ANNUAL REPORT
1 JULY 2020 TO 30 JUNE 2021

AUSTRALIA
NEW ZEALAND
TRAUMA REGISTRY
Management of the Severely Injured

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FOREWORD

On behalf of the Australian New Zealand Trauma Registry (ATR), we are proud to present the 2020-2021 annual report, our sixth. We thank all 35 collaborating sites who actively endorse and work with the registry on the daily basis. This contributes to making our clinical quality registry an important evidence base for improving trauma care by providing feedback to the community and policy makers on hospital performance.

Trauma patients in Australia and New Zealand were cared for by our front-line staff who have continued to deliver high quality care despite the ongoing challenges from the COVID-19 pandemic. We observed an increase in case load and longer processes compounded by personal protective equipment and staff shortages due to quarantine requirements. Despite these challenges, trauma clinicians from 10 new sites will begin contributing data for the next report, increasing rural regional representation. We are grateful for all trauma healthcare professionals for their extraordinary efforts.

To ensure registry integrity, autonomy of the ATR is vital. Our core mission is to independently and objectively report on the care of the severely injured in Australia and New Zealand. The governance restructure of the ATR in 2020 facilitated streamlined decision-making with eight board members working closely together. All members voluntarily contribute their time to ensure the rigorous operation and ongoing development of the Registry. The ATR works with the AusTQIP Steering Committee to promote the overarching goal of quality improvement. Alfred Health is the legal entity and coordinator of funds and contracts while the day-to-day registry operations are managed by the ATR Manager and team at the Monash University.

Registry data are increasingly important to support change as highlighted in the National Clinical Quality Registry and Virtual Registry Strategy 2020-2030. A key priority is reporting of vulnerable populations and contributing to equitable outcomes for Aboriginal and Torres Strait Islander in Australia and Mori in New Zealand. The ATR, at this time, does not collect this information as we are working to establish the Indigenous Data Sovereignty and Governance structures essential to ensure the sovereign rights of First Nations are respected, considered and acted upon. From 2023, we anticipate collecting information regarding ethnicity with the publication of the amended data dictionary.

The accessibility and usability of ATR data is of vital importance to achieve innovative solutions, which is why different forms of collaboration are part of the responsibility we have towards our patients, clinicians, and policy makers. The ATR has been working on unique projects such as the Australian Traumatic Brain Injury National Data (ATBIND) project. The Principal Investigator A/Prof. Gerard O'Reilly and his team are working to identify the key determinants of outcomes for patients with moderate to severe traumatic brain injury (TBI) across Australia. Importantly, one of the outcomes is to establish a data-based set of national clinical quality indicators, targeting the identified key gaps (including for the health of Aboriginal and/or Torres Strait Islander communities using a knowledge interface methodology to ensure Indigenous Data Sovereignty and Governance) and inconsistencies in patient and system-level interventions linked to identified variations and inconsistencies in outcomes of Australians sustaining a moderate or severe TBI.

Lastly, we thank the Australian Department of Health, the Bureau of Infrastructure and Transport Research Economics and the New Zealand Accident Compensation Corporation for the funding that has allowed the ATR to maintain its core function and provide annual reports to the wider community.

Professor Kate Curtis
Co-chair ATR Steering Committee

Professor Mark Fitzgerald
Co-chair ATR Steering Committee

Professor Ian Civil
Clinical Lead
NZ National Trauma Network

2020-21 YEAR IN REVIEW

AUSTRALIA

DEMOGRAPHICS

9,413 severely injured

median **AGE 51**

73% MALE

35% occured on the **WEEKEND**

CAUSE OF INJURY

3.5% penetrating **trauma**

<1%BURNS

95.7% BLUNT trauma

46.7% transport related

37.9% FALLS

4.9% by assault

PLACE OF INJURY

44.4% streets & highways

33.2% home

PRE-HOSPITAL

69.8% direct from scene to definitive **HOSPITAL**

Median time from injury to definitive care 1hr 33mins

HOSPITAL

Median time **spent in ED** **4hrs 58mins**

median **length of stay** **7.1 days**

37.4% admitted **to ICU**

median ICU length of stay **3.9 DAYS**

OUTCOMES

9.3% in-hospital **deaths**

48.4% of deaths **aged 75+**

11.7% of deaths OCCURED IN ED

64.9% discharged **home**

17.7% to rehabilitation

2020-21 YEAR IN REVIEW
NEW ZEALAND

DEMOGRAPHICS

1,841 severely injured

median **AGE 49**

72% MALE

39% occured on the **WEEKEND**

CAUSE OF INJURY

4.2% penetrating **trauma**

<1%BURNS

94.8% **BLUNT** trauma

49.6% transport related

32.6% **FALLS**

7.0% by assault

PLACE OF INJURY

45.9% streets & highways

24.6% home

PRE-HOSPITAL

75.3% direct from scene to definitive **HOSPITAL**

Median time from injury to definitive care **1hr 36mins**

HOSPITAL

Median time **spent in ED** **4hrs 40mins**

median **length of stay** **7.7days**

33.7% admitted **to ICU**

median ICU length of stay **3.7 DAYS**

OUTCOMES

9.2% in-hospital **deaths**

35.3% of deaths **aged 75+**

10.6% **of deaths** OCCURED IN ED

56% discharged **home**

22.9% to rehabilitation

EXECUTIVE SUMMARY

This annual report provides a bi-national view of severe injury resulting in hospitalisation from major trauma centres across Australia and New Zealand.

It covers dates of injury between 1 July 2020 to 30 June 2021 for severely injured patients with an Injury Severity Score greater than 12 or in-hospital death following injury from 27 Australian and seven New Zealand designated trauma services. This year we have one additional site, Lyell McEwin Hospital in South Australia, submitting data for the first time.

Each year we continue to welcome more sites to the collaboration to provide a more comprehensive snapshot of the major trauma journey. Recent findings highlighted the need to collect data from regional sites, especially within the elderly cohort, as they often are not transferred to a major trauma service, but receive conservative treatment closer to home[1]. The ATR is in the process of recruiting more regional sites to start submitting data in the near future.

In addition to welcoming new sites, the ATR is looking to data linkage with other important datasets to improve data capture and completeness, which will further enable us to refine our risk adjustment methodology. Data linkage between the ATR and admitted hospital episodes, prehospital records and death registries will be essential to use population level data to identify variation in outcomes to improve care. Importantly, injury prevention programs need these linked data sets to understand the impact of interventions.

The ATR is also in the process of developing an interactive dashboard for existing sites to allow better access and enable clinicians to visualise and manipulate data to make meaningful comparisons with other sites and jurisdictions.

2020-21 Snapshot

In 2020-21 the ATR received data for 11,254 patients (9,413 in Australia, 1,841 in New Zealand), an increase of 10.7 per cent since the previous year. A major change is occurring in the epidemiology of severe injuries with older patients injured from low falls increasingly the predominant group experiencing severe injury and death[2,3]. Low falls accounted for 45.9 per cent of all severe injuries in those aged 65 years or above. High falls also make a major contribution to morbidity and mortality in this age group with ladders and stairs being household hazards that should be targeted for injury prevention programs. Mortality from a low fall for this age group was 24.3 per cent, well above the overall binational mortality rate of 9.3 per cent.

In early 2020 a worldwide Covid-19 pandemic hit Australian and New Zealand shores with both nations moving into lockdowns. The previous report saw a reduction in major trauma and overall numbers as people were in lockdown. This financial year (despite lockdowns still occurring) there was an increase in overall numbers that was not restricted to any single category, even when compared to pre-Covid levels.

Comparisons across the jurisdictions for process measures show large variation. The percentage of patients transferred versus direct admissions to major trauma services averaged 29%. The median time from injury to hospital was greater than 90 minutes for direct admissions. This means that the majority of life saving interventions in the first hour or two occur before arrival at the trauma service. The delivery of these interventions is variable across the jurisdictions and requires careful comparison and refinement to optimise outcomes. The time in ED is greater than 5 hours for the majority of patients, despite a "NEAT" target of four hours[4].

We are still collecting and reporting blood alcohol levels poorly across the services and this should be addressed to improve prevention programs.

The use of inpatient rehabilitation post-discharge varies between 5-26% across services. There have been major changes in configuration of rehabilitation services, with more in-home programs. Comparisons of long-term outcomes will be essential.

Risk-Adjustment Modelling

Risk adjustment modelling is used in this report to benchmark hospitals for length of stay and mortality. There is no consensus internationally as to the best approach to risk adjustment for comparison of death and length of stay in major trauma patients. Unfortunately, any risk adjustment model must take account of missing data, differences in epidemiology, patient transfers, case mix and the influence of geography between regions. The new model includes previously identified risk factors, but significantly improves the methodology for age adjustment. Comparing outcomes for transferred patients is difficult because we don't have a denominator, nor do we have data from referring hospitals. It is hoped that as we move to improved data linkage with admissions and prehospital data, this will become possible.

What do these results mean for trauma services?

Major trauma numbers have increased significantly following the impact of Covid and mandated lockdowns. Benchmarking of length of stay and mortality shows some variation even after risk adjustment. These variations highlight differences in case mix, practice, availability of services such as rehabilitation as well as the configuration and context of major trauma services across both countries. Understanding the reasons behind these differences allows clinicians to investigate whether changes in the model of care will result in better outcomes.

Credible, reliable data from trauma registries has been shown to drive improvements to trauma systems. It is hoped that as data quality and completeness continue to improve, together with improved benchmarking of processes and outcomes, preventable death and morbidity following severe injury will decline.

The ATR will work with consumer groups, professional societies, governments and health services to use this valuable data source.

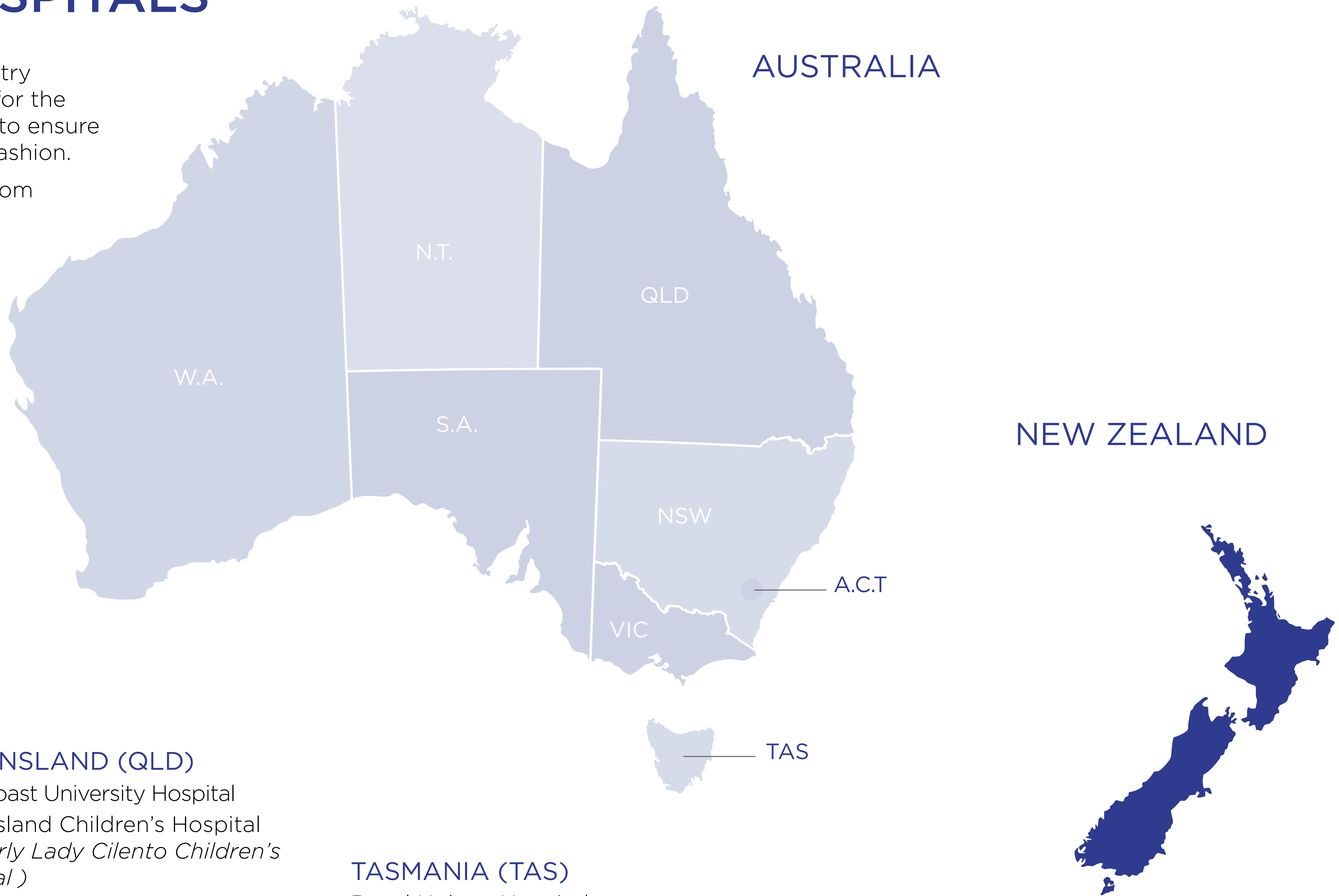
Professor Peter Cameron
University Representative
Monash University

Emily McKie
ATR Manager

CONTRIBUTING HOSPITALS

The ATR would like to thank the Trauma Registry staff from all contributing registries and sites for the invaluable work they perform on a daily basis to ensure the Registry receives quality data in a timely fashion.

The ATR has 6-years quality Australian data from 1 July 2015 to 30 June 2021 and four year's quality New Zealand data from 1 July 2017 to 30 June 2021. Sites which have commenced data submissions after these start dates are mentioned below.



JURISDICTIONS

AUSTRALIAN CAPITAL TERRITORY (A.C.T.)

Canberra Hospital

NEW SOUTH WALES (N.S.W.)

NSW data submitted by the Institute of Trauma and Injury Management (ITIM)

Children's Hospital, Westmead
John Hunter Children's Hospital
John Hunter Hospital
Liverpool Hospital
Royal North Shore Hospital
Royal Prince Alfred Hospital
St George Hospital
St Vincent's Hospital
Sydney Children's Hospital
Westmead Hospital

NORTHERN TERRITORY (N.T.)

Royal Darwin Hospital

QUEENSLAND (QLD)

Gold Coast University Hospital
Queensland Children's Hospital *(formerly Lady Cilento Children's Hospital)*
Princess Alexandra Hospital
Royal Brisbane and Women's Hospital
Townsville Hospital (from 1 January 2020)
Sunshine Coast University Hospital (from 1 October 2018)

SOUTH AUSTRALIA (S.A.)

S.A. data submitted by the S.A. Department of Health

Flinders' Medical Centre
Royal Adelaide Hospital
Women's and Children's Hospital
Lyell McEwin (from 1 January 2018)

TASMANIA (TAS)

Royal Hobart Hospital (from 1 April 2020)

VICTORIA (VIC)

Victorian data submitted by the Victorian State Trauma Registry (VSTR)

Alfred Hospital
Royal Melbourne Hospital
Royal Children's Hospital

WESTERN AUSTRALIA (W.A.)

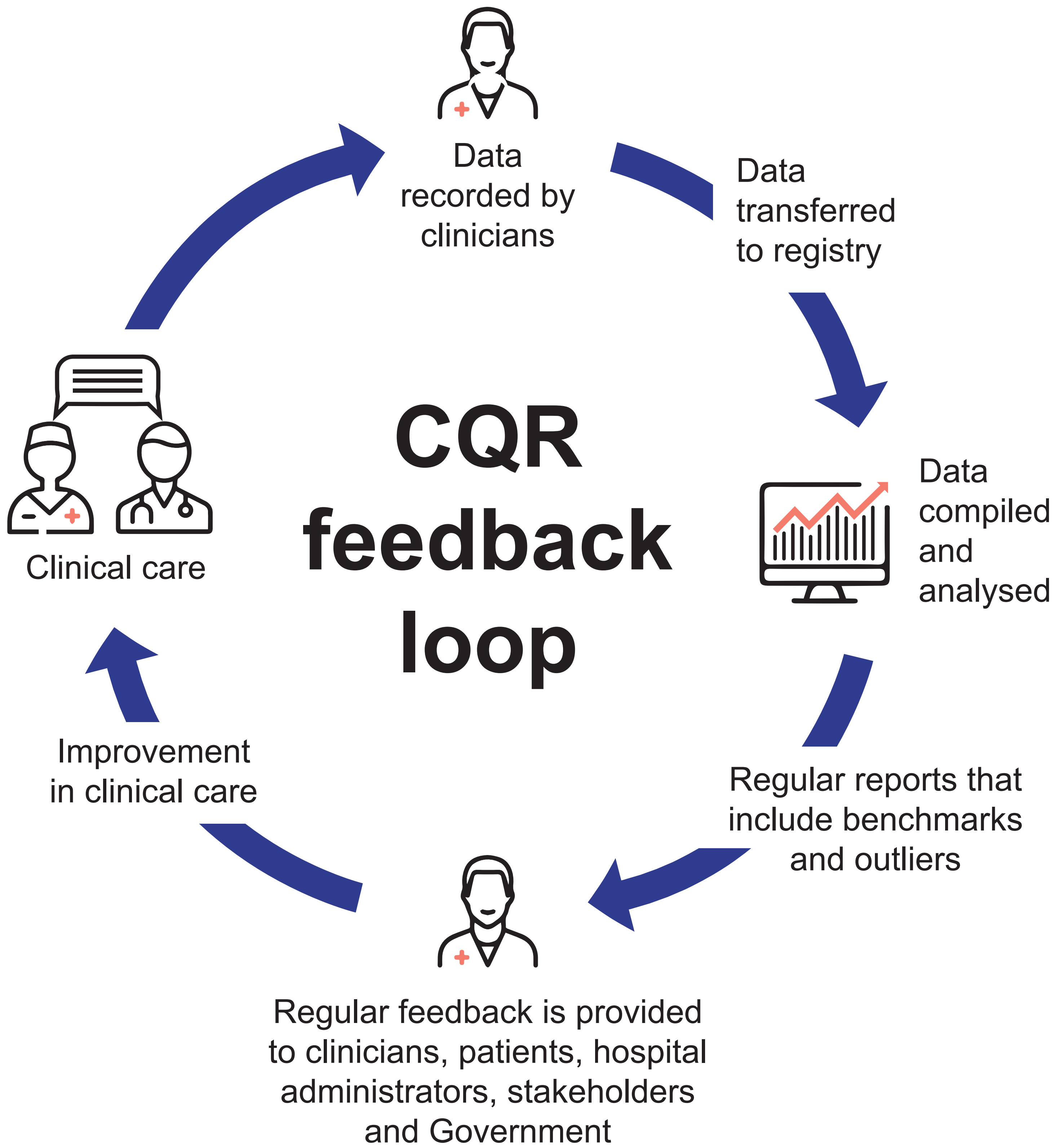
Perth Children's Hospital *(formerly Princess Margaret Hospital)*
Royal Perth Hospital

NEW ZEALAND (N.Z.)

New Zealand data submitted by the New Zealand National Trauma Network (NZMTCN)

Auckland City Hospital
Starship Hospital
Middlemore Hospital
Waikato Hospital
Wellington Regional Hospital
Christchurch Hospital
Dunedin Hospital

THE ATR AS A CLINICAL QUALITY REGISTRY



Operating since 2012, the ATR has established itself as a leading clinical quality registry (CQR). The Australian Commission on Safety and Quality in Health Care has promoted the importance of CQRs as drivers of quality improvement for over a decade, allocating trauma to the second highest priority due the high burden of disease, increasing costs and unsatisfactory outcomes associated with poor quality trauma care.

In 2016, funding for the Australian Trauma Registry was the number one recommendation from the Road Safety Senate Committee. Funding was subsequently obtained from the Department of Health and the Bureau of Infrastructure, Transport, and Regional Economies to support the registry's core responsibilities and reporting. In 2018, New Zealand joined the collaboration to become the Australia New Zealand Trauma Registry (ATR), and the registry began providing risk adjusted outcomes.

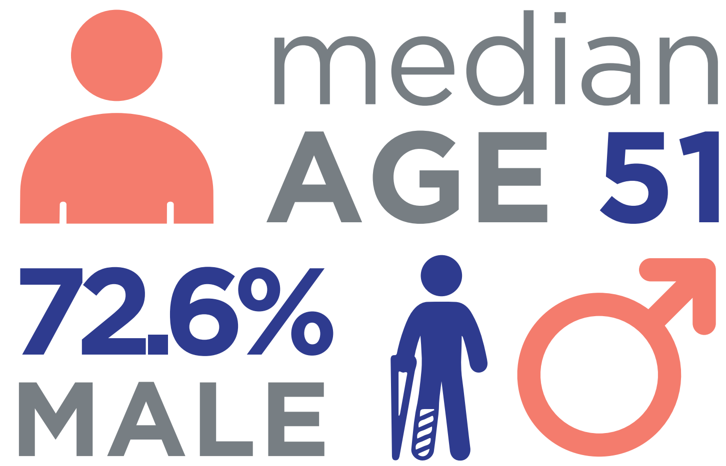
The ATR is now a leading CQR, collecting pre-hospital and in-hospital data on the most severely injured patients, defined as an Injury Severity Score (ISS) greater than 12 or death following injury, from 28 Australian and seven New Zealand level 1 trauma centres. The ATR now has six years of quality Australian data from 1 July 2015 to 30 June 2021, and four years of New Zealand data from 1 July 2017 to 30 June 2021, and continues to recruit sites with the purpose of capturing population-based data for the severely injured.

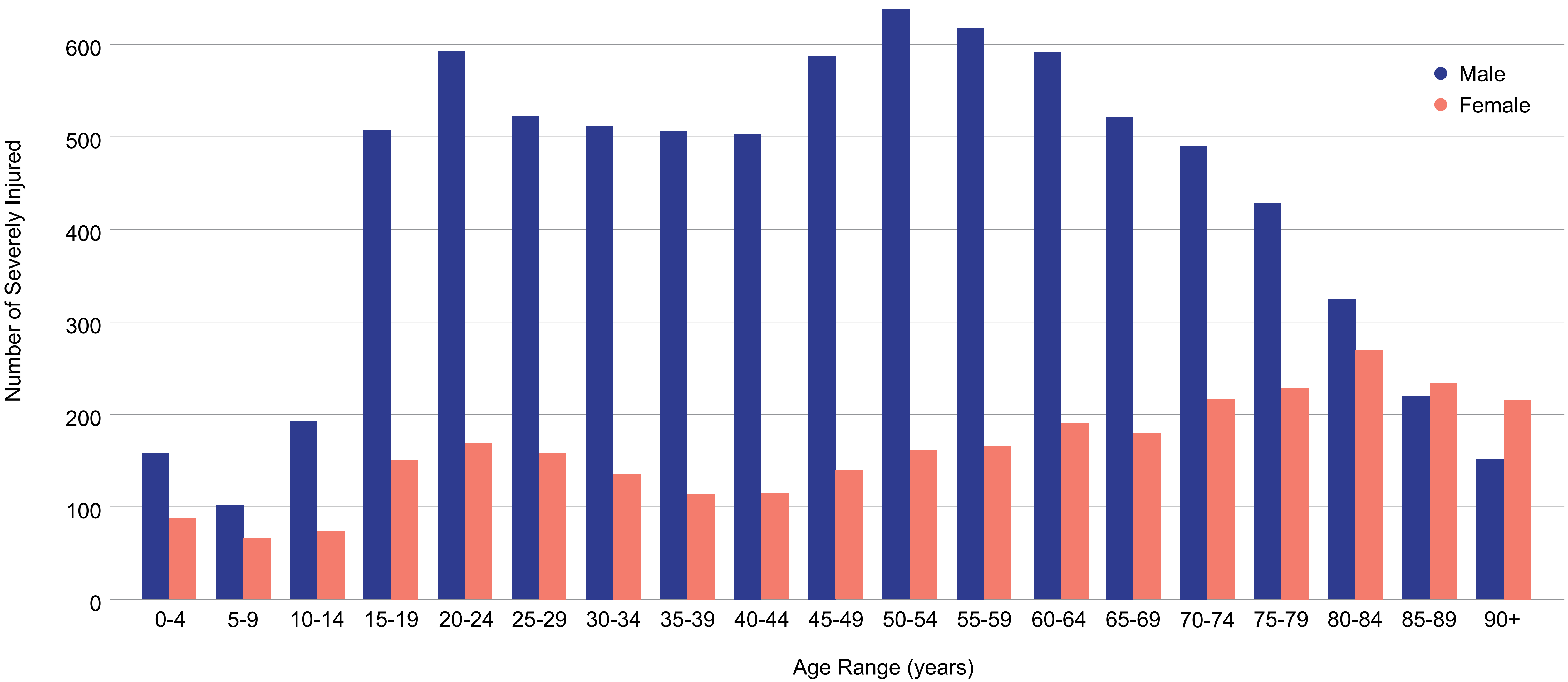
DEMOGRAPHICS

AGE AND GENDER

Incidence by age and gender showed that most severe injuries continue to involve males (72.6%). The distribution of severely injured patients according to sex and age group are shown in the figure below.

