AUSTRALIAN TRAUMA
QUALITY IMPROVEMENT PROGRAM

AUSTRALIAN TRAUMA REGISTRY

CONSOLIDATED REPORT

1/1/2013 – 30/6/2015

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FOREWORD

The Australian Quality Improvement Program, including the Australian Trauma Registry (AusTQIP-ATR) Steering Committee is pleased to release this consolidated report from the Registry that provides the basis for understanding the burden and patterns of serious injury in Australia. The collaborating Trauma Centres and sites, the National Trauma Research Institute (NTRI) and Monash University have worked jointly to update data systems to continue the Australian Quality Improvement Program. The efforts of the Australasian Trauma Society, the Royal Australasian College of Surgeons and all involved have ensured that data continues to be available for improving the care of injured people.

In November 2016, the Australian Commission on Safety and Quality in Health Care (ACSQHC) released a report that prioritised clinical domains for development of national clinical quality registries. Trauma was listed as number two, acknowledging the high burden of disease and the consequences of suboptimal care. Prime Minister Malcolm Turnbull and the Federal Government recognised this priority, providing funding to enable the Registry to develop data of increasing detail and value. This welcome initiative is supported by the Department of Infrastructure and Regional Development and the Department of Health.

The AusTQIP-ATR program aims to include all major trauma cases in Australia. As the program grows sites that are not Level 1 Trauma Centres will be encouraged to contribute data and join the Collaboration Agreement. This, along with data sharing and linkages to other agencies, will increase the knowledge of the population incidence and quality of trauma care in Australia. Furthermore, the planned inclusion of New Zealand Major Trauma Registry data will enable a bi-national understanding of the strengths and weaknesses of Australasian trauma systems.

The ongoing operation of the AusTQIP-ATR program is central to injury prevention initiatives and clinical innovations which will improve the outcome of trauma victims. We welcome insights gained from the data to form a base for this broad, collaborative, national effort.

Professor Mark Fitzgerald

Professor Kate Curtis

EXECUTIVE SUMMARY

This report is the second produced by the Australian Trauma Registry (ATR), and the first for the Australian Trauma Quality Improvement Program (AusTQIP) since 2014. Data had previously been collected from the 27 collaborating sites around Australia from the 1st January 2010 to the 31st December 2012. Data collection resumed in June 2016 of retrospective data dated from 1st January 2013 to continue chronologically from where the previous data collection had ceased. The decision was made to move from reporting in calendar years, to reporting in financial years. Therefore this reporting period is for two and a half years, to bring the final six monthly increment into line with the end of the 2014/2015 financial year.

The original collaborating sites have continued to contribute to the ATR, except for two sites that merged during the reporting period and are reporting as one site, bringing the total number of sites down from 27 to 26. Two sites have been unable to submit any data during the reporting period, and a further two sites were unable to contribute until the last financial year. Notes and caveats have been made to this effect where they have impacted on the reported measures.

The findings in this report concur with current literature, particularly the Victorian State Trauma Registry (VSTR) 2014 – 2015 report and the New Zealand Major Trauma Registry Annual Report (NZ-MTR) 2015 – 2016, which have been referenced where appropriate.

The number of cases submitted to the ATR for the reporting period is 18,268 for this 30 month period. It is not possible to compare fully with the aggregate numbers in the inaugural report. However the raw data indicates that numbers have increased, despite known gaps in completeness in both reports. This suggests that collection and/or submission practices have improved and this is encouraging for ongoing data collection.

Males are overrepresented and comprise 70% of major trauma cases. This is a well-documented finding and supported by other literature. Also, as reported elsewhere, the incidence of major trauma in the 75+ year old age group is rising. The overwhelming type of injury in Australia is blunt, with 44% being road trauma (38% 'on road' and 6% 'off road'). Second to road trauma are falls, with most falls occurring in the home and then residential institutions correlating with the rise in the incidence of falls in the elderly.

Approximately one third of patients are transferred from at least one other facility prior to being admitted to definitive care, with the majority being transported from the scene of injury by road ambulance. Head injuries, with or without other injuries, comprise over 44% of all injuries. The second largest group are people with multiple body systems injuries, including burns but excluding head injury.

This ATR report excludes benchmarking at this time. It does, however, measure some key process indicators. The first of these is mortality, comprising 11.14% of major trauma cases. This compares with 12% reported by the VSTR and 9% reported by the NZ-MTR. Females have a higher mortality rate than males - 13.88% compared to 10.07%. Mortality incidence peaks at one to two days post hospital admission, suggesting that the first 24 to 48 hours are critical to survival.

Most patients spend