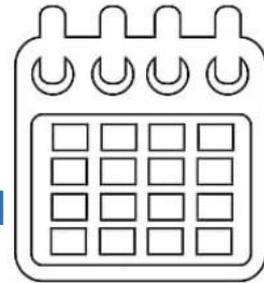
61%  
**Male**



**36%**

Occurred at the

**Weekend**



**430 Major Trauma (26%)**

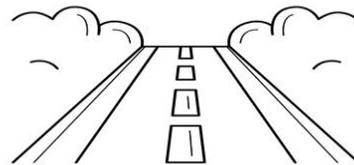
## MOST COMMON PLACE OF INJURY

**73%**

occurred at  
**home**



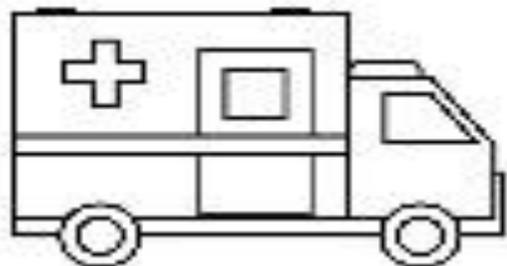
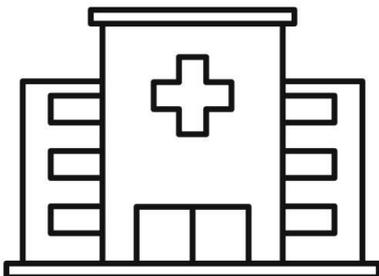
**24% on the streets**



## ARRIVAL

**55%** of all patients arrive by road ambulance and

**69%** of major trauma patients



**23%** of major trauma admissions are transfers from another hospital

## HOSPITAL



Median **time spent in ED**

All Trauma **6 hours 49 minutes**

Major Trauma **3 hours 46 minutes**

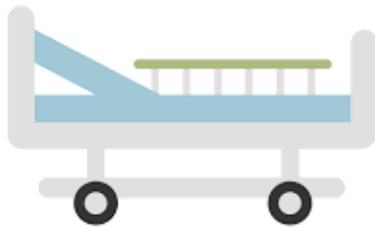
Median LOS for all patients = 3 days

Median LOS for Major Trauma patients = 7 days



**4%** are transferred

to another hospital for specialist care



median ICU LOS for trauma pts = 4 days

## OUTCOMES

Discharged to

Home and self-care  
73%

Other hospital 8%

Inpatient Rehab 7%

Death 3%

The remaining patients went to a nursing care facility, special accommodation (including prison) or left against medical advice

# Data

Data is collected on all patients 15 years of age and over admitted to ACH as a result of an acute injury caused by trauma. The Auckland City Hospital Trauma Registry provides data for injury research, across a number of specialities and disciplines.

Auckland City Hospital contributes to the New Zealand Trauma Registry(NZTR), which is a single web-based system collecting all major trauma patient's data admitted to acute hospitals in New Zealand. This data provides information to reduce in-hospital mortality rates, improve recovery from injuries and improve quality of care for major trauma patients.

## Trauma related articles 2023-2024

Civil, I., Bhagvan, S.

### **E-scooters: peril or panacea for personal mobility**

(2024) *ANZ Journal of Surgery*, 94 (4), pp.504-505

Judge, M.F., Kool, B., Civil, I.

### **Major trauma in working-age adults in New Zealand**

(2024) *New Zealand Medical Journal*, 137(1590), pp. 22-23.

Owen, H. E., Wyeth, E. H., Maclennan, B., Barson, D., McBride, P., Gabbe, B J., Civil, I., Derrett, S.

### **Cohort profile: The Trauma Outcomes Project, a prospective study of New Zealanders experiencing major trauma**

(2023) *British Medical Journal*, 13(11), e075480

Civil, I., Isles, S., Campbell, A., Moore, J.

### **The New Zealand National Trauma Registry: an essential tool for trauma quality improvement**

(2023) *New Zealand Medical Journal*, 136 (1574), pp. 8-10

Civil, I., Isles, S.

### **Optimal trauma care delivers cost savings: The New Zealand Trauma Network experience**

(2023) *EMA – Emergency Medicine Australasia*, 35(1), pp. 25-33.

Janssen, G., Khashram, M., Bhagvan, S., Civil, I.

### **Thoracic Vascular Trauma**

(2023) *Textbook of Emergency General Surgery: Traumatic and Non-Traumatic Surgical Emergencies*, pp. 743-752

Peek, K.N., Black, B.J.L.

### **Children's toys no longer: a porcine model study of the lethality of modern air rifles**

(2024) *New Zealand Medical Journal*, 137(1591), pp. 55-61

# Code Crimson

If the patient is at high risk of haemorrhagic death Code Crimsons are activated pre hospital or any time in the Adult Emergency Department. The decision is based on four parameters of the Assessment of Blood Consumption score(ABC), each parameter met scores 1 point. If the patient scores greater than or equal to 2 they meet the activation criteria.