There were two main age-group peaks for males: the 20-29 year olds and the 50-59 year olds. For females, there were also two main peaks. The first was the same as males (20-29 years) but the second was in older females (80-89 years).





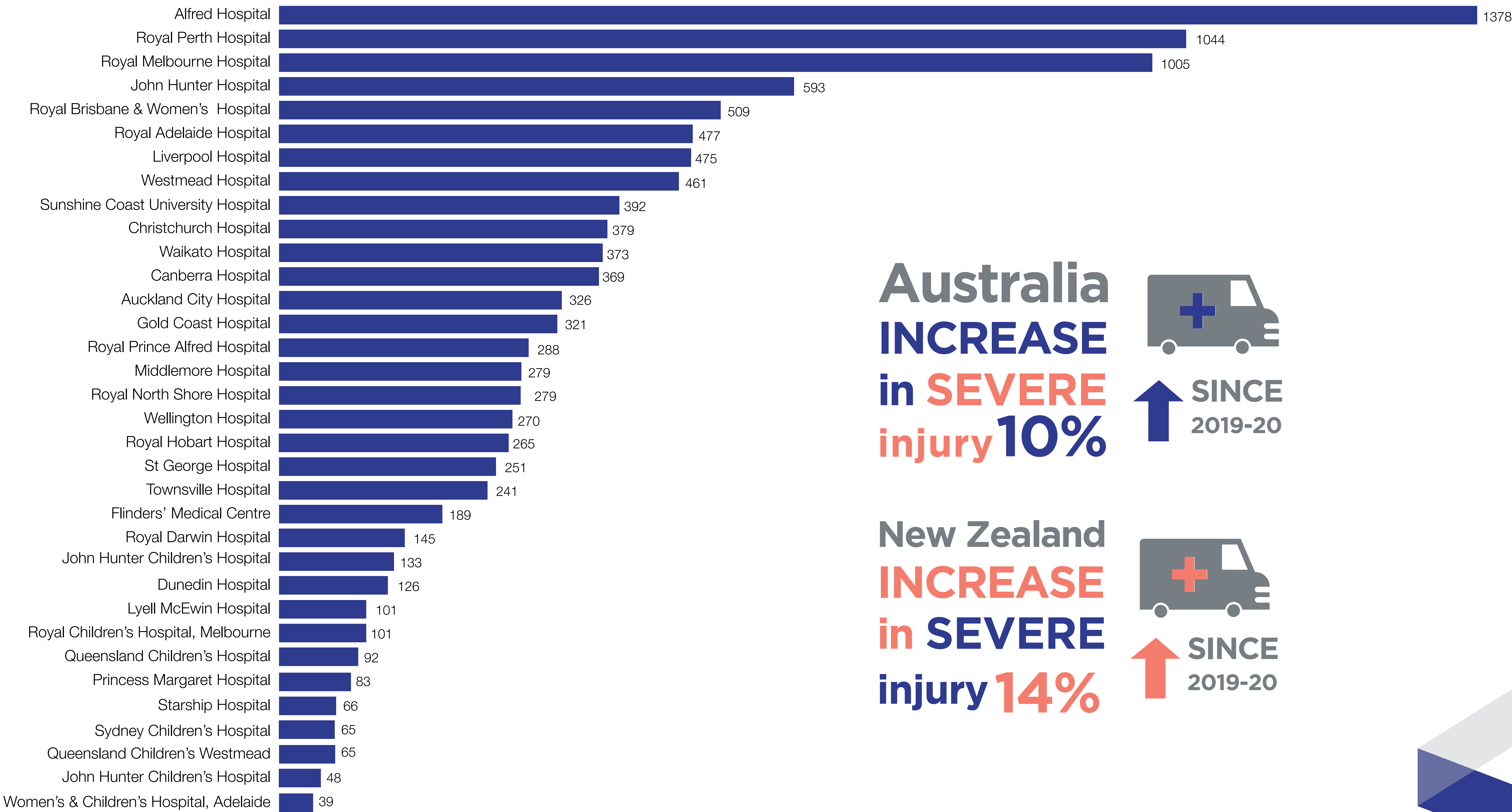
Age Group	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90+
n	245	165	266	658	762	681	646	621	617	727	799	784	782	702	706	656	593	452	366

DEMOGRAPHICS

Across the 2020-21 financial year (FY) 11,254 episodes of severely injured were collected by the ATR. Australia provided 9,413 episodes from 28 major trauma centres, and New Zealand provided 1,841 episodes from seven trauma centres.

Bi-nationally severe injury numbers increased compared to the previous year, with an overall increase of 12 per cent.

Number of Severely Injured 2020-21 , by Hospital



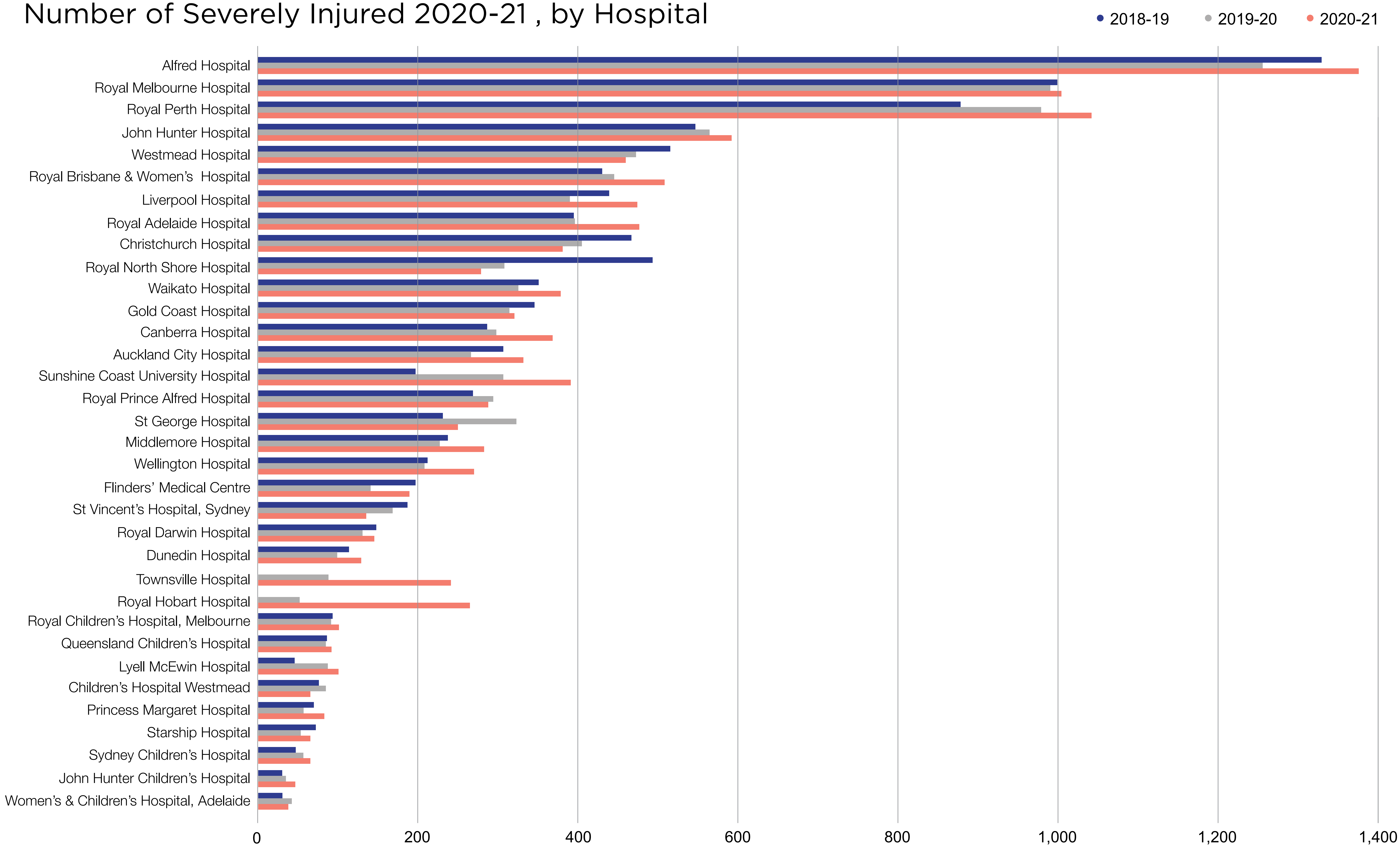
Australia INCREASE in SEVERE injury 10% SINCE 2019-20

New Zealand INCREASE in SEVERE injury 14% SINCE 2019-20

COVID-19

The covid-19 pandemic was first confirmed in Australia in January 2020 and New Zealand in February 2020. How lock-downs and changes to trauma guidelines, including allocation of covid-designated hospitals and diversion of trauma patients to alternate hospitals, impacted trauma services will require further investigation, but from the three year comparison below, there were significant changes in major trauma numbers between sites over the past three years.

Number of Severely Injured 2020-21 , by Hospital



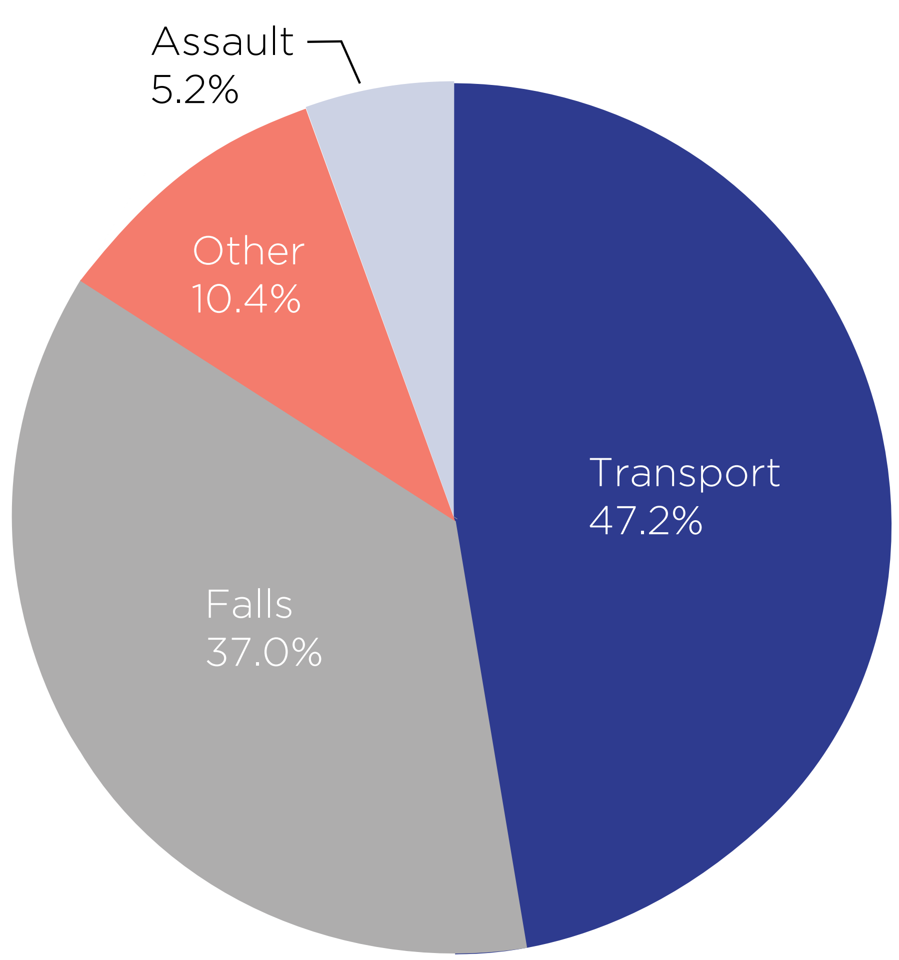
INJURY EVENT

INTENT OF INJURY

Injury intent was specified for 75 per cent of all severe injuries of which 89.4 per cent were related to unintentional injuries. Injury intent data is not provided by New South Wales or the Northern Territory.

TYPE OF INJURY

Bi-nationally, ninety-six per cent of severe injury was caused by blunt mechanisms, with 3.6 per cent due to penetrating trauma, and less than one per cent due to burns, similar to the previous three years.



Cause of Injury

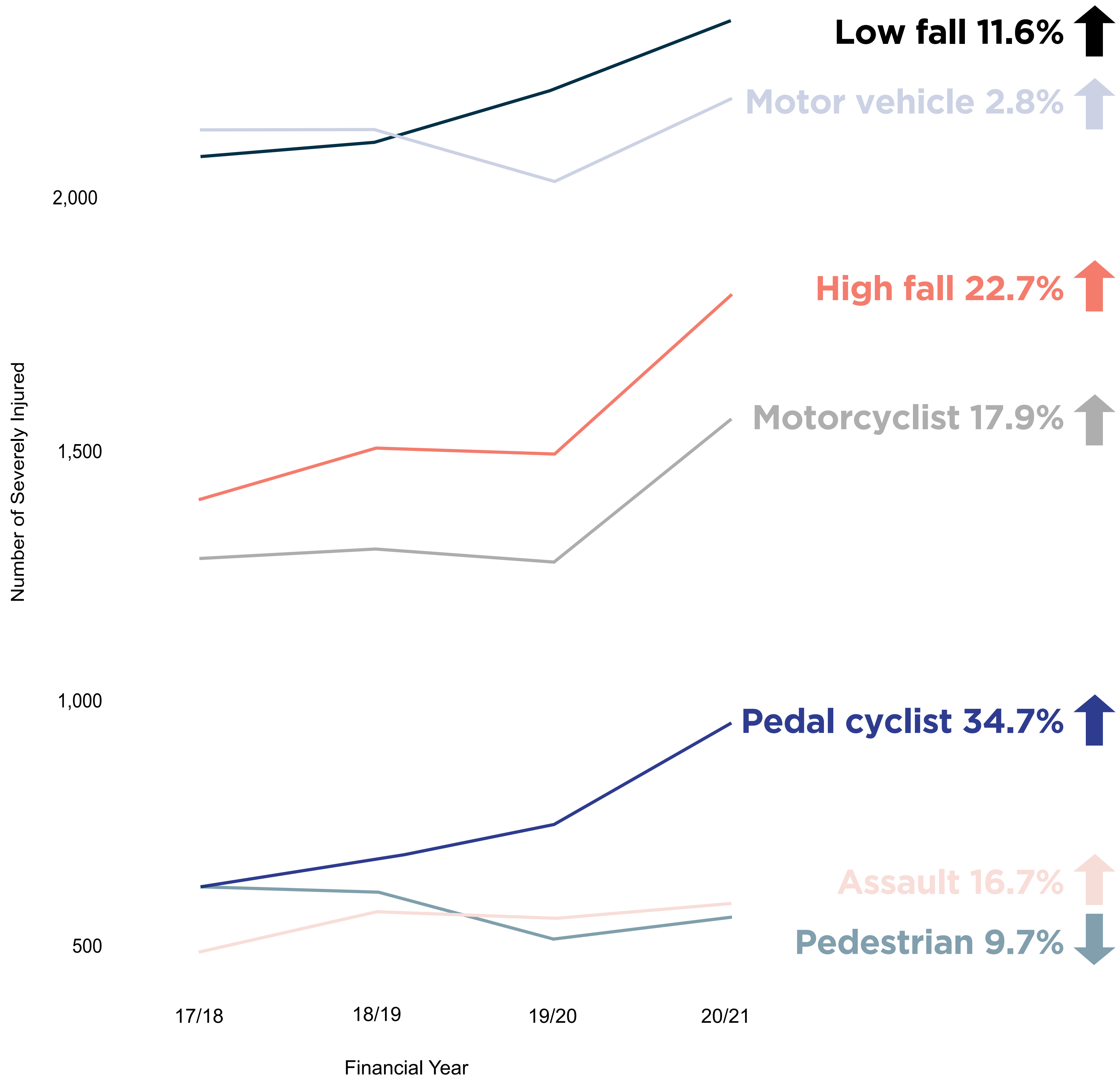
CAUSE OF INJURY

Transport-related and falls-related injuries accounted for 84.2 per cent of all severe injuries and remain the leading cause of in-hospital admissions for severe injury.

Forty-seven per cent of severe injuries were transport related. Of these, 41.8 per cent were motor vehicle, 29.6 per cent were motorcyclists, 18.0 per cent were pedal cyclists and 10.6 per cent were pedestrians.

Thirty-seven per cent of all severe injuries were caused by falls, of these low falls accounted for 56.6 per cent and high falls 43.4 per cent.

CAUSE - OVER 4 YEARS



INJURY EVENT

DAY OF INJURY

The incidence of severe injuries according to day of the week remained consistent with previous years. Saturday and Sunday remains the predominant days for injury, with 36 per cent of injuries occuring over the weekend.

Whilst most falls and transport-related injuries had peak incidence over the weekend some groups such as pedal cyclists and motorcyclists had much higher numbers occurring on the weekends. A larger proportion of pedestrians were injured on Thursday and Friday.

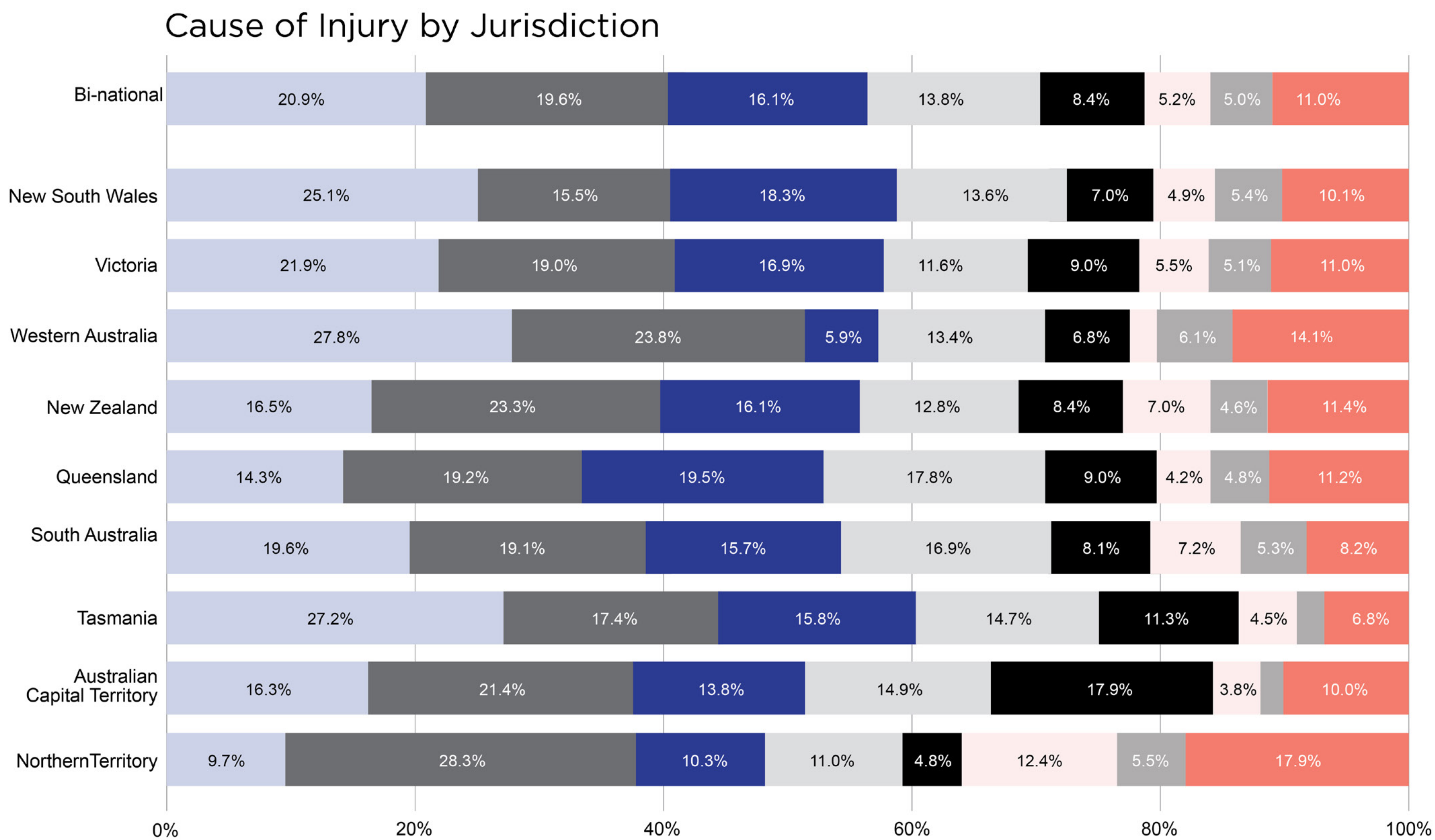
PLACE OF INJURY

Eighty-seven per cent of severely injured patients had a known place of injury, with 45 per cent occurring on the street or highway and 32 per cent occurring at home. In the home was the most common place of injury for children aged 0-4 years old (67 per cent) and older adults aged 70 years and older (54 per cent). The street and highway was the most prevalent injury place for all other age groups, particularly for the 15 to 29 year age group (45 per cent). The category 'home' for patients aged 75 years and above includes residential aged care.

				Transport			
	Assault	**High Fall**	**Low Fall**	**Motor Vehicle**	**Motorcyclists**	**Pedal Cycle**	**Pedestrian**
Monday	8.8% (n=52)	13.8% (n=249)	14.1% (n=333)	11.9% (n=263)	8.5% (n=133)	9.7% (n=92)	12.3% (n=69)
Tuesday	10.7 (n=63)	12.4% (n=223)	13.1% (n=309)	13.4% (n=295)	8.9% (n=138)	10.2% (n=97)	13.0% (n=73)
Wednesday	11.2% (n=66)	14.0% (253)	13.8% (n=324)	13.1% (n=289)	8.7% (n=135)	12.6% (n=120)	13.9% (n=78)
Thursday	15.0% (n=88)	12.4% (n=224)	13.7% (n=323)	13.3% (n=292)	10.7% (n=167)	13.1% (n=124)	18.2% (n=102)
Friday	16.8% (n=99)	13.6% (n=246)	15.5% (n=366)	14.6% (n=321)	11.8% (n=183)	12.8% (n=121)	18.4% (n=103)
Saturday	18.7% (n=108)	17.2% (n=311)	15.9% (n=374)	17.7% (n=388)	24.7% (n=384)	20.6% (n=196)	12.7% (n=71)
Sunday	19.0% (n=112)	16.6% (n=299)	13.9% (n=326)	16.0% (n=351)	26.7% (n=417)	21.0% (n=199)	11.5% (n=65)
Total	100.0% (n=588)	100.0% (n=1,805)	100.0% (n=2,355)	100.0% (n=2,199)	100.0% (n=1,557)	100.0% (n=949)	100.0% (n=561)

CAUSE OF INJURY BY JURISDICTIONS

Transport and falls-related injuries continue to be the most common severe injuries across all jurisdictions. In 2020-21, low falls were the most prevalent for five of the nine jurisdictions, whilst motor vehicle crashes were the most prevalent for four jurisdictions.



	Low Fall	Motor Vehicle	High Fall	Motorcyclists	Pedal Cyclists	Assault	Pedestrians	Other
n	2,355	2,199	1,805	1,557	949	588	561	1,232

INJURY

SEVERITY OF INJURY

Injury Severity Score (ISS) is an internationally-standardised approach to describing the overall severity of injury for each patient. Trauma patients are allocated an ISS after injury in order to determine their status as ‘major trauma’. For this report, major trauma is defined as an ISS > 12 and an ISS > than 25 as severe, which is derived from the Abbreviated Injury Scale (AIS) 2008. ISS is useful for predicting hospital length of stay, and associated morbidity and mortality.

In the 2020-21 financial year, the proportion of severely injured categorised by ISS range was comparable with the previous three years. Most injuries admitted to hospital had an ISS between 16 and 24 (44%). When the cohort was broken down into gender, similar proportions by ISS range occured.

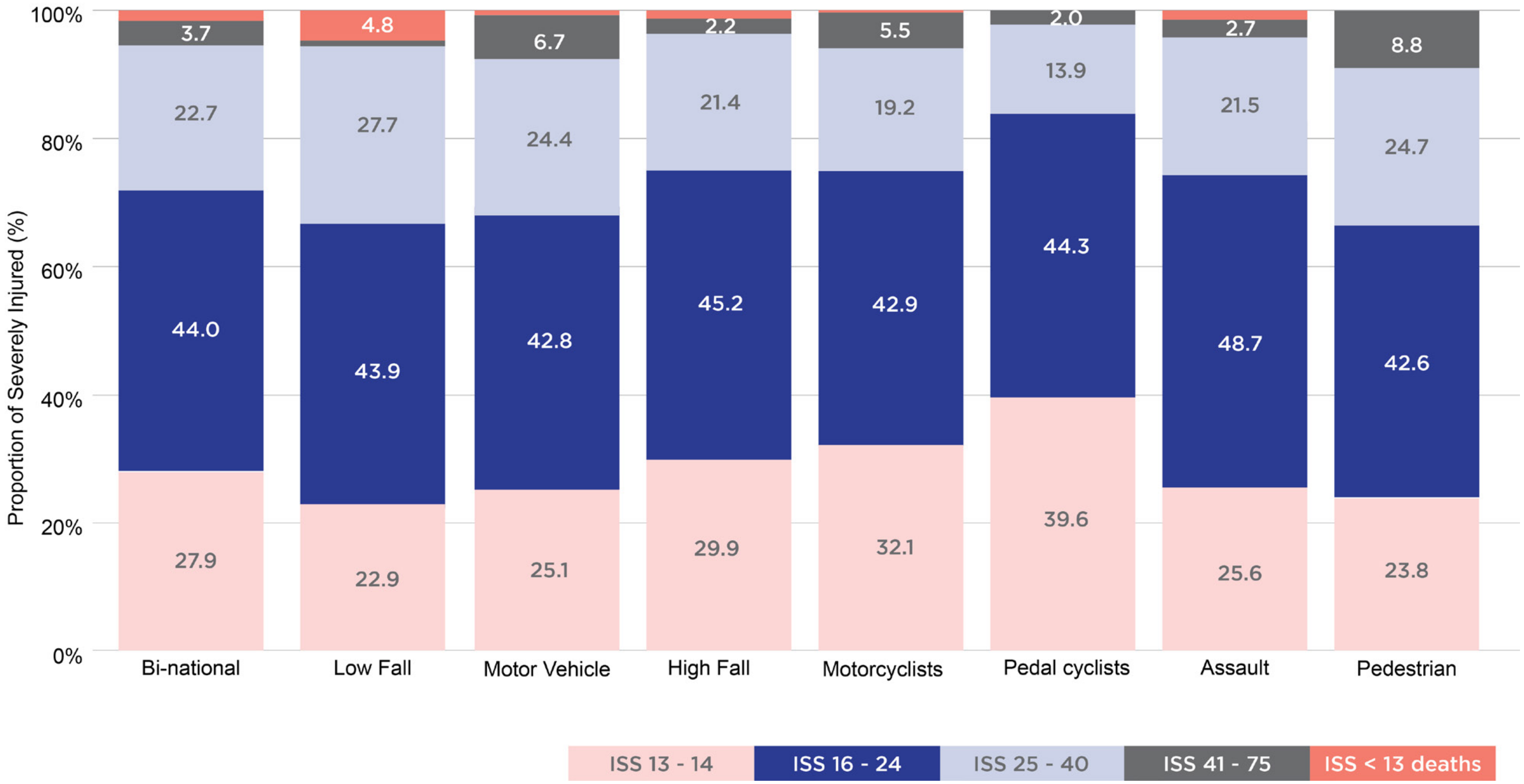
An ISS greater than 25 was most prevalent in the pedestrian, low fall, and motor vehicle populations whilst less severe injuries occurred in pedal cyclists. Low falls are defined as falls of one metre or less.

DEATHS WITH ISS<13

The ATR also collects data on in-hospital deaths with an ISS less than 13. For the 2020-21 financial year there were 192 patients.

- 77 per cent were aged 70+ years
- 58.3 per cent were caused by a low fall
- 10 per cent died in the Emergency Department

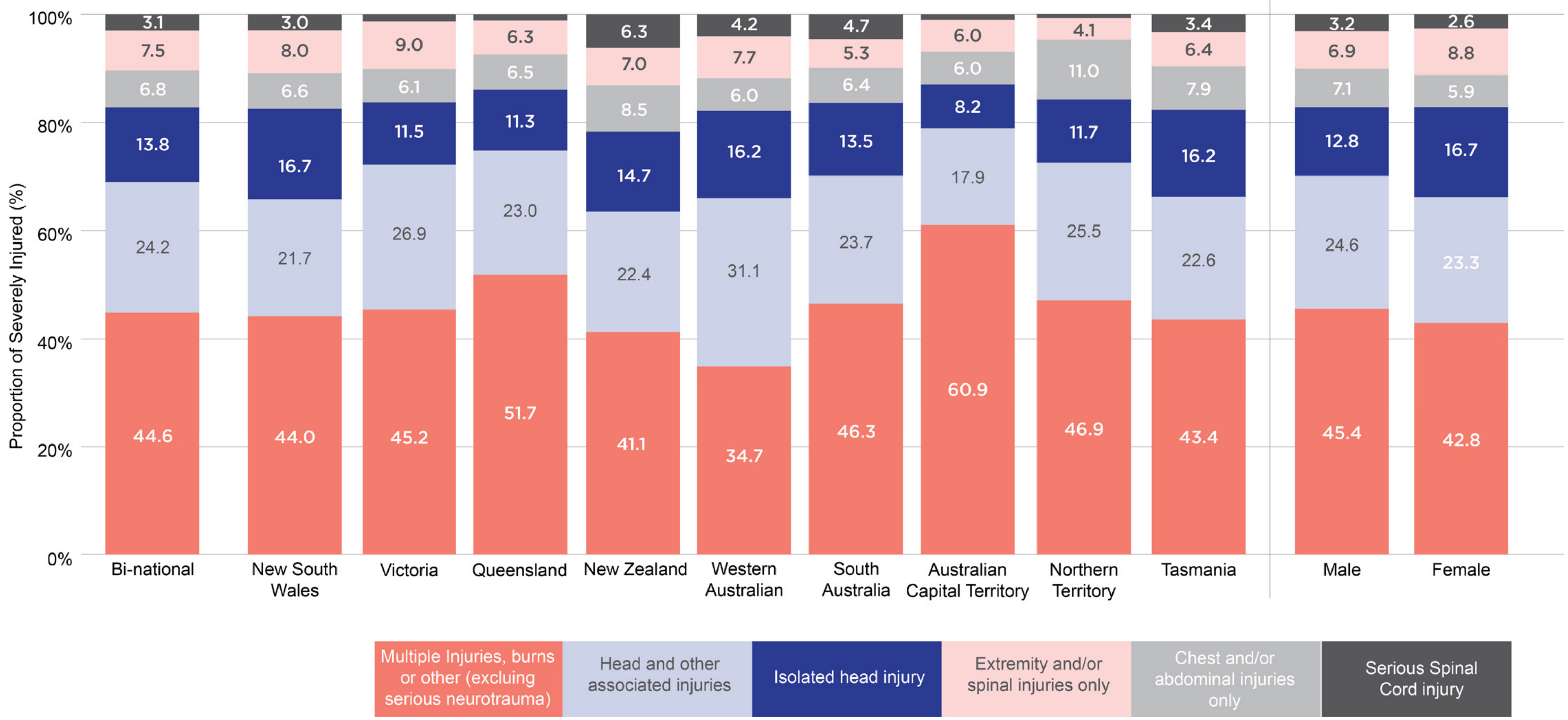
Injury Severity by Cause



INJURIES SUSTAINED

Multiple injuries were the most prevalent across all jurisdictions for the severely injured, followed by 'head and other associated injuries' and 'isolated head injuries'. Head injuries, both complex and isolated, make up nearly 40 per cent of all injuries. Twenty-four patients were without AIS coding to ascertain injury severity. Twenty-five patients had unknown gender.

Injury Severity by Cause



Jurisdiction	Severly Injured (n)
Bi National	11,254
New South Wales	2,661
Victoria	2,485
New Zealand	1,841
Queensland	1,555

Jurisdiction	Severly Injured (n)
Western Australia	1,127
South Australia	807
Australian Capital Territory	369
Northern Territory	145
Tasmania	265

Gender	Male	Female
n	8,166	3,063

Multiple injuries, burns or other = includes multiple body region injuries (excluding serious neurotrauma), burns and other injuries that do not fit into any of the other groups.

Head and other associated injuries = head injury with AIS > 2 in addition to another injury.

Isolated head injury = head injury with AIS > 2 and no other injury with AIS > 1.

Extremity and/or spine injuries only = extremity injury with AIS > 1 and/or spine injury with AIS 2 or 3 and no other injury with AIS > 1.

Chest and/or abdominal injuries only = chest and/or abdominal injury with AIS > 2 and no other injury with AIS > 1 in other body regions.

Serious spinal cord injury = spinal cord injury with AIS > 3 with or without other injuries.

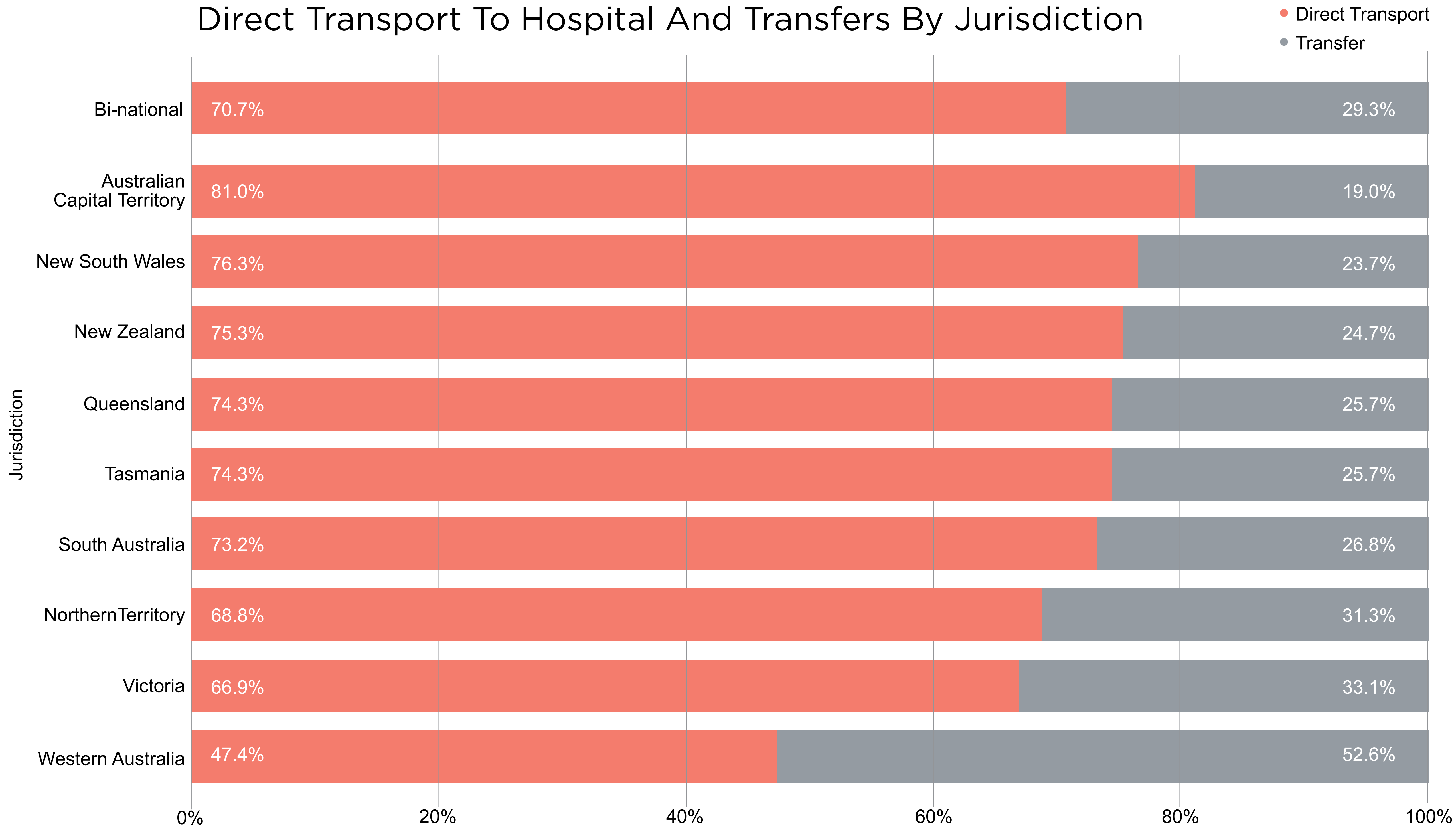
TRANSPORT TO HOSPITAL

Two-thirds (70.7%) of severely injured patients were transported direct from the scene to definitive care. Of those transported direct, 74.3 per cent arrived via road ambulance, 19.1 per cent via helicopter and 5.7 per cent via private vehicle/walk-in.

For the severely injured that arrived at a major trauma service via one or more hospitals, 67.5 per cent were transported from the scene via road ambulance, 20.4 per cent via private vehicle/walk-in, 6.1 per cent via helicopter. The majority of those who were transferred (98.5%), attended only one other hospital prior to arrival at a major trauma service.

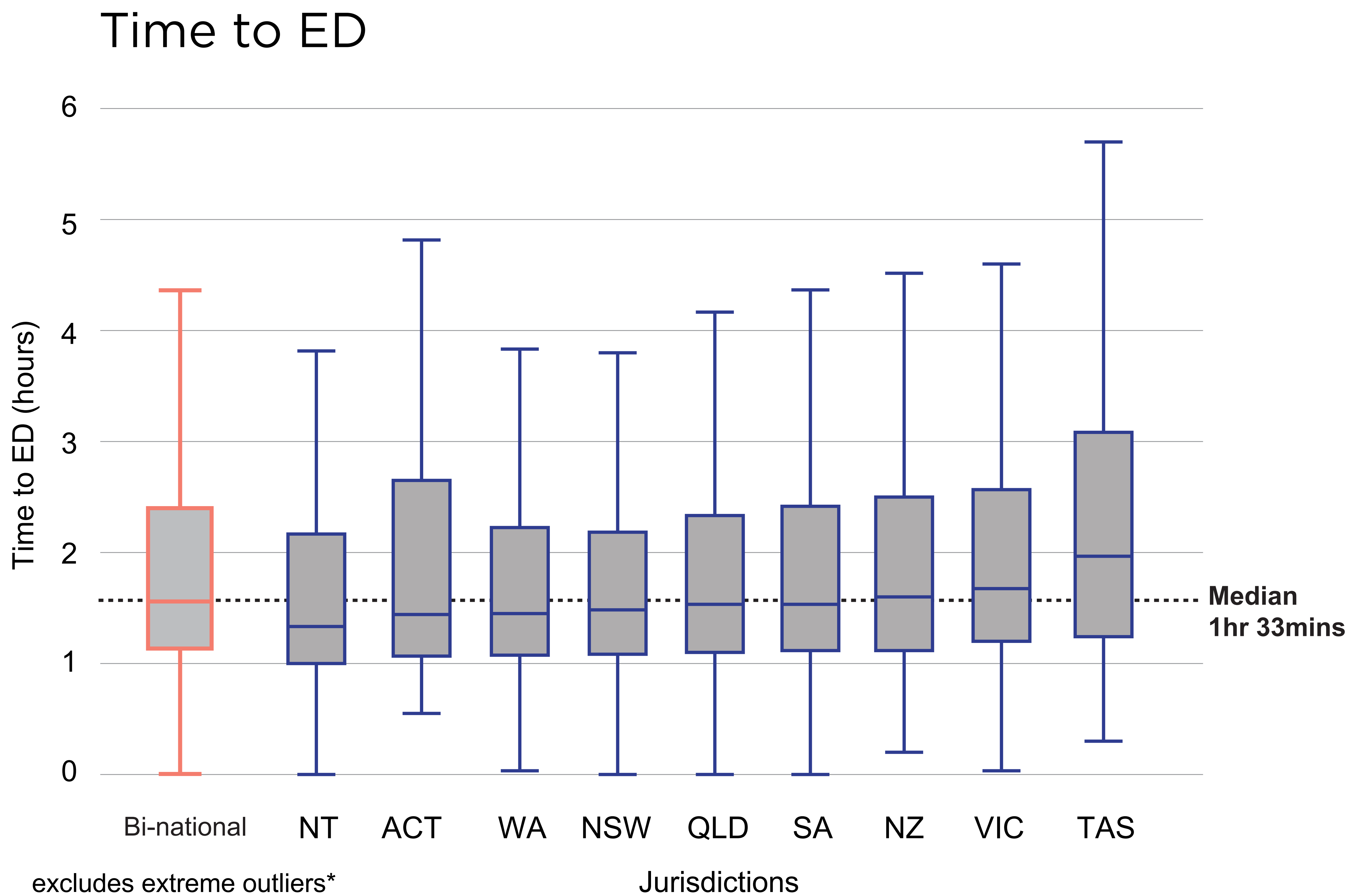
The number of patients who arrived at definitive care either directly from the scene or via a different health service, varied between jurisdictions. Direct transport from the scene to hospital ranged from 47.4% to 81.0%.

Direct Transport To Hospital And Transfers By Jurisdiction



TIME FROM INJURY TO EMERGENCY DEPARTMENT

Time to the Emergency Department (ED) was analysed for patients conveyed directly from injury to definitive care. The median time from injury to definitive care was **1 hour 33 minutes**, similar to the previous financial year.

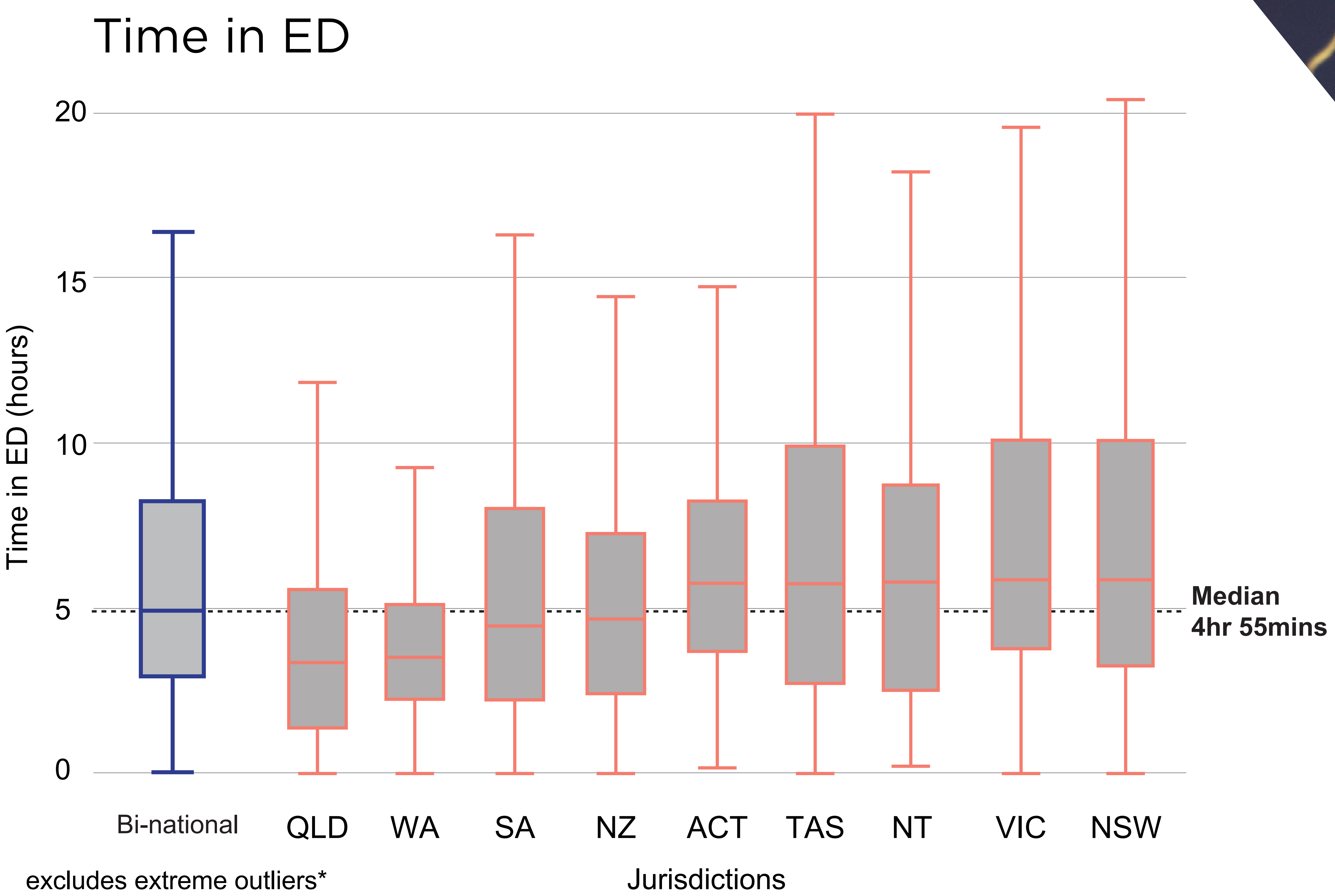


* Extreme outliers are values smaller than the lower quartile minus 1.5 times the interquartile range (IQR) or values larger than the upper quartile plus 1.5 times the IQR (Tukey, 1977)

TRAUMA CENTRE CARE

TIME IN EMERGENCY DEPARTMENT (ED)

The bi-national median time spent in the ED was **four hours and 55 minutes**. This time varied when categorised by jurisdiction. The Australian National Healthcare Agreement, 2018, states the importance of Emergency Department care remaining within 4-hours is a key performance indicator for improved outcomes.