The parameters are listed below.

- Penetrating truncal mechanism of injury
- Systolic Blood pressure of 90mmHg or less
- Pulse of 120/min or more
- Positive trauma E-FAST ultrasound scan

The aim of a Code Crimson Call is to get all the surgical decision makers and facilitators in the resuscitation room to facilitate rapid access to theatre or interventional radiology. These additional personal are notified

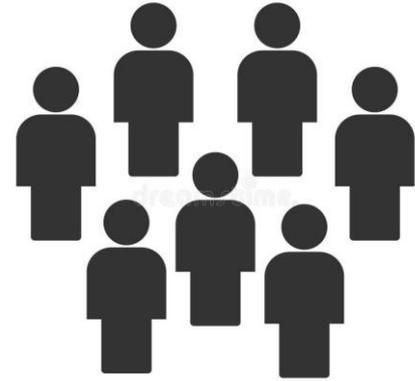
- Surgical Consultant on call
- Emergency Department Consultant if they are not in the ED
- Level 8 Anaesthetist
- Level 8 Nursing Coordinator
- Radiology Registry who will contact the on call Interventional Radiologist

Characteristic	Number (%)
<b>Outcome</b>	
Alive	43 (81)
Dead	10 (19)
<b>Intervention</b>	
Yes	30 (57)
No	13 (25)
Resuscitative thoracotomies in this group	7 (13)
<b>Major Trauma</b>	
Yes	47 (87)
No	6 (11)

## 0800 4 TRAUMA

Inter-hospital transfers for unstable patients are facilitated with 0800 4 TRAUMA. This number is available 24/7, calls are automatically directed to the on-duty intensivist who can accept patients with major trauma on behalf of all services at ACH and ensures all appropriate personnel are notified.

# Demographics



## Injuries by gender

Incidence by gender showed that most severe injuries involve the male population (71%).

## Injuries by age

Overall most injuries in the trauma registry occur in the 25 to 34-year age bracket. Outside this the peak age range for males is 15-24 years and females 55-64 years.

The median age of the trauma patient for 2023 is 49 years old. On average the younger patients are admitted at the weekend and the older ones during the week. The number of patients admitted with trauma over the age of 65 years continues to increase. 437 patients over 65 were admitted in 2023, the highest number in over 10 years.

## Injuries by ethnicity

The percentage of Māori in the Auckland City Hospital catchment area is half the national average however Maori continue to be over represented in all trauma and major trauma numbers.

	For New Zealand	Northland	Waitematā	Counties Manukau	Auckland	ACH admissions major trauma	ACH admissions all trauma
<b>Māori</b>	16.1%	34.9%	9.9%	15.8%	7.9%	23%	16%
<b>Pacific</b>	6.6%	2.3%	7.1%	21.3%	10%	11%	11%
<b>Other</b>	77.3%	62.8%	83.0%	62.9%	82.1%	66%	73%

# Injury Event

## Day of injury

Of all trauma patients 36% are admitted at the weekend. The average number of Major Trauma patients admitted per day Monday to Friday is just under 1. This doubles at the weekend.

## Place of injury

The majority of major trauma patients are involved in transport incidents occurring on the road. This includes motor vehicle, motorcycle, pedestrian and cyclists. In recent times this data includes electrically powered scooters and bicycles.

## Cause of injury

Most injuries occur as a result of a fall (31%). The patients in this group include fall from a great height, such as a cliff, roof, balcony or ladder and fall from a standing height. More than half of the deaths were from some kind of fall and most of those were from standing height.

## Injury type and intent

Injury type is recorded in the Trauma Registry as blunt, penetrating or burn. 93% of all patients have a blunt type of injury, the remaining 7% were penetrating. Most injuries are unintentional however the majority of penetrating injuries are intentional (self-harm or assault).

There has been an increasing number of gun-shot wounds over the last 7 years, with a gender ratio of 17 Male: 1 Female.



# Injury

## Severity of injury

Major trauma patients have an ISS>12, or an admission to the department of critical care, or die from their injuries.

The proportion of major trauma patients continues to increase annually.

77% of our major trauma admissions come to ACH directly, the rest are transfers.

ACH provides definitive care for 96% of the major trauma patients admitted.

Most major trauma arrives with an ISS range of 13-24

## Transport to hospital

Most patients admitted with an injury to Auckland City Hospital are transported by road ambulance.

The out-of-hospital destination policy ensures patients with a severe head injury in the Northland area arrive at Auckland City Hospital. While flow charts describe the preferred hospital based on the best descriptor of the patient's clinical condition it may be appropriate to bypass another major trauma hospital. Patients with a reduced Glasgow Coma Scale (GCS) come directly to ACH.