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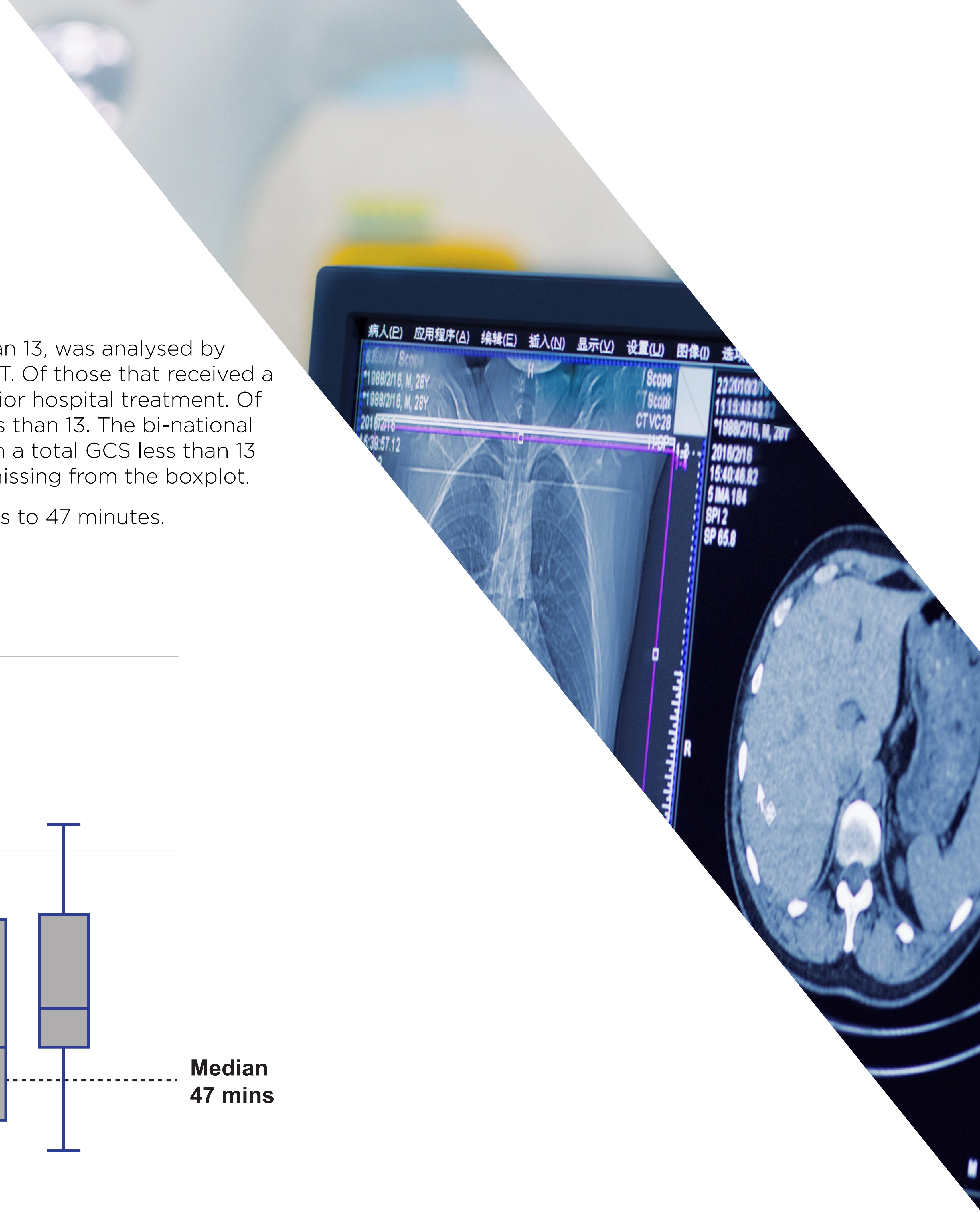
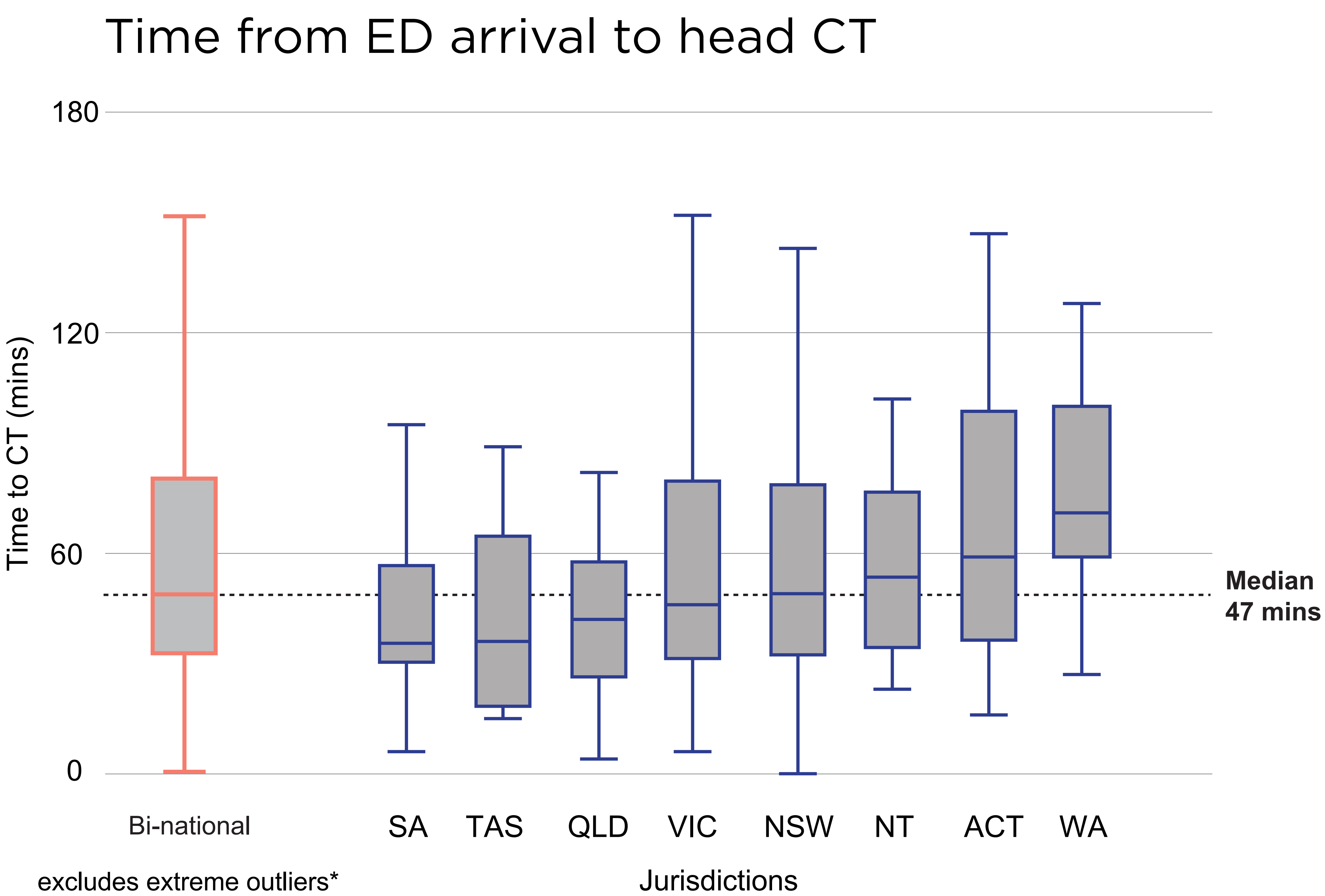
TRAUMA CENTRE CARE



TIME FROM ED ARRIVAL TO HEAD COMPUTED TOMOGRAPHY (CT)

The time to first head CT for patients with a total Glasgow Coma Scale (GCS) less than 13, was analysed by jurisdiction. Just under fifty per cent of all severely injured patients received a head CT. Of those that received a head CT, 3,863 were direct transfers from the scene to definitive care, receiving no prior hospital treatment. Of those, 858 (22.2%) arrived at the Emergency Department with a known total GCS less than 13. The bi-national median time from arrival at the definitive hospital to time of head CT for patients with a total GCS less than 13 was **47 minutes** (IQR 0.53-1.27 hours). New Zealand does not provide CT type so is missing from the boxplot.

Time to Head CT has increased slightly over the previous three years, from 44 minutes to 47 minutes.



* Extreme outliers are values smaller than the lower quartile minus 1.5 times the interquartile range (IQR) or values larger than the upper quartile plus 1.5 times the IQR (Tukey, 1977)

HOSPITAL LENGTH OF STAY BY HOSPITAL (LOS)

Hospital Length of Stay was compared between hospitals, before and after risk adjustment. The following risk factors were included in the model as they were found to be significant predictors: restricted cubic splines for age with 4 knots, cause of injury, arrival Glasgow Coma Scale (GCS) - motor, shock-index grouped in quartiles, highest and second highest AIS scores. The relationship between age and mortality among trauma patients is nonlinear. There are several options to dealing with non-linearity, including categorising based on arbitrary cut-offs, including a quadratic term or including cubic splines. In a recent publication, we compared the various methods and found that cubic splines to be the most appropriate. The model assumes that the relationship is polynomial between the knots, locations set by the model at 18, 52 and 82 years.

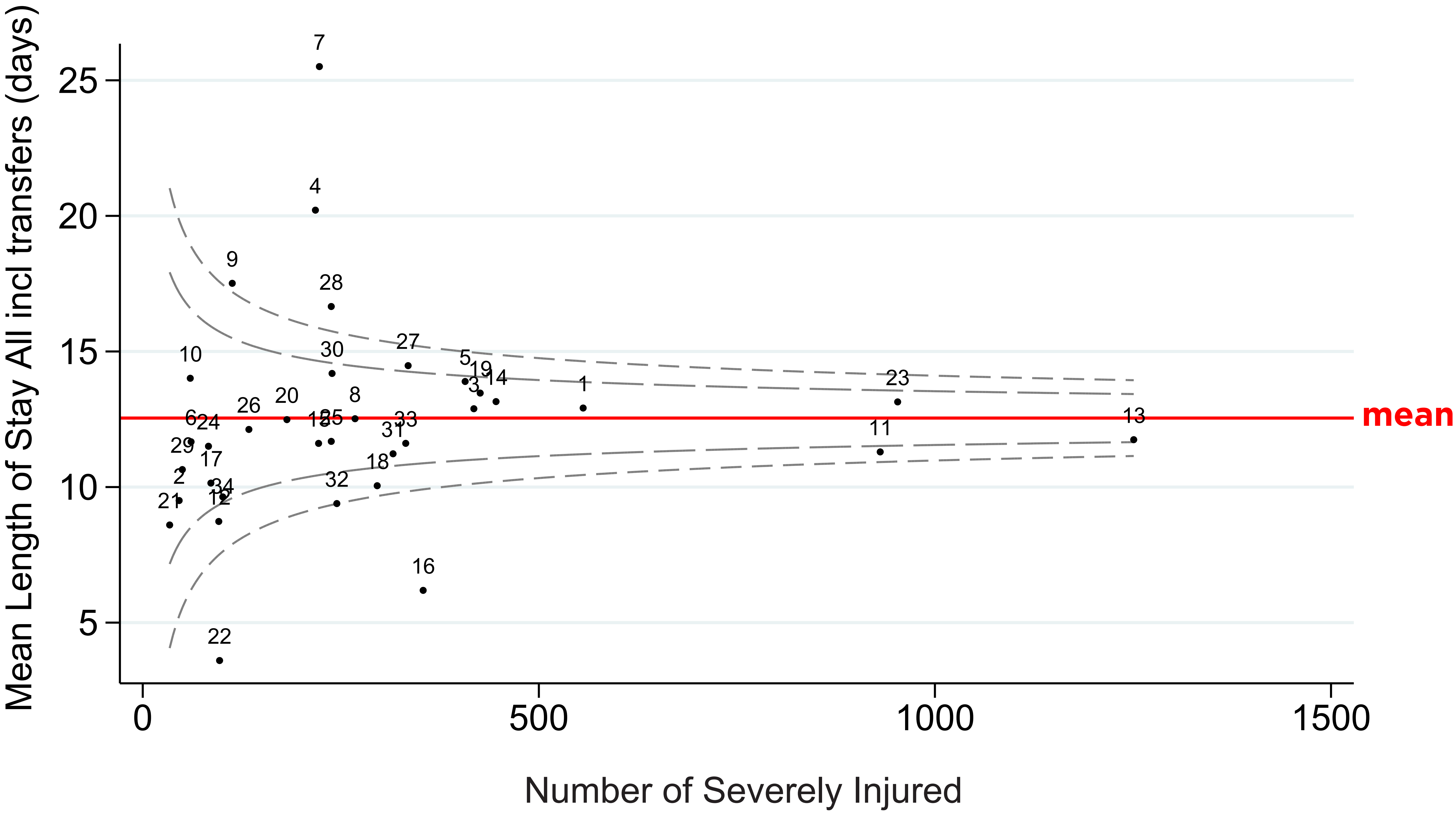
The mean LOS was calculated from the robust linear regression model, which accounted for the right skewness in the data. Only survivors were included in the LOS analysis. No significant differences were noted after risk adjustment. Please refer to Appendix A for detailed data analysis.

Each numbered dot represents one hospital in the funnel plots on the following pages. The funnel plots, where the aim is to identify outliers, show contours which represent two standard deviations (95% control limits) and three standard deviations (99.8% control limits) from the mean. Those outside these lines are considered outliers, with a 5% and 0.2% chance of a false positive respectively.

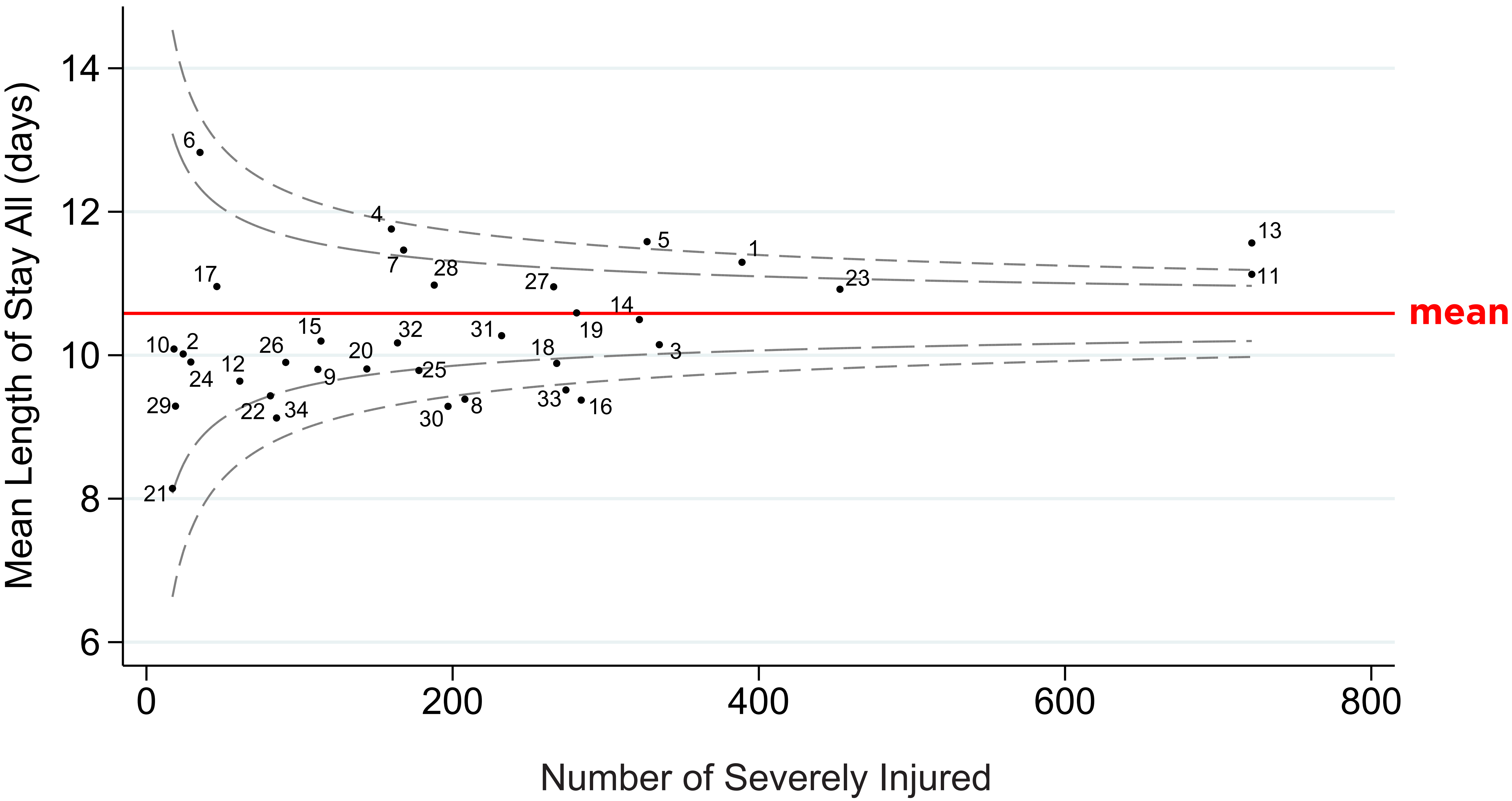
Total numbers for risk adjustment have been reduced because the transferred group of patients has been excluded. This resulted in a 30% reduction in numbers. A further reduction in numbers was the exclusion of non-blunt cases such as burns and penetrating as they are a heterogenous group (5%).

ID#	Hospital Name	Jurisdiction
1	John Hunter Hospital	NSW
2	John Hunter Children's Hospital	NSW
3	Liverpool Hospital	NSW
4	St George Hospital	NSW
5	Westmead Hospital	NSW
6	Children's Hospital, Westmead	NSW
7	Royal North Shore Hospital	NSW
8	Royal Prince Alfred Hospital	NSW
9	St Vincent's Hospital	NSW
10	Sydney Children's Hospital	NSW
11	Royal Melbourne Hospital	VIC
12	Royal Children's Hospital	VIC
13	Alfred Hospital	VIC
14	Royal Brisbane and Women's Hospital	QLD
15	Townsville Hospital	QLD
16	Sunshine Coast University Hospital	QLD
17	Queensland Children's Hospital/Lady Cilento Children's Hospital	QLD
18	Gold Coast Hospital	QLD
19	Royal Adelaide Hospital	SA
20	Flinders' Medical Centre	SA
21	Women's and Children's Hospital	SA
22	Lyell McEwin Hospital	SA
23	Royal Perth Hospital	WA
24	Perth Children's Hospital/Princess Margaret Hospital	WA
25	Royal Hobart Hospital	TAS
26	Royal Darwin Hospital	NT
27	Canberra Hospital	ACT
28	Auckland City Hospital	NZ
29	Starship Hospital	NZ
30	Middlemore Hospital	NZ
31	Waikato Hospital	NZ
32	Wellington Hospital	NZ
33	Christchurch Hospital	NZ
34	Dunedin Hospital	NZ

Unadjusted Hospital Length of Stay By Hospital

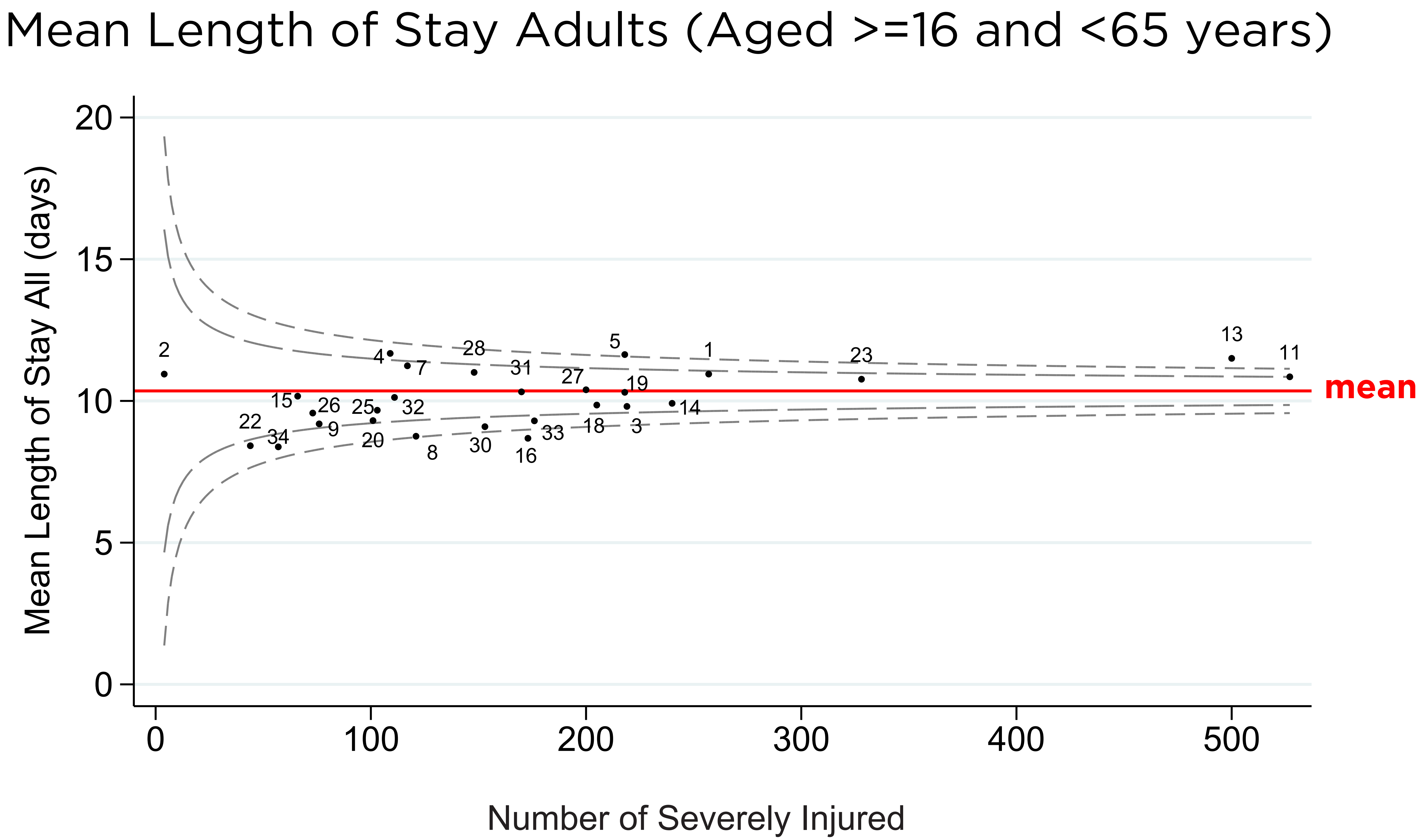


Risk-Adjusted Hospital Length of Stay By Hospital

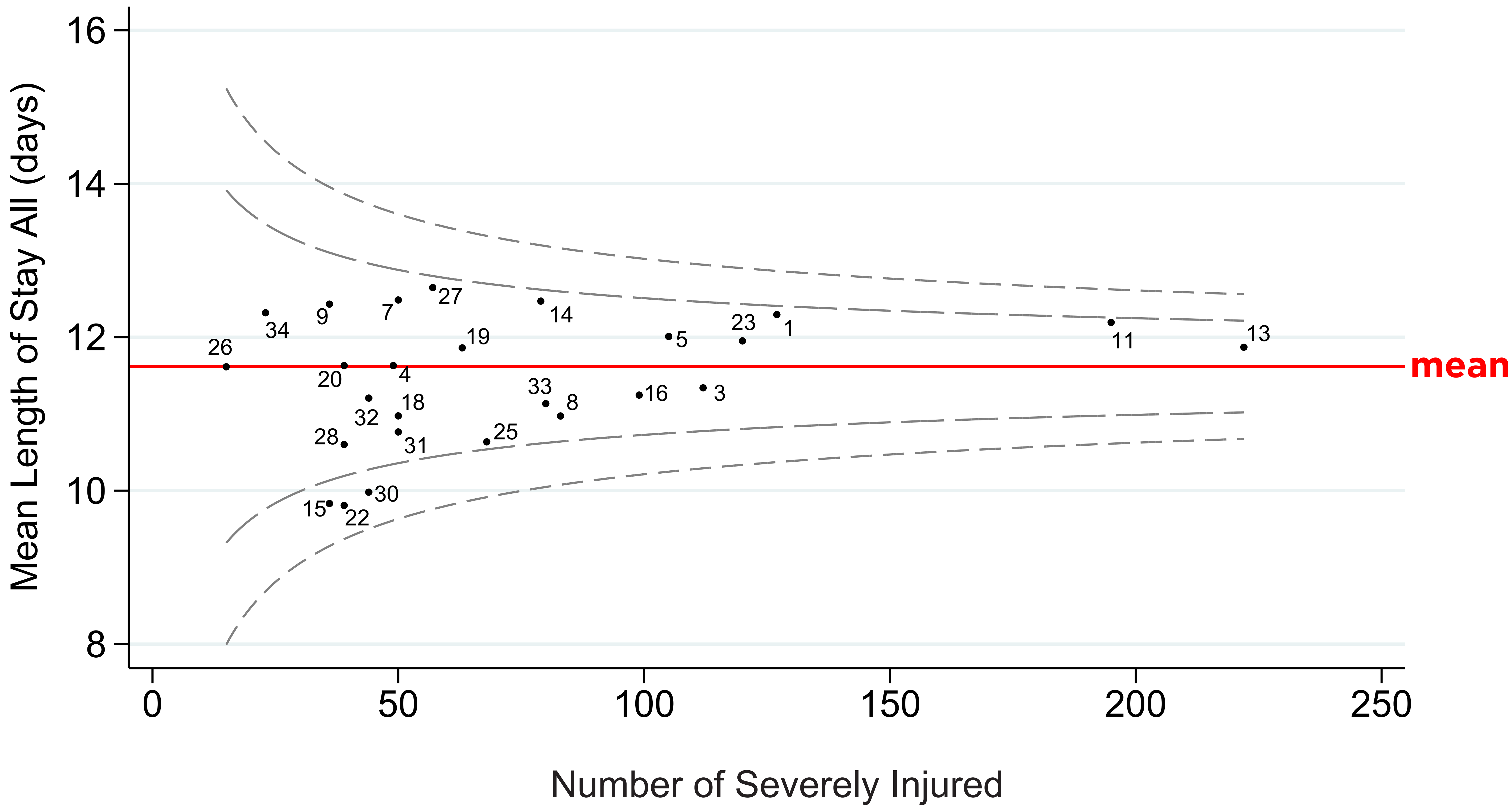


RISK-ADJUSTED HOSPITAL LENGTH OF STAY (LOS) BY AGE GROUPS

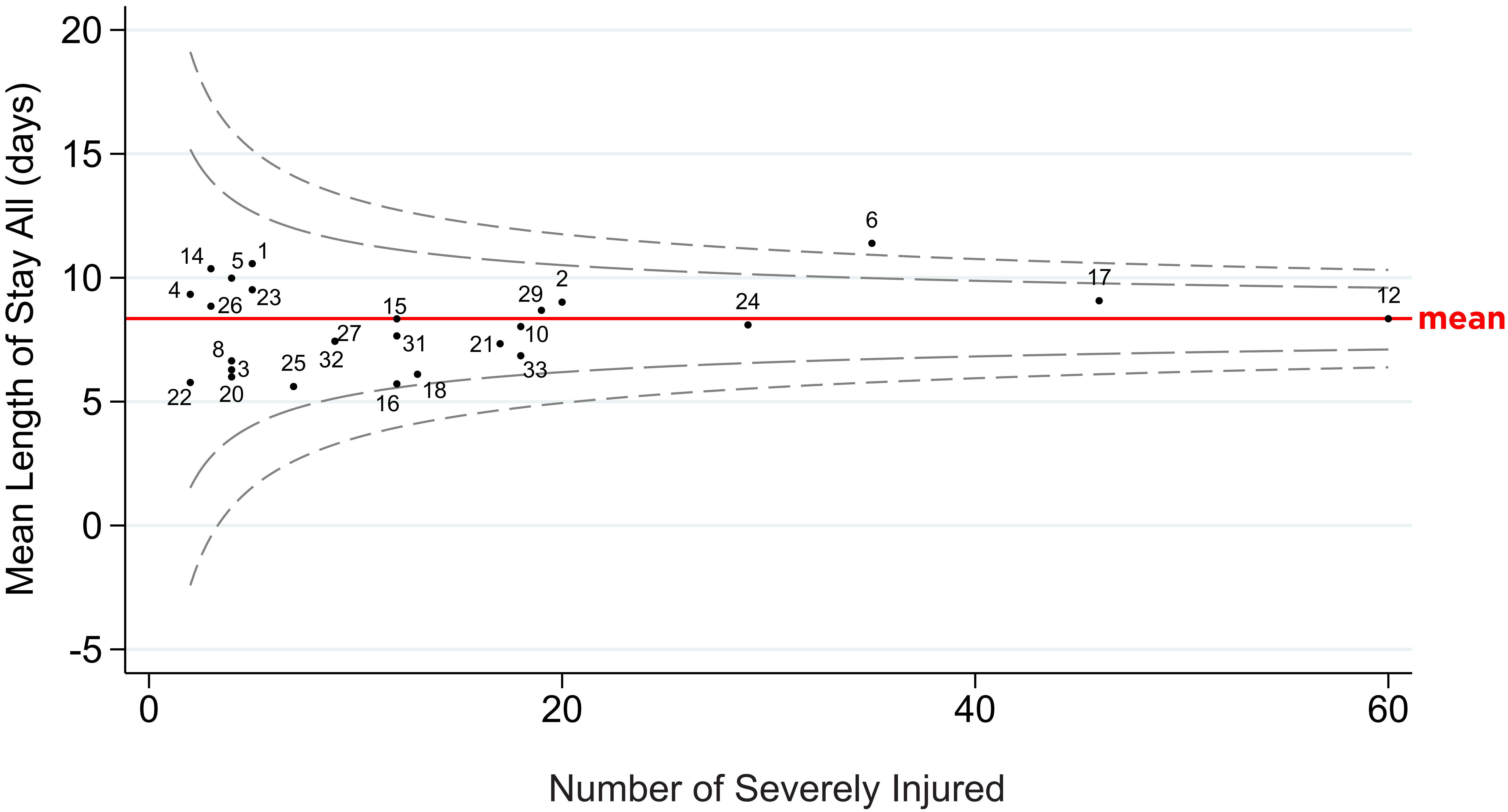
The **unadjusted bi-national median (IQR) hospital LOS was 7.0 (3.5-13.8) days**. When hospitals were risk adjusted there was no difference between hospitals for children (aged <16 years), adults (>=16 and <65 years) and older adults (>=65 years). Each numbered dot represents one hospital in the funnel plots below. The funnel plots, where the aim is to identify outliers, show contours which represent two standard deviations (95% control limits) and three standard deviations (99.8% control limits) from the mean. Those outside these lines are considered outliers, with a 5% and 0.2% chance of a false positive respectively.



Mean Length of Stay Older Adults (Aged >=65 years)

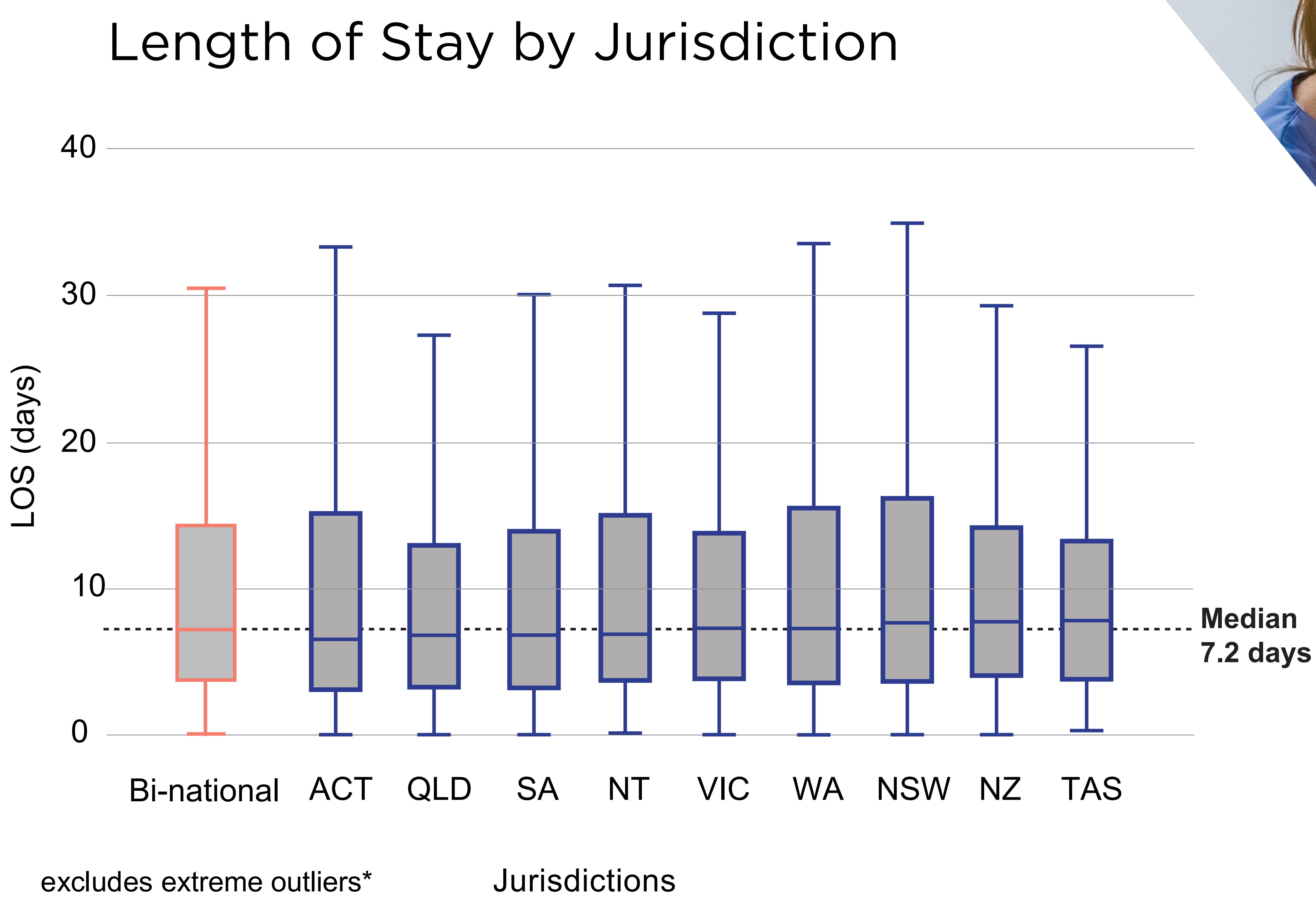


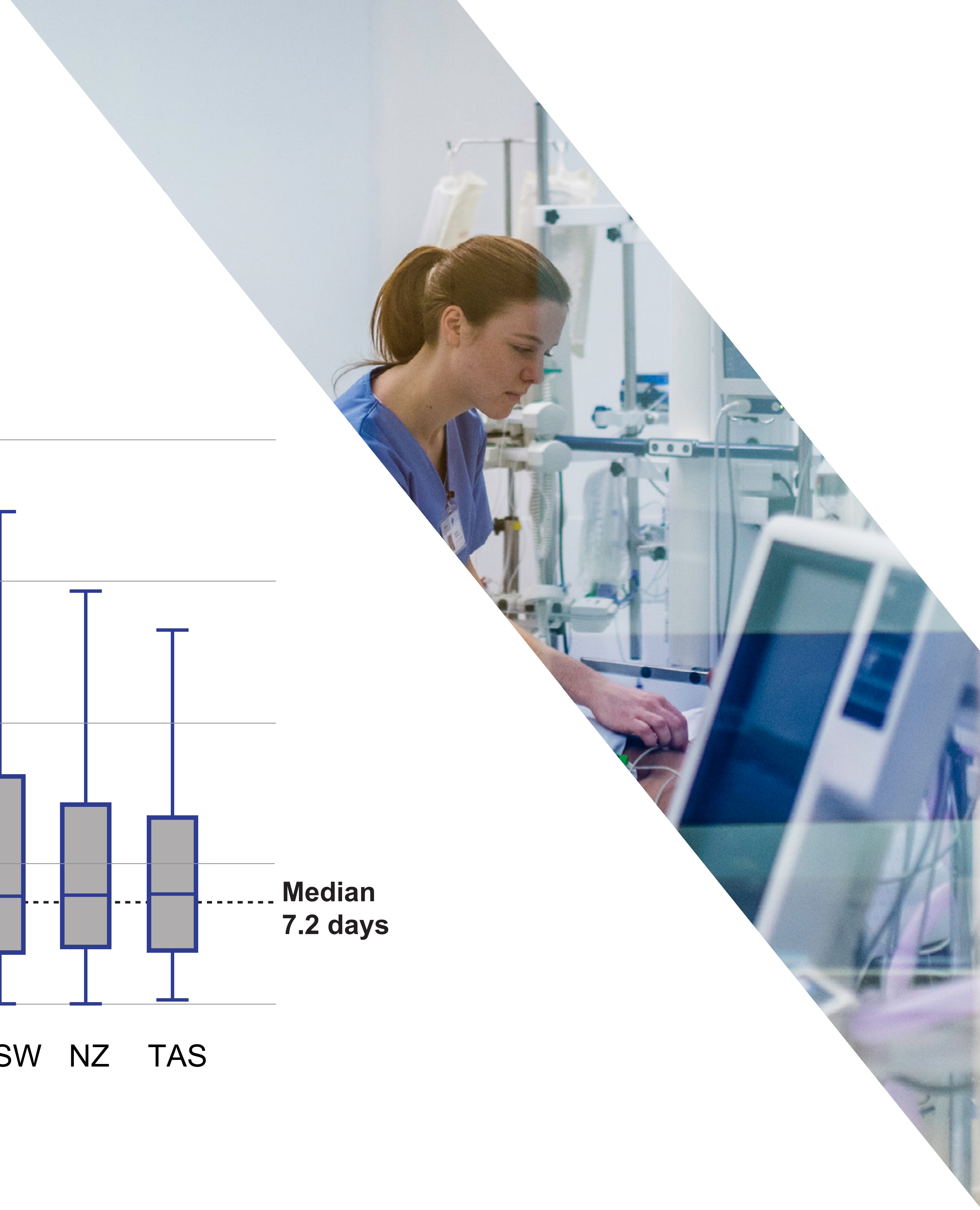
Mean Length of Stay Paediatrics (Aged <16 years)



LENGTH OF STAY (LOS) BY JURISDICTION

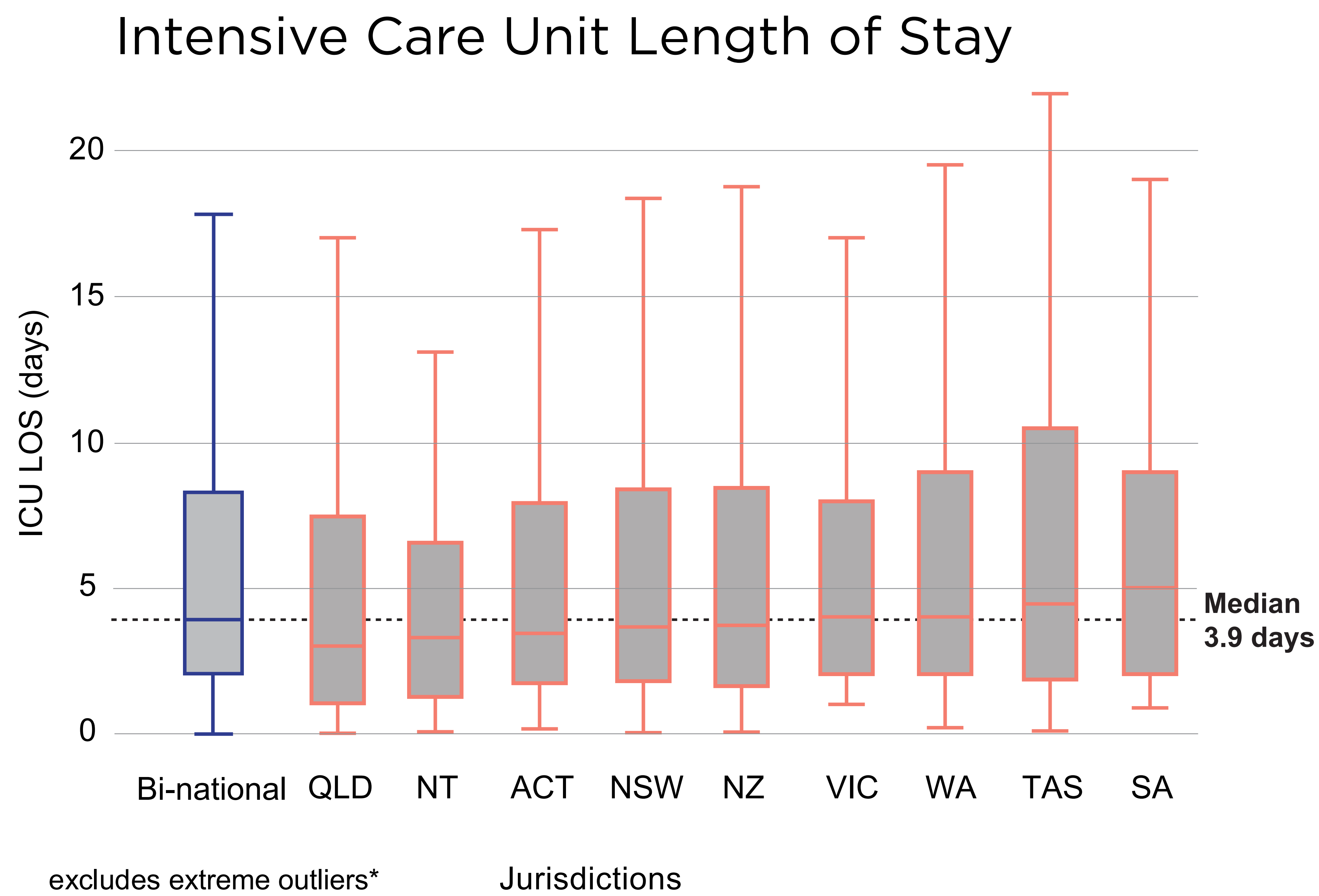
The **unadjusted bi-national median (IQR) hospital LOS was 7.2 (3.7-14.44) days.**





INTENSIVE CARE UNIT (ICU) LENGTH OF STAY (LOS)

The bi-national median (IQR) hospital ICU LOS was **3.9 (2.0-8.3) days.**

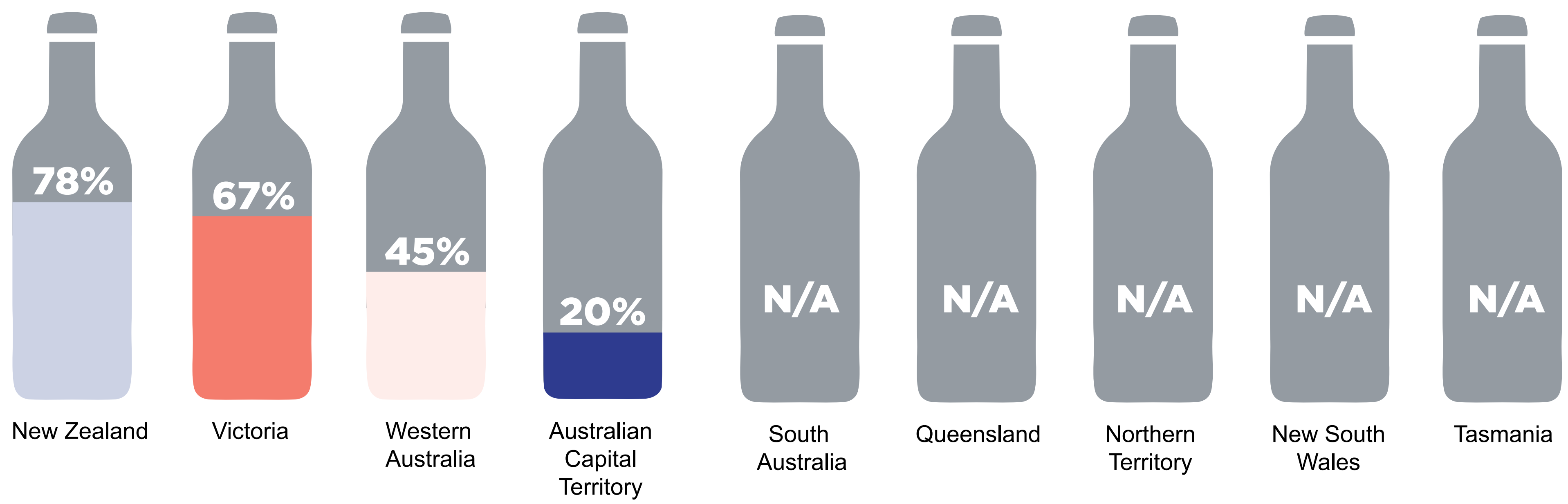


* Extreme outliers are values smaller than the lower quartile minus 1.5 times the interquartile range (IQR) or values larger than the upper quartile plus 1.5 times the IQR (Tukey, 1977)

BLOOD ALCOHOL CONCENTRATION COLLECTION RATE

Blood alcohol collection is one of the eight RACS process indicators and is recommended in patients with severe injuries, defined as an ISS>12.

The ATR does not currently receive blood alcohol concentration from all jurisdictions, and continues to work with registries and sites to improved data capture. The below figure demonstrates the proportion of severely injured cases where a blood alcohol test was performed and recorded for transport related injuries aged 15 years and older.



OUTCOMES FROM INJURY

The primary outcome collected by the ATR is discharge destination (including deaths). Discharge destination was provided for over 98.4 per cent of patients.

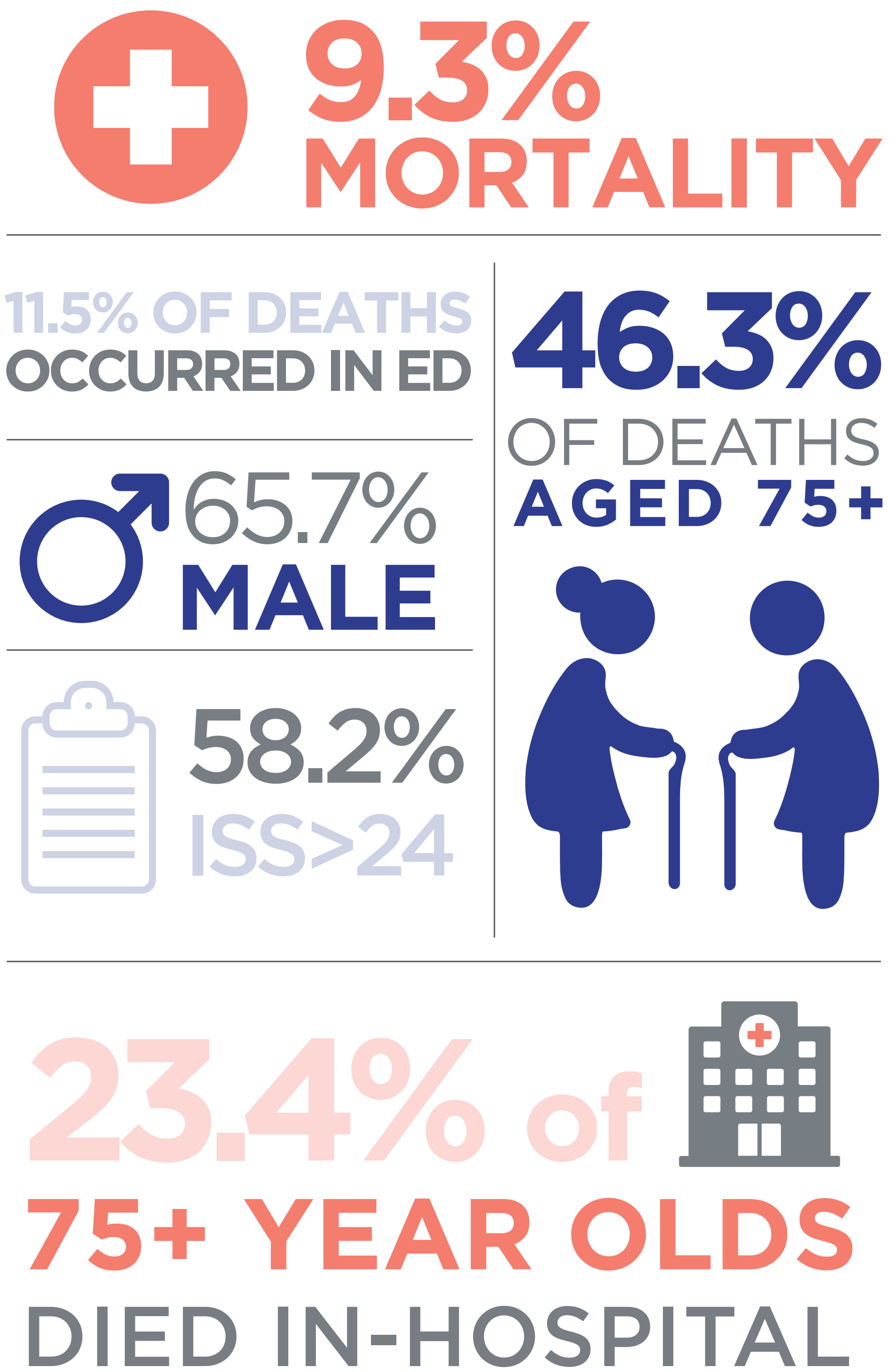
MORTALITY

One thousand and fifty severely injured people died in-hospital with a bi-national mortality rate of 9.3 per cent.