## Major trauma incidents by sex, injury intent, type of injury severity score

Characteristic	Number (%)
<b>Sex</b>	
Female	124 (29)
Male	306 (71)
<b>Injury intent</b>	
By other	51
Self-inflicted	13
Unintentional	359
Unknown	7
<b>Dominant injury type</b>	
Blunt	407
Penetrating	23
<b>Injury Severity Score</b>	
1-12	47(11)
13-24	251 (58)
25-44	120 (28)
45+	12 (3)

# Trauma Centre Care

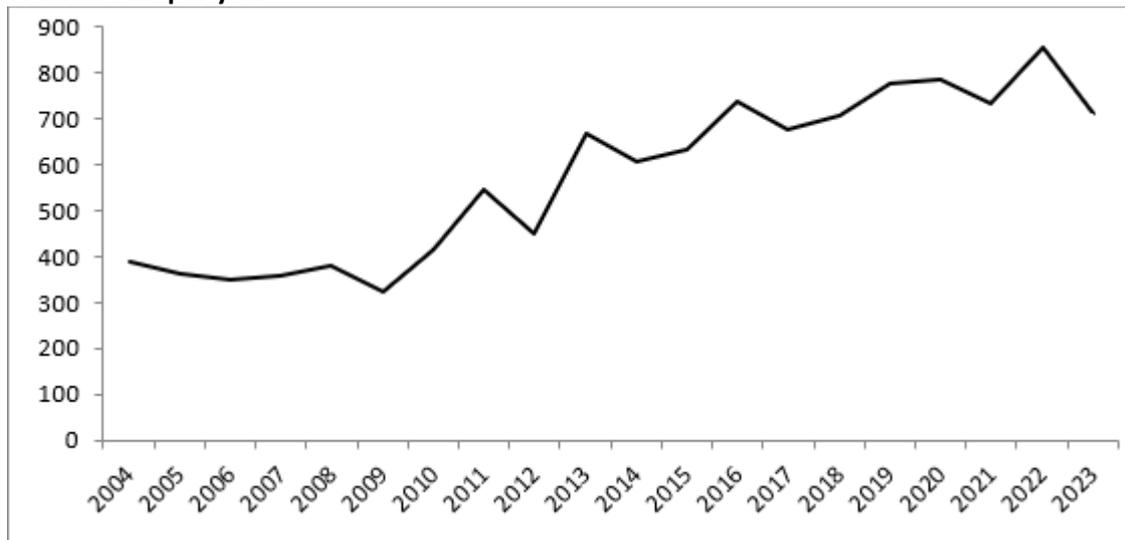
## Time in ED

Trauma patients can travel through ED very quickly via direct admission, usually to DCC or Neurosurgery. Some patients ED stay will include a period in the Clinical Decision Unit before admission. The median time spent is 6 hours and 49 minutes. The mean time in ED for major trauma patients is 3 hours and 45 minutes.

Ramping occurs when ambulances are waiting for beds, if there are 4 ambulances waiting for a bed for 45 minutes or longer discussions occur with the hospital and an 'Ambulance Waiting Area' is set up within ED where ambulance crew can take over care of up to 8 low acuity ambulance patients to allow ambulances to be released back into the community.

Ramping has rarely occurred at ACH although did happen during COVID for a time. It was uncommon to see ramping in late 2023 at Auckland City Hospital.

## Trauma calls per year



## Time to index CT

Trauma care is often guided by the detailed images created by CT scans. The average time from patient admission to index CT being done at Auckland City Hospital is 1 hour and 7 minutes.

## Hospital LOS

The median length of stay for major trauma patients is 7 days.

The median length of stay for major trauma patients in the Intensive Care Unit(ICU) is 4 days, 42% of major trauma patients at ACH have an ICU stay

# Outcomes from injury

## Mortality

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 an underlying comorbidity.

Below is a table with percentage of deaths per ISS grouping.

ISS					
	1-8	9-15	16-24	25-40	41-75
No.Deaths	2/1007	4/369	12/162	24/111	8/21
Percentage	0.2%	1.1%	7.4%	21.6%	38.1%

The mortality rate of major trauma patients at ACH is 11.6%. Most trauma deaths are Central Nervous System related, reflecting the destination policy of the region. Maori continue to be overrepresented in trauma admissions (16% of all trauma admissions) and mortality (20%).

## Discharge Destination

Most patients are discharged home or to their usual residence. The trauma service coordinates follow up across the services. Some trauma patients (15%) require ongoing inpatient care post discharge, whether it is ongoing care in another hospital or rehabilitation

Our two most common rehab destinations are: ABI (Acquired Brain Injury unit) and Older Peoples Health

Auckland City Hospital has a strong relationship with ABI <https://www.abi-rehab.co.nz/> ABI provides community services and inpatient services for patients with an acquired brain injury. Clinicians from the outreach service visit ACH daily.