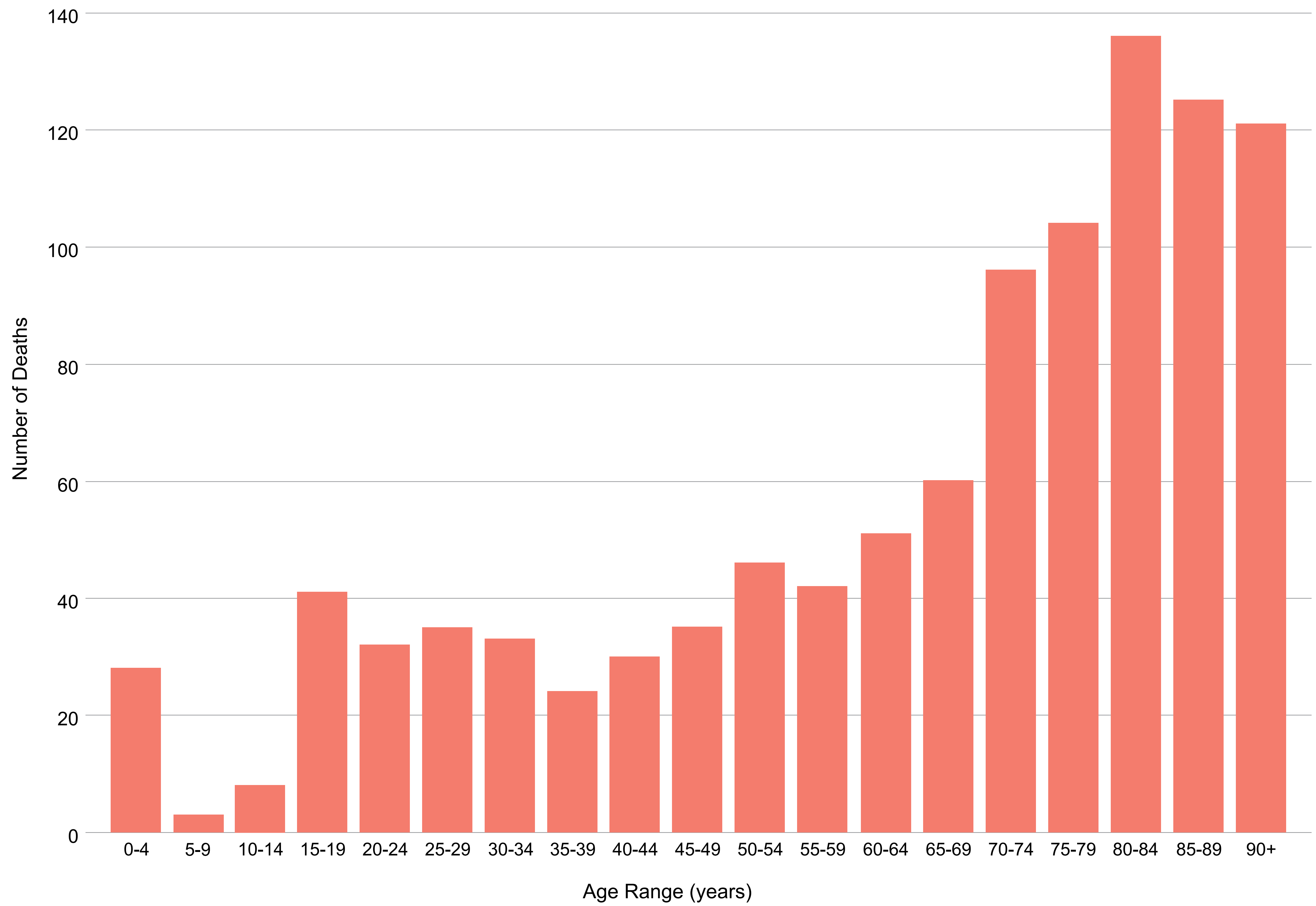
Categorising by age-group identified further mortality trends in the severely injured.

Mortality Over Past Four Years

Year	Severe Injuries (n)	Deaths (n)	Deaths (%)
17/18	9,840	927	9.4
18/19	10,135	1,007	9.1
19/20	10,050	1,053	9.6
20/21	11,254	1,050	9.3



Mortality by Age Range (years)



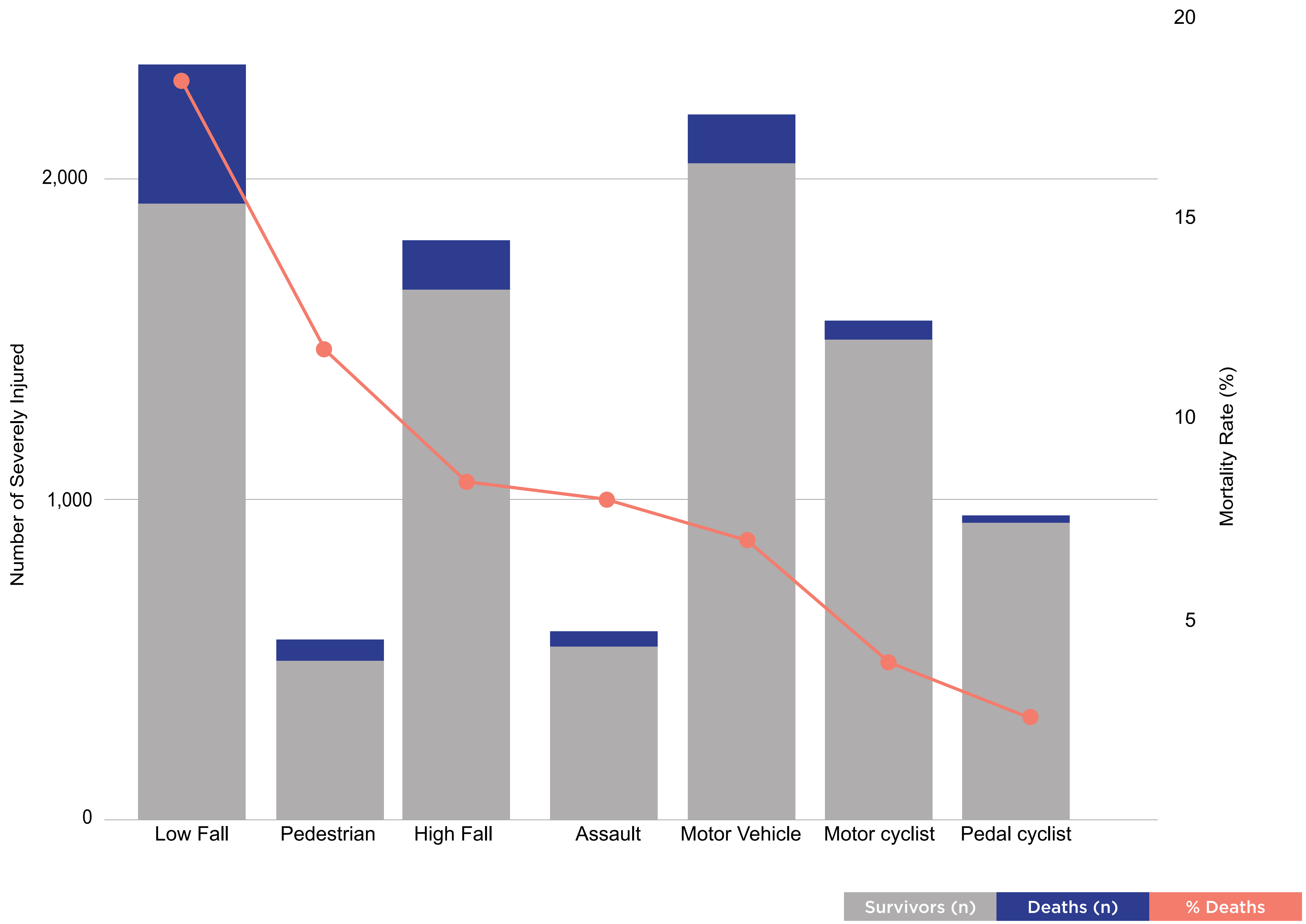
MORTALITY BY MECHANISM OF INJURY

As a proportion of total deaths, low falls accounted for the highest number of deaths (41.3 per cent) and transport-related accounted for 29.6 per cent. The graph below shows the total incidence, including survivors and deaths as well as the proportion of deaths for each injury cause from highest mortality rate to lowest. Low falls had the highest proportion of deaths, 21 per cent, followed by pedestrians with 15 per cent mortality. Pedal cyclist had the lowest mortality rate (3 per cent).

41.3% DEATHS
LOW FALLS

29.6% TRANSPORT
DEATHS RELATED

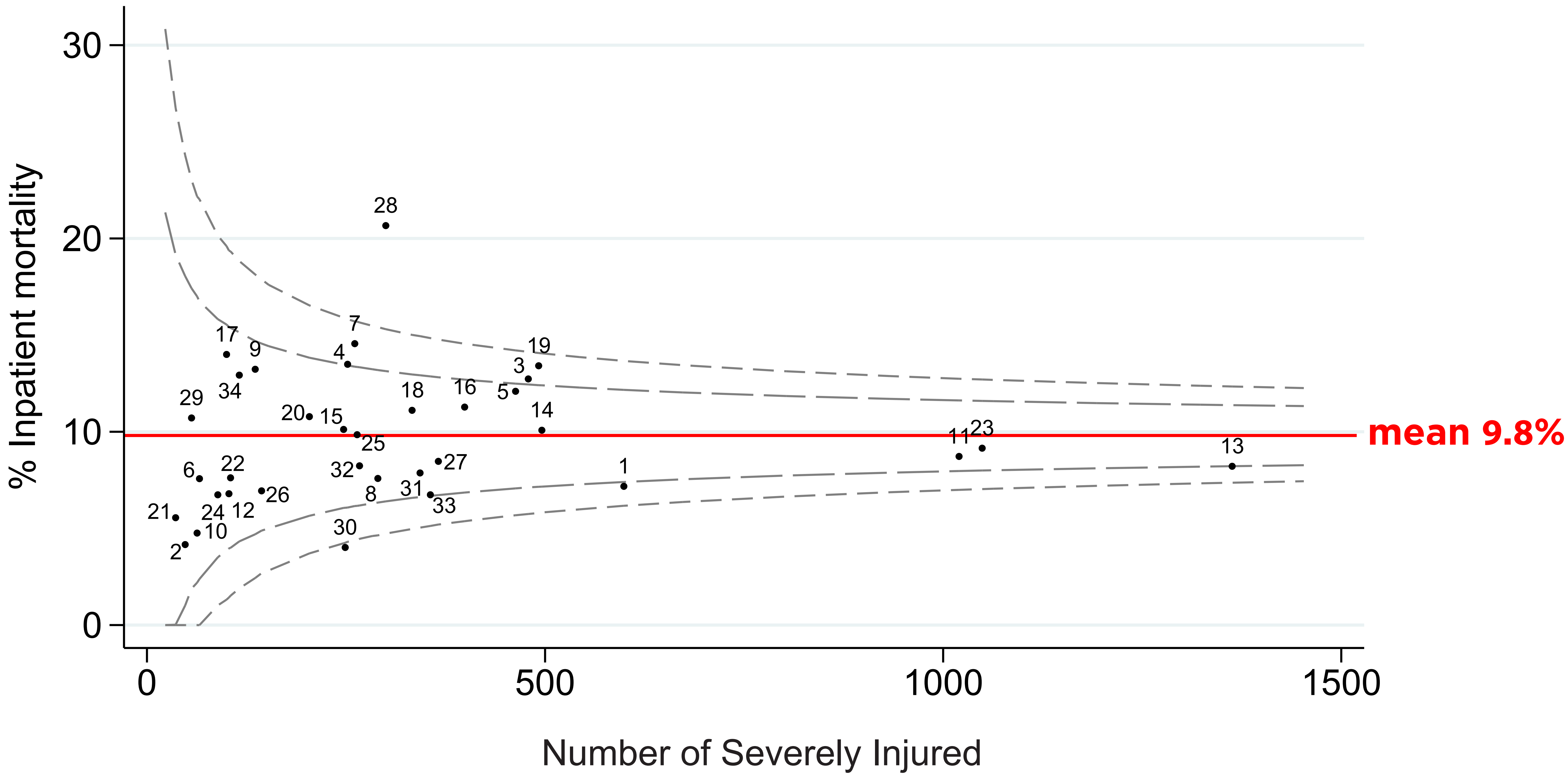
Survivors, Deaths and Mortality Rate by Injury Mechanism



UNADJUSTED MORTALITY BY HOSPITAL (INCLUDING TRANSFERS)

Unadjusted plots do not help explain the variations which occur between hospitals, such as patient proximity to hospital, number of transfers and prior treatment, and severity of injuries. The below plot represents unadjusted mortality by hospital, including all transfers. It allows the reader to identify the total number of severely injured patients admitted for severe injuries. The following pages will exclude transfers to ensure the group being analysed is homogenous. Unadjusted mortality for patients that were transfered to one or more hospitals are represented on page 28, by jurisdiction.

Unadjusted Mortality By Hospital (including transfers)



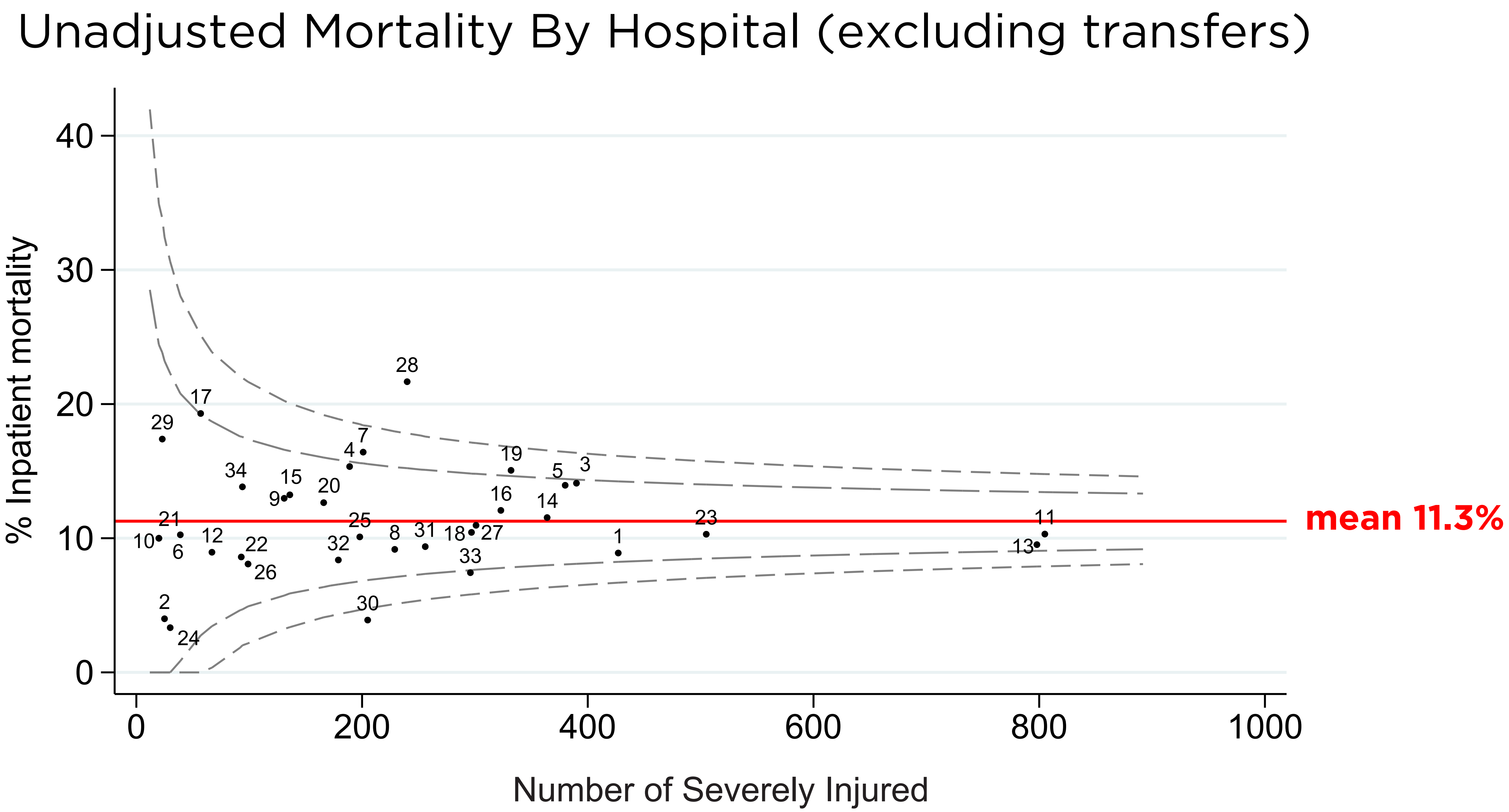
The use of these funnelplots to identify outliers needs to be interpreted with caution due to small numbers

MORTALITY BY HOSPITAL (EXCLUDING TRANSFERS)

Mortality was compared between hospitals, before and after risk adjustment. The following risk factors were included in the model as they were found to be significant predictors: restricted cubic splines for age with 4 knots, cause of injury, arrival Glasgow Coma Scale (GCS) - motor, shock-index grouped in quartiles, highest and second highest AIS scores. The mean mortality was calculated from the binary firth logistic regression model, which accounted for the skewness in the data. No significant differences were noted after risk adjustment. Please refer to Appendix A for detailed data analysis.

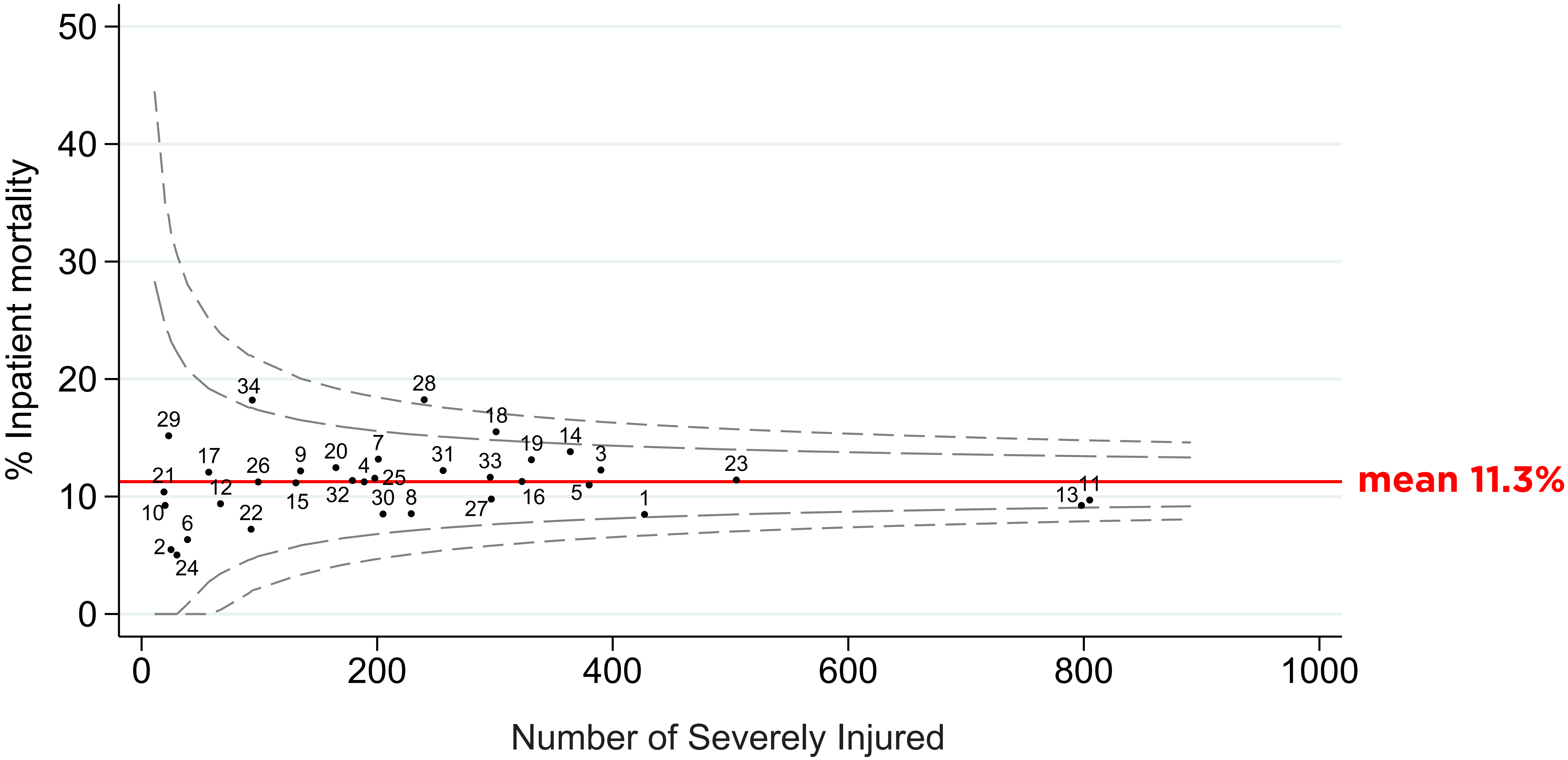
Each numbered dot represents one hospital in the funnel plots below. The funnel plots, where the aim is to identify outliers, show contours which represent two standard deviations (95% control limits) and three standard deviations (99.8% control limits) from the mean. Those outside these lines are considered outliers, with a 5% and 0.2% chance of a false positive respectively.

Total numbers for risk adjustment have been reduced because the transferred group of patients has been excluded. This resulted in a 30% reduction in numbers. A further reduction in numbers was the exclusion of non-blunt cases such as burns and penetrating as they are a heterogenous group (5%).



The use of these funnelplots to identify outliers needs to be interpreted with caution due to small numbers

Risk-adjusted Mortality by Hospital

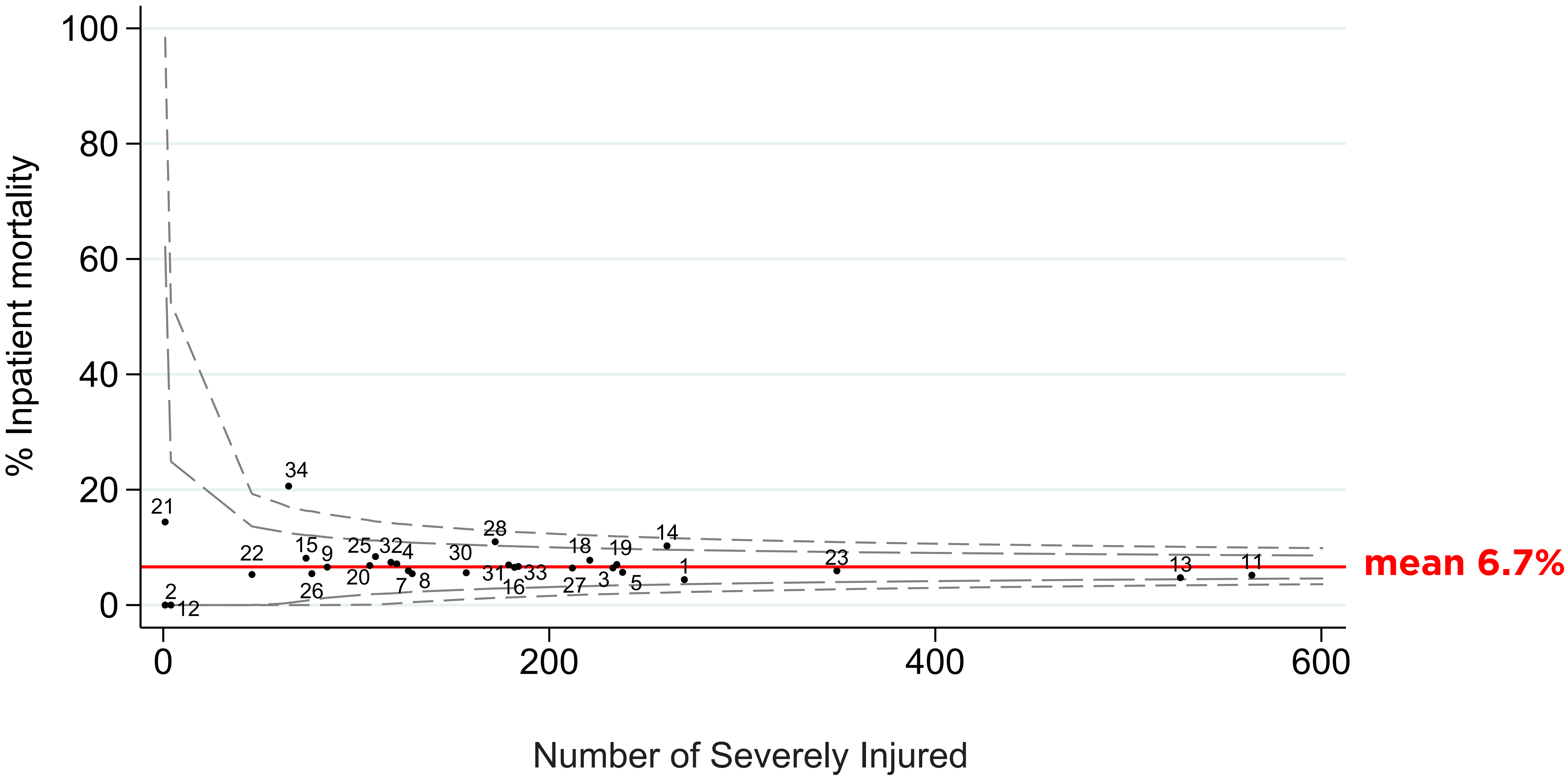


The use of these funnelplots to identify outliers needs to be interpreted with caution due to small numbers

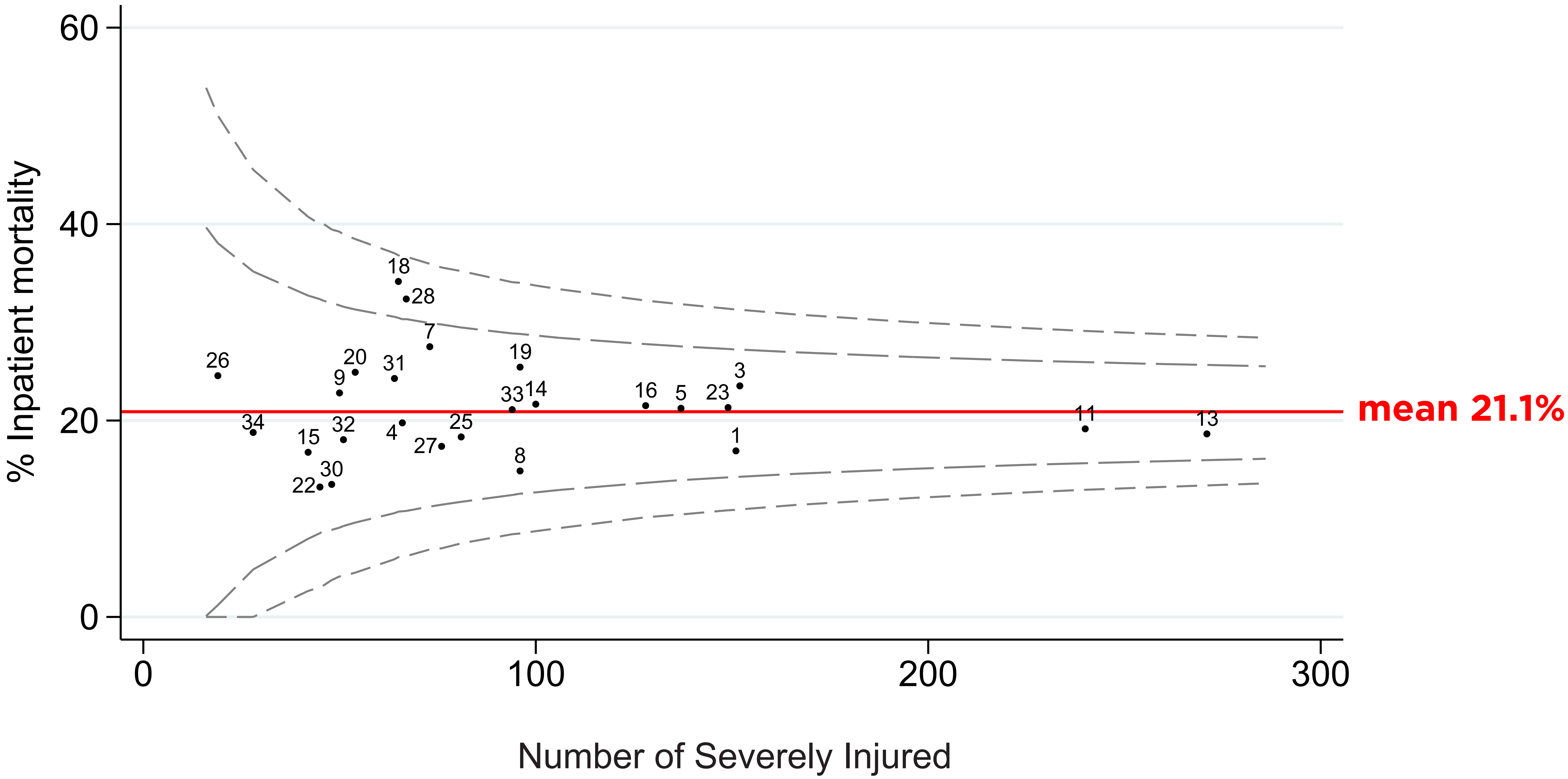
RISK ADJUSTED MORTALITY BY HOSPITAL AND AGE GROUP (EXCLUDING TRANSFERS)

Mortality was compared between hospitals using funnel plots and risk adjusted. Patients were categorised into three age groups: children (aged <16 years), adults (>=16 and <65 years) and older adults (>=65 years). In all three populations there were no significant differences between sites.

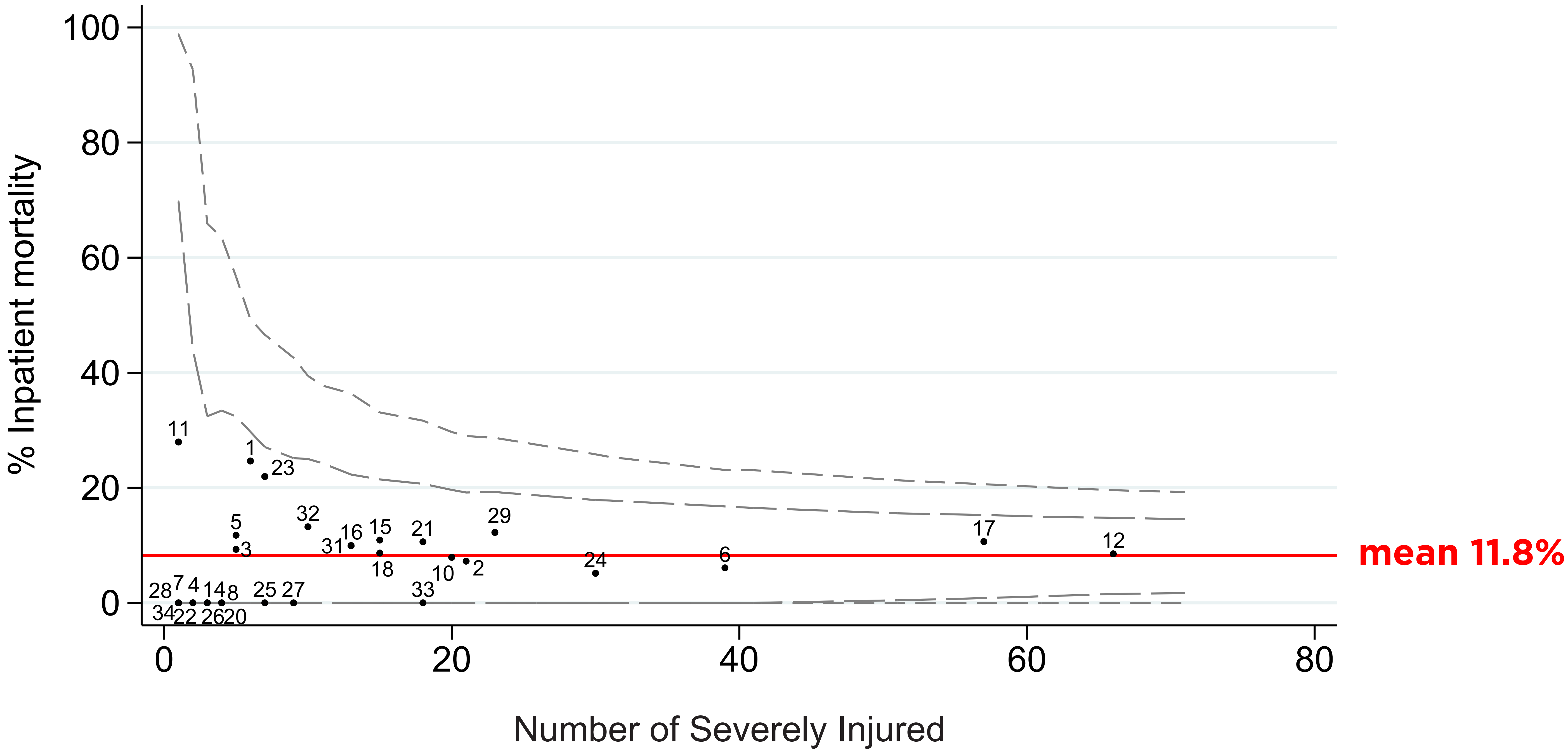
Risk Adjusted Mortality Adults (Aged >=16 and <65 years)



Risk Adjusted Mortality Older Adults (Aged >=65 years)



Risk Adjusted Mortality Paediatrics (Aged <16 years)



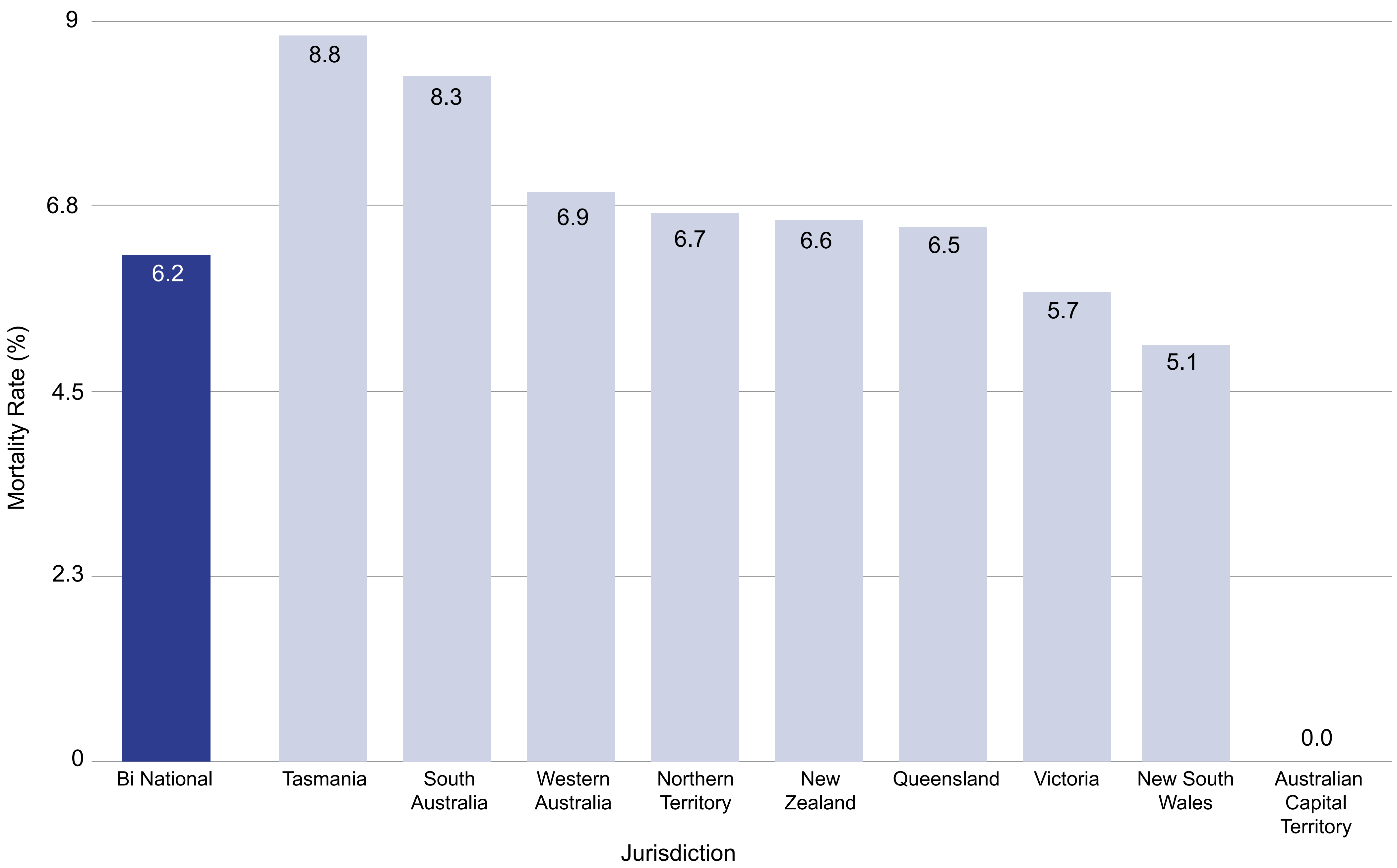
The use of these funnelplots to identify outliers needs to be interpreted with caution due to small numbers

TRANSFER OUTCOMES

Transfers make up 29.3 per cent of all major trauma patients and they are an important group of patients to consider, when assessing trauma outcomes. Approximately 6.2 per cent die even after transfer to a major trauma service which is a decrease from 6.9 per cent in the previous year. Thirty-seven per cent of transferred patients were treated in the ICU. The median LOS was 7.1 (3.8-13.7) days. Unfortunately, this is an extremely heterogenous group which makes interfacility comparison of outcomes difficult. To reliably compare outcomes for this group, we will need to link with geospatial information on location of injury and with identification of prehospital and regional hospital deaths, prior to transfer. The ATR is developing processes to allow for this over coming years.

Mortality rates for patients transferred to one or more hospitals prior to arrival at definitive care is shown in the below graph. The Northern Territory was excluded as their total number of transfers was less than fifty.

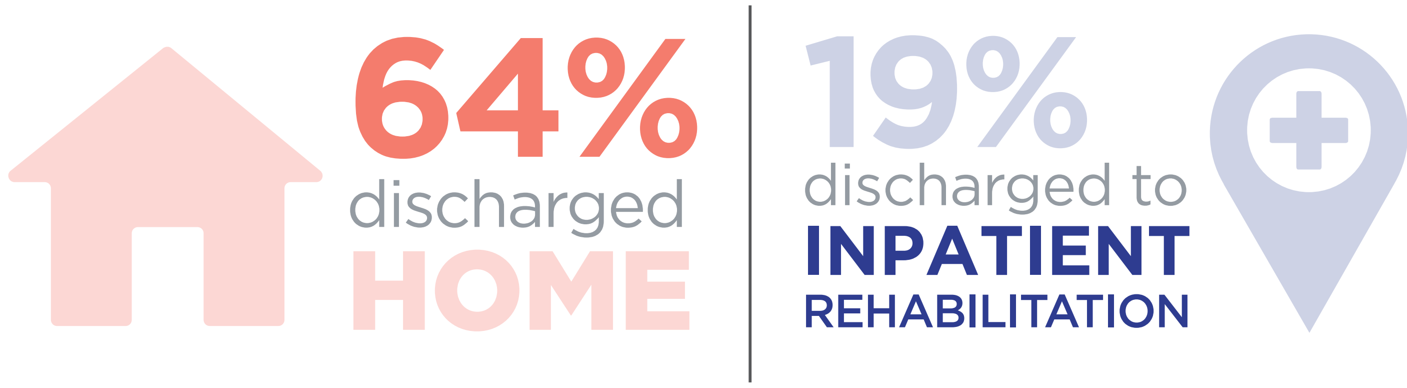
Mortality Rate Of Transferred Patients by Jurisdiction

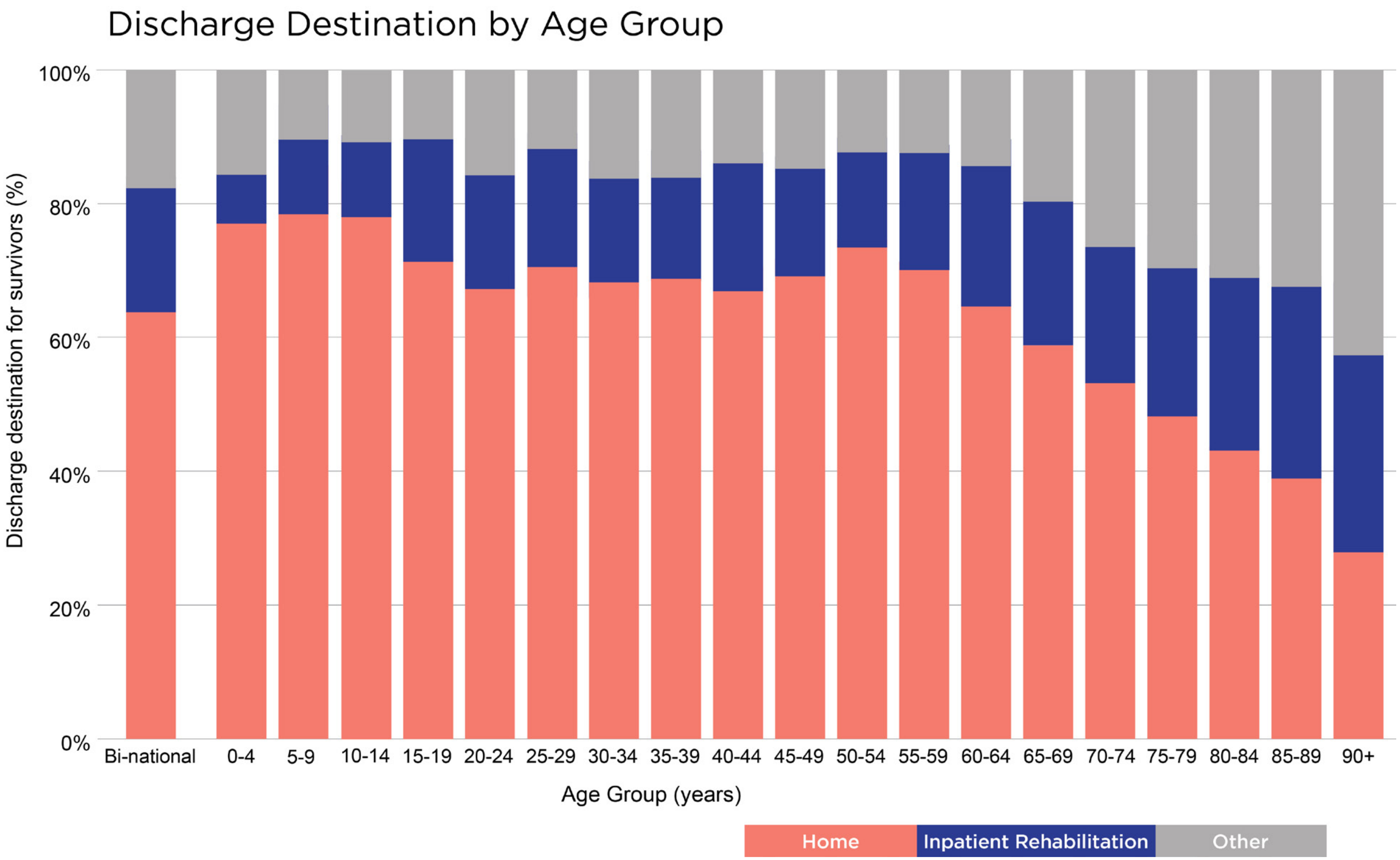


Jurisdiction	Total Transfers (n)	Deaths (n)	Mortality (%)
Tasmania	68	6	8.8
South Australia	216	18	8.3
Western Australia	593	41	6.9
Northern Territory	45	3	6.7
New Zealand	455	30	6.6
Queensland	399	26	6.5
Victoria	823	47	5.7
New South Wales	630	32	5.1
Australian Capital Territory	70	0	0.0
Bi-national	**3299**	**203**	**6.2%**

DISCHARGE DESTINATION

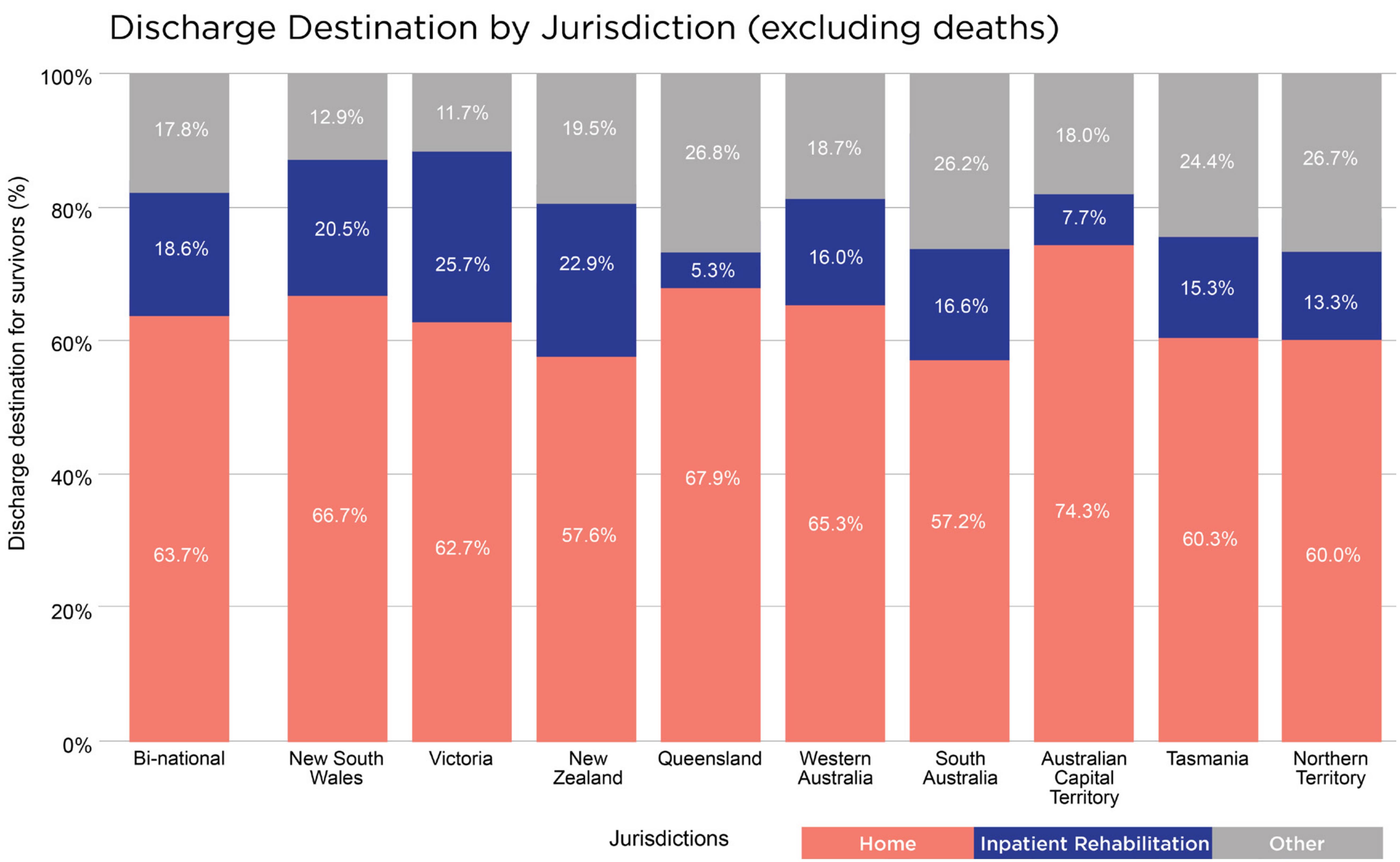
A known discharge destination was collected for 98.4 per cent of patients. For patients discharged alive, the proportion of patients discharged home decreased as injury severity increased and patients discharge to inpatient rehabilitation increased with injury severity. A similar trend occurred with age. As age increased, the likelihood of being discharged home decreased and being discharge to inpatient rehabilitation increased.





DISCHARGE DESTINATION

When looking at discharge destination by jurisdiction, proportions of patients discharged to home and to inpatient rehabilitation vary greatly.



PAEDIATRICS (0-15 YEARS OLD)

More than 65,000 children aged 0-14 were hospitalised following injury in Australia in 2017-18, according to the Australian Institute of Health and Welfare[3]. The Australia New Zealand Trauma Registry collects trauma data on only the most severe injuries - those who are hospitalised with an Injury Severity Score (ISS) greater than 12 or death after injury.