Auckland City Hospital provides rehab for older patients in Older Peoples Health - Mana Awhi. A Geriatrician is dedicated to refer trauma patients to.

# Head Trauma

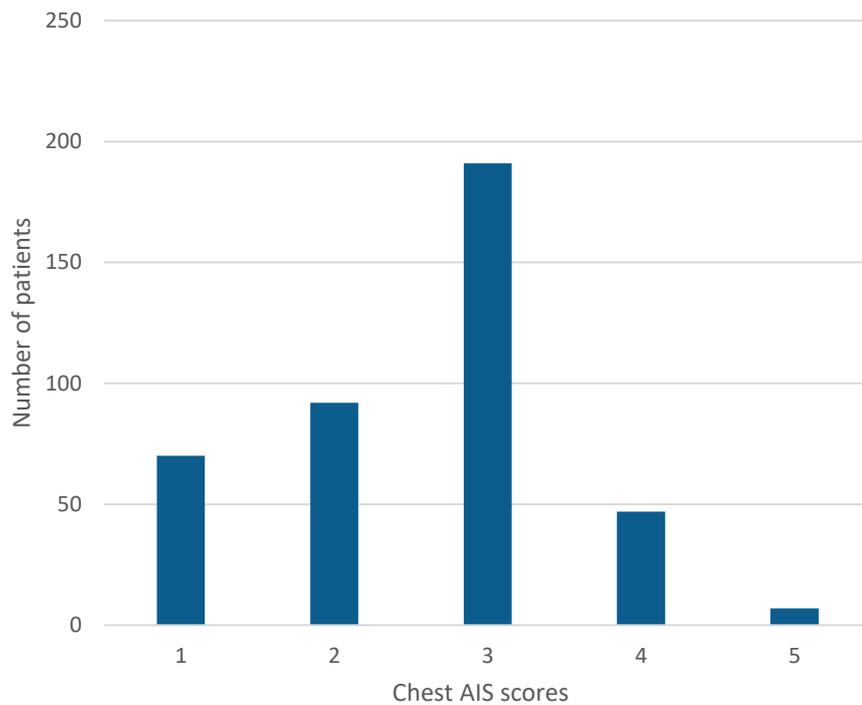
ACH admission numbers with Traumatic Brain Injury AIS>2 reflect the national and regional destination policies and the growing subspecialisation within all hospitals and clinical services. Patients are transferred to a trauma service with a neuroscience centre or an intensive care unit supported by an in-house neurosurgical unit. Of the 430 major trauma patients, 68% had an AIS>2 in the head region

532	Patients were admitted to ACH in 2023 with an AIS>2 for the head
78%	Are brought to Auckland City Hospital by emergency services
43%	Admitted under the Trauma Service
24%	Were admitted to ICU
41	Didn't survive their injuries
491	survived their injuries
13%	Went to Rehab

# Chest Trauma

The destination policy dictates, if the adult patient in the Northern Region has any of the following they should be taken to Auckland City Hospital or Middlemore Hospital.

- Penetrating trauma to the neck or torso
- Crush injury to the neck or torso
- Flail chest



Rib Fractures are the most common injury from blunt thoracic trauma. Surgical fixation of severe rib fractures is sometimes required and is offered at ACH. The Trauma Service coordinates other supportive treatments such as those provided by the Pain Service and Physiotherapy Department. Elderly patients in this group are at risk of significant mortality and morbidity and in 2023 make up 31% of these admissions.

# Abdominal Trauma

Auckland City Hospital is the default hospital for patients with abdominal trauma in most of the Northern region. Services provided include CT imaging, Interventional Radiology (IR).



Road traffic crashes are the most common cause of significant abdominal trauma; any injuries may involve the abdominal organs.

192	Patients were admitted to ACH in 2023 with injuries to the abdominal region
19%	Had splenic injuries
13%	Had kidney injuries
23%	Had liver injuries
14	Patients with abdominal injuries received Interventional Radiology



# Auckland City Hospital Trauma Service

## Senior Medical Officers

Prof Ian Civil      Clinical Director  
Dr Li Hsee              Trauma Surgeon  
Dr Savitha Bhagvan      Trauma Surgeon  
Assoc/Prof Rebecca Schroll      Trauma Surgeon  
Dr Mark Friedericksen      Emergency Physician

## Fellows/Registrars

Dr Benjamin Black  
Dr Niamh Day  
Dr Tea Elliott

## Trauma Nurse Specialists

Pamela Fitzpatrick  
Nancy Mitchell  
Bridget Dwyer

## Trauma Systems Co-ordinator

Sue Wilkinson

## Trauma Administrator

Mittal Patel and Anne Stephens

Report prepared by Sue Wilkinson