Seven hundred and fifty-nine severely injured children aged zero to 15 years were reported across Australia and New Zealand for the period 1 July 2020 to 30 June 2021, accounting for 6.7% of all severe injuries. This group of children represent the most severely injured trauma survivors in what is the most common cause of death and disability in children and young people.

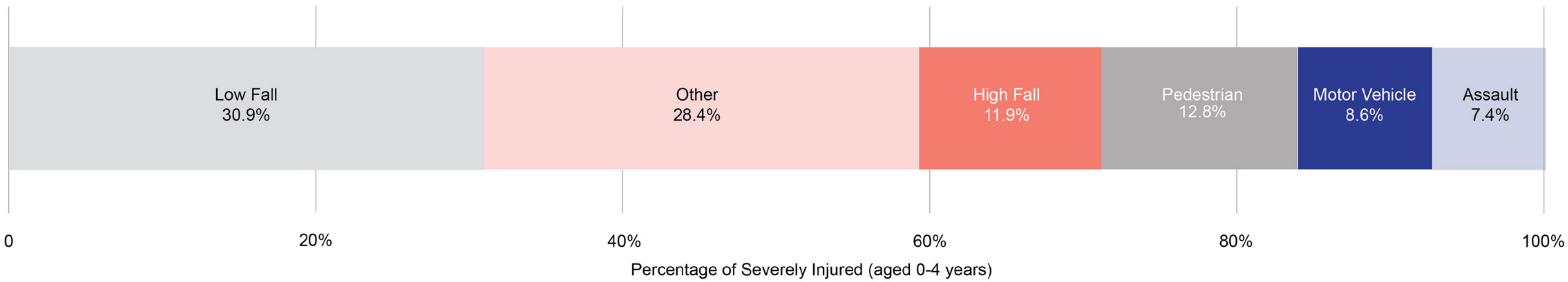
759 SEVERELY INJURED | **5.4%** mortality

68% 0-15 yo deaths were **AGED 0-4**

CHILDREN AGED 0-4 YEARS

Children aged zero to four years accounted for one-third of all paediatric severe injuries (n=245), and two-thirds of all paediatric deaths. The most common known mechanism was low fall (n=75). Sixty-nine children were classified with a mechanism of other or unknown, the second largest group (see graph below). Of these, 36 had an intent of unintentional, 6 maltreatment by parent and 26 had unknown intent. Cases in this age group that have unknown cause or intent are often classified as non-accidental injuries (NAI). Drownings and hangings are not included in this report. Injury severity was greatest in the ISS 16-24 range (n=103) followed by the 25-40 range (n=69).

Mechanism of Injury (aged 0-4 years)



73% occurred in **HOME**

15% occurred on **THE ROAD**

In-hospital mortality accounted for 11.2 per cent (n=28) of the cohort, above the bi-national mortality (9.3 per cent). Of the deaths, 25 per cent died in the emergency department (also well above the bi-national ED mortality of 11.5 per cent). The most common known causes of death were pedestrian (n=8), accidental suffocation/strangulation (n=5), and assault (n=4). Submersion/Drowning is not included in this report. The categories 'other' and 'unknown' are often how non-accidental injuries (NAI) are recorded. 77 per cent of children aged 0-4 years were discharged home and 7.4 per cent to inpatient rehabilitation.

The global Covid-19 pandemic may have affected the number of severe injuries as well the cause and place of injury due to lock-downs that occurred across both Australia and New Zealand in 2020-2021.

PAEDIATRICS (0-15 YEARS OLD)

CHILDREN AGED 5-15 YEARS

Children aged five to 15 years accounted for two-thirds of paediatric severe injuries (n= 514) similar to previous three years. The most common mechanism was transport related (n=322) followed by falls (n=116). Injury severity was greatest in the ISS 16-24 range (n=273, 53%) followed by the 25-40 range (n=115, 22%).

CAUSE OF INJURY

63% TRANSPORT RELATED

23% FALLS related

2% HORSE RELATED

PLACE OF INJURY

40% ROAD

17% HOME

14% sports & ATHLETICS AREA

OUTCOME

2.5% DIED in-hospital

85% deaths TRANSPORT RELATED

OUTCOME

In-hospital mortality accounted for 2.5 per cent (n=13) of the cohort, well below the bi-national mortality (9.3 per cent). This report does not include hangings and drownings. Of those deaths, 15 per cent died in the emergency department. Seventy-eight per cent were discharged home and 12% to inpatient rehabilitation.

The global Covid-19 pandemic may have affected the number of severe injuries as well the cause and place of injury due to lock-downs that occurred across both Australia and New Zealand in 2020-2021.

ELDERLY (AGED 65 YEARS AND ABOVE)

In the 2019-21 financial year 3,492 (31 per cent) of all severely injured were aged 65 years or older. Low falls was the most common cause of injury (46 per cent) with an overall mortality rate of 18 per cent.

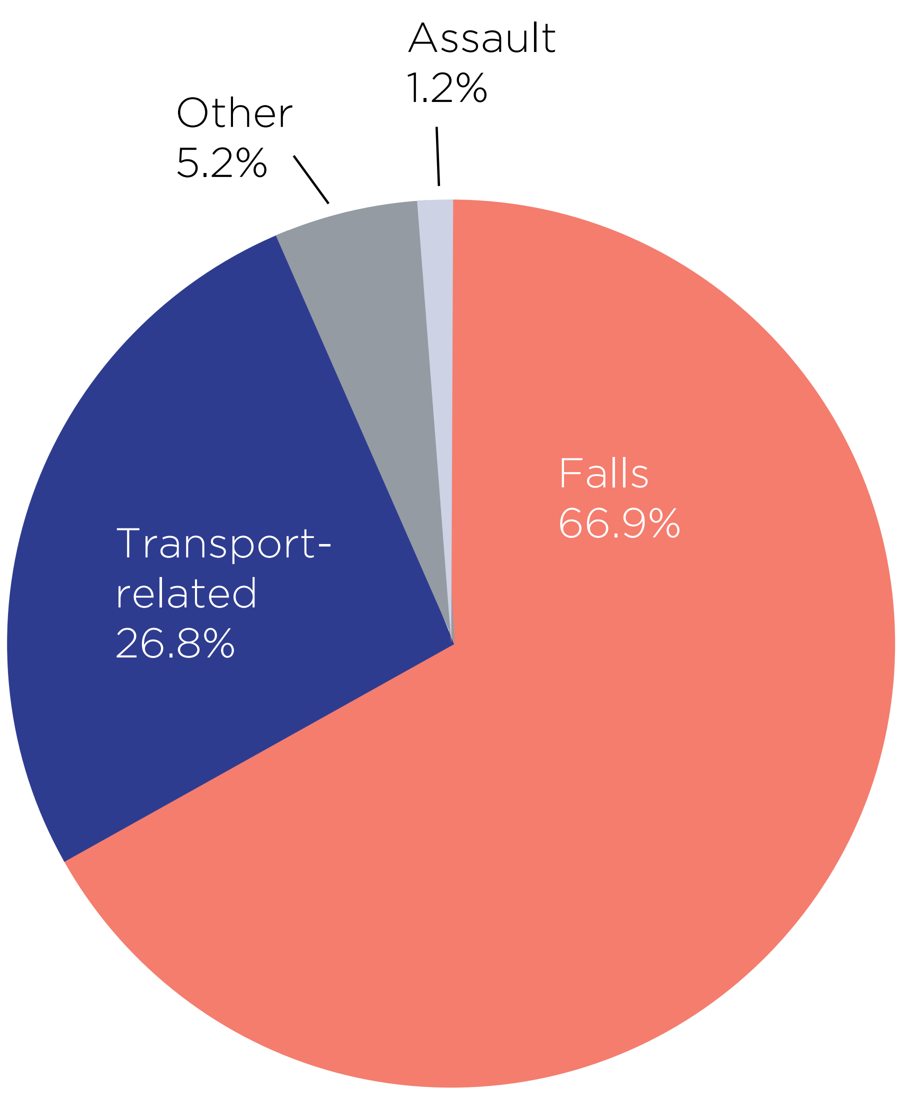
31% of all SEVERE INJURIES **AGED 65+**

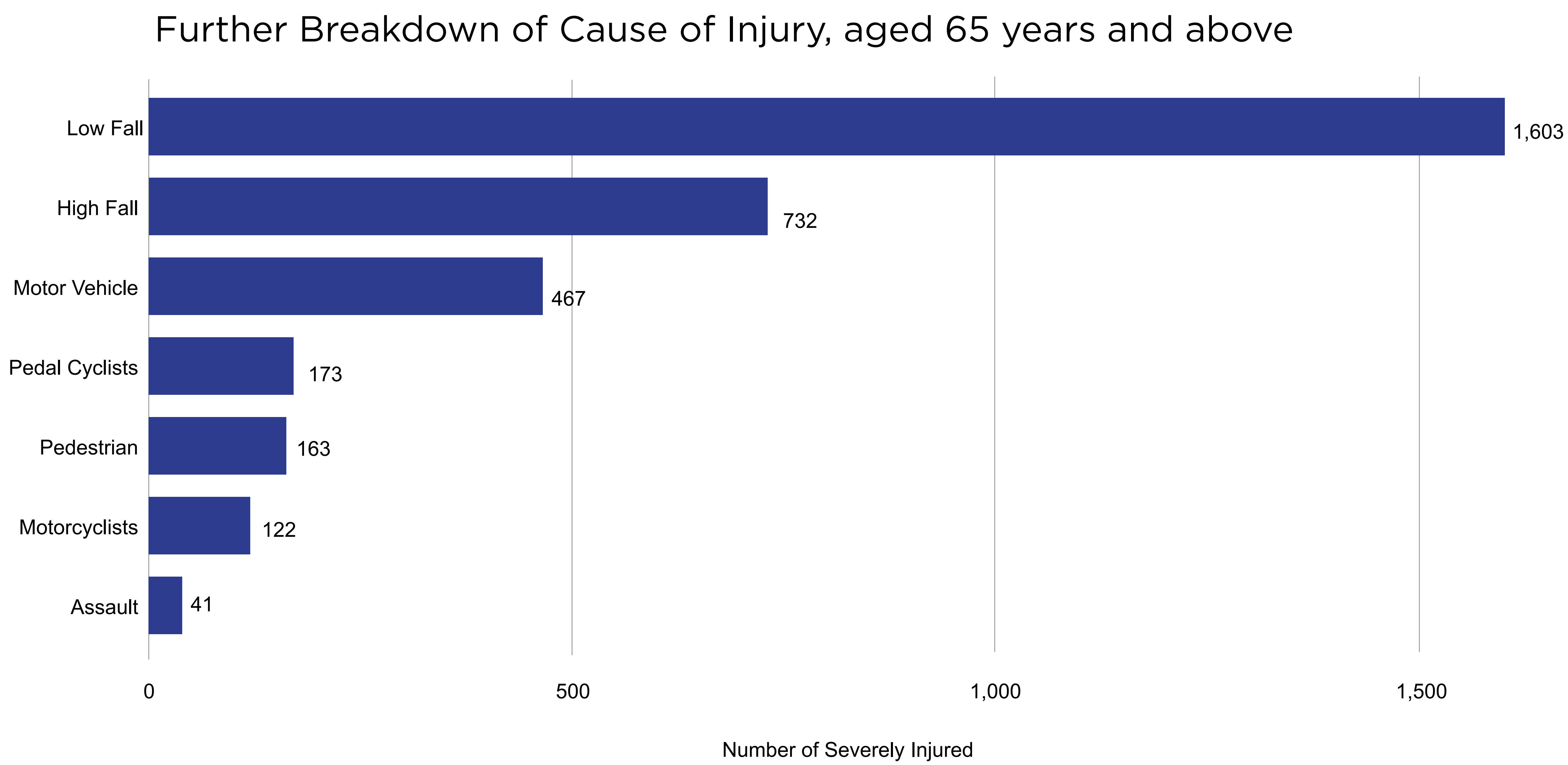
21% INCREASE over 4 years

61% **MALE**

CAUSE OF INJURY

Falls were the most prominent injury cause within this age group, followed by transport-related causes. When falls and transport-related causes were further broken down, low falls were identified as the most common injury cause for this age cohort, 46 per cent (n=1603), compared with the 19.5 per cent low falls rate for all severely injured.





ELDERLY (AGED 65 YEARS AND ABOVE)

PLACE OF INJURY

57.1% home

29.0% streets & highways

71% direct TRANSPORT FROM SCENE TO definitive care

median length of stay **7.8days**

30% admitted to ICU

median ICU length of stay **3.3 DAYS**

in-hospital MORTALITY **18.0%**

LOW FALLS IN-HOSPITAL MORTALITY **24%**

DISCHARGE DESTINATION

48.0% to HOME

23.7% to inpatient rehabilitation

ROYAL AUSTRALASIAN COLLEGE OF SURGEONS (RACS) TRAUMA QUALITY IMPROVEMENT COMMITTEE AND THE ATR

One of the aims of the Royal Australasian College of Surgeons (RACS) Trauma Quality Improvement (TQI) committee has been to support quality improvement for all trauma patients. This year RACS celebrates 26 years of supporting the development of the Australian Trauma Registry (ATR).

By using the ATR data to establish benchmarks, and providing cross-comparison feedback to each trauma centre, processes of care for improvement within the trauma system can be identified.

The RACS TQI committee developed a set of binational process indicators which allows for cross-comparison and benchmarking of key process indicators between sites and jurisdictions. There are eight process indicators, of which the ATR currently collects seven and reports on five. The ATR data working group is in the process of incorporating the remaining indicator into the bi-national data dictionary and is continuing to work with sites to improve data capture and completeness of the existing variables so reporting of all the process indictors is possible.

RACS TQI PROCESS INDICATORS

INDICATORS	1	2	3	4	5	6	7	8
INDICATOR NAME	Mortality	Pre-hospital transport times	Discharge Destination	Time to CT scan if GCS < 13	Trauma team activation for patients with ISS > 12	Blood alcohol collection in patients with ISS > 12.	Time in first facility, if transferred.	Time in the Emergency Department.
DEFINITION	The rate of in-hospital deaths that occur, either in the Emergency Department or after inpatient admission, in patients admitted following injury.	The mean and/or median times that elapse between the time of injury and the episodes of care that occur prior to arrival at the 1st receiving hospital.	The rate at which patients are discharged to the various destinations other than death, at the conclusion of their hospital admission	The mean and/or median time that elapses between arrival at the reporting hospital and the first head CT performed at that same hospital.	The per centage of patients with major injuries, defined as an ISS > 12, who had a trauma team activated at the time of presentation to the Emergency Department.	The per centage of patients with major injuries, defined as an ISS > 12, who had a blood alcohol level collected and documented within 6 hours of first hospital admission.	The mean and/or median length of time that is spent in the first facility, prior to the transfer to definitive care.	The mean and/or median length of time that is spent in the Emergency Department, prior to discharge to the ward, or other disposition from the ED that is not death.
RATIONALE	To understand the burden of death from injury in patients that are alive on presentation to hospital.	To understand the timeliness of prehospital encounters.	To quantify the varying outcomes of in hospital admissions, with a view to determining resource allocation.	To measure the timeliness of CT investigation of a patient with a suspected brain injury.	To determine the accuracy of trauma team activation.	To measure the recognition of major injury by compliance with blood alcohol collection practice.	To measure the timeliness of transfer to definitive care and evaluate compliance with transfer protocols.	To measure the timeliness and efficiency of the care delivered in the Emergency Department.

APPENDIX A - ATR METHODOLOGY

Governance

The National Trauma Research Institute (NTRI), founded in 2003, is a collaboration between Alfred Health, Monash University and Gold Coast University Hospital and Health Service. The NTRI collaborates with organisations nationally and internationally to integrate Research, Education, Medical Technologies and Trauma Systems Development to improve clinical care and outcomes.

In 2012, the NTRI established the Australian Trauma Quality Improvement Program (AusTQIP) including the Australian Trauma Registry (ATR) bringing together Australia's 26 designated trauma centres to form a collaboration to provide important data on the most severely injured. In 2018, New Zealand joined the collaboration, introducing a further seven designated trauma centres to the registry. In 2022, we welcome Lyell McEwin in SA to the collaboration, bringing the total number of sites to 35.

AusTQIP was formed with an overarching Steering Committee comprised of representation from all jurisdictions, and other participating stakeholders (Appendix B). Reporting to the Steering Committee is the AusTQIP Management Committee (Appendix B).

The ATR is supported by the Department of Infrastructure, Regional Development and Cities (DIRDC) and the Department of Health (DOH), who have provided further funding for the period 1 July 2019 to 30 June 2022. The ATR is also supported by the New Zealand National Trauma Network and the NTRI, as well as by the large group of contributing sites.

Minimum Dataset

ATR data is defined by the Bi-National Trauma Minimum Dataset (BNTMDS). Data elements from existing hospital and state-based registries were mapped to the dataset according to standard definitions. If data elements were not already collected by existing data sources, they were not otherwise obtained by the ATR. The current version of the minimum dataset (Version 2.0) can be downloaded from the ATR website (www.atr.org.au).

Inclusion/ Exclusion Criteria

The ATR collects data on severely injured patients presenting to one of 35 major trauma centres across Australia and New Zealand.

Inclusion Criteria

Patients admitted to these centres who subsequently die after injury, or who sustain major trauma (defined as an Injury Severity Score greater than 12)[5] are included in ATR data.

Exclusion Criteria

Patients with delayed admissions greater than seven days after injury, poisoning or drug ingestion that do not cause injury, foreign bodies that do not cause injury, injuries secondary to medical procedures, isolated neck of femur fracture, pathology directly resulting in isolated injury, elderly patients who die with superficial injury only (contusions, abrasions, or lacerations) and/or have co-existing disease that precipitates injury or is precipitant to death (e.g. stroke, renal failure, heart failure, malignancy , advanced frailty by Rockwood), drowning, hanging.

Data Definitions

Emergency Department length of stay (ED LOS) is calculated by the ATR based on the date and time of arrival at the definitive care hospital to the emergency department discharge date and time. ED LOS is presented as hours.

Intensive Care Unit length of stay (ICU LOS) is based on values provided by the designated trauma centres or as reported by the state-based trauma registries. ICU LOS is presented as days.

Hospital length of stay (LOS) is from date and time of arrival at definitive care hospital to the date and time of discharge from definitive care hospital as reported. Hospital LOS is based on values provided by the designated trauma centres or as reported by the state-based registries. Hospital length of stay is presented as days.

External cause of injury International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification[6] (ICD-10-AM) codes were used to define causes/mechanisms of injury, injury type and injury intent. Causes of injury were based on the Center for Disease Control's External Cause of Injury and Mortality Matrix (www.cdc.gov/nchs/data/ice/icd10_transcode.pdf).

Type of injury was based on ICD-10-AM codes as previously reported[7]. Codes were mapped to injury types in the BNTMDS.

Data Analysis

Risk adjusted outcomes are provided in this report. The primary outcomes were inpatient mortality and length of stay (LOS). For both outcomes, funnel plots were created as a visual representation of how individual sites fare compared to their peers and the overall average; it also identifies those who are performing better or worse than the average. The funnel plot contours represent two standard deviations (95% control limits) and three standard deviations (99.8% control limits) from the mean, those above and below these lines are considered outliers, with a 5% and 0.2% chance of a false positive respectively. Both crude and risk-adjusted funnel plots were calculated. For inpatient mortality, the binary firth logistic regression model was used and the robust linear regression model for LOS, due to right skewness in the data. Only survivors were included in the LOS analysis. The following risk factors were included in the model as they were found to be significant predictors: restricted cubic splines for age with 4 knots, cause of injury, arrival Glasgow Coma Scale (GCS) - motor, shock-index grouped in quartiles, highest and second highest AIS scores. We ran separate analysis for paediatric (age <16 years), adult (15<age<65) and older adults (age>64). Data analysis was performed in Stata V16.0 (Stata Corp, College Station, Tx, USA) and level of significance set at 5%. The relationship between age and mortality among trauma patients is non-linear. There are several options to dealing with non-linearity, including categorising based on arbitrary cut-offs, including a quadratic term or including cubic splines. In a recent publication, we compared the various methods and found that cubic splines to be the most appropriate. The model assumes that the relationship is polynomial between the knots, locations set by the model at 18, 52 and 82 years. Although the splines are not easily interpretable, note that this is used in the context of benchmarking and not patient risk-stratification, which would probably require a different approach.

Data Confidentiality

In 2016, Monash University, Department of Epidemiology and Preventive Medicine, became the custodian of the ATR data and responsible for all reporting.

Patient level data is not reported, only hospital and jurisdictional aggregate data is provided in this report.

Data Quality

Data submitted to the ATR underwent various validity checks such as date and time formats and chronology, and correct classification as per the ICD-10-AM and Abbreviated Injury Scale 2005 (Updated 2008)[8] (AIS) codes prior to data processing. If data did not pass these validations, an error file was generated and a notification sent to sites submitting the data to address and correct the error, if possible.

Data contribution varies between hospitals as not all hospitals have all the BNTMDS data points available. However this continues to improve, along with data completeness as the hospitals update data systems and improved data quality processes are put in place.

Severity of Injury

Injury Severity Score (ISS) is an internationally-standardised approach to describing the overall severity of injury for each patient. The calculated value enables comparison between cohorts of injured patients, and can be used for inclusion into trauma registries. The higher the number the more severe the injury, ranging from one to 75.

Trauma patients are allocated an ISS after injury in order to determine their status as 'major trauma'. For this report major trauma is defined as an ISS > 12, which is derived from the Abbreviated Injury Scale (AIS) 2008. ISS is useful for predicting hospital length of stay, and associated morbidity and mortality.

APPENDIX B - GOVERNANCE COMMITTEES

AUSTQIP STEERING COMMITTEE MEMBERSHIP

Member	Committee Role
Professor Ian Civil	NZ National Trauma Network - Clinical Director
Ms Siobhan Isles	NZ National Trauma Network - Programme Director
Professor Kate Curtis	Co-chair/University representative
Professor Mark Fitzgerald	Co-chair/Alfred Health/NTRI representative
Professor Peter Cameron	University representative
Dr Don Campbell	Queensland representative
Associate Professor Grant Christey	RACS TQI Representative
Mr Chris Clarke	South Australia representative
Dr John Crozier	Royal Australasian College of Surgeons (RACS) representative
Associate Professor Michael Dinh	New South Wales representative
Associate Professor Daniel Ellis	Treasurer/South Australian Representative
Dr Yen Kim	AusTQIP Manager
Associate Professor Anthony Joseph	Australasian Trauma Society representative
Ms Bronte Martin	National Critical Care & Trauma Response Centre (NCCTRC) Executive Sponsor
Associate Professor Joseph Mathew	Australasian College of Emergency Medicine representative
Ms Kathleen McDermott	Northern Territory representative
Ms Emily McKie	Manager, Australia New Zealand Trauma Registry
Dr Rebekah Ogilvie	Australian Capital Territory representative
Dr Sudhakar Rao	Western Australia representative
Professor Michael Reade	Australian Defence Force representative
Mr Nick Rushworth	Consumer representative
Dr Adam Mahoney	Tasmania representative
Associate Professor Warwick Teague	Paediatric Specialist/ Victorian representative

Proxies, Adjuncts and Observers	
Ms Maxine Burrell	Western Australian representative
Mr Huat Lim	NCCTRC / Northern Territory

ATR BOARD COMMITTEE MEMBERSHIP

Member	Committee Role
Professor Kate Curtis	Co-chair
Professor Mark Fitzgerald	Co-chair
Professor Peter Cameron	Data Host/Management Representative
Ms Emily McKie	Australia New Zealand Trauma Registry Manager
Professor Ian Civil	NZ Clinical Director, National Trauma Network
Ms Siobhan Isles	NZ National Programme Director, National Trauma Network
Dr Don Campbell	AusTQIP Steering Committee representative
Associate Professor Dan Ellis	Treasurer, AusTQIP Steering Committee representative
Dr Yen Kim	AusTQIP Manager
Associate Professor Grant Christey	AusTQIP Steering Committee representative, RACS representative
Ms Jane Ford	

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John Hunter Children's Hospital
John Hunter Hospital
Liverpool Hospital
Royal North Shore Hospital
Royal Prince Alfred Hospital
St George Hospital
St Vincent's Hospital
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Westmead Hospital

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Royal Children's Hospital

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This report has been prepared by
Ms Emily McKie, Manager, ATR.

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IMAGE SOURCES

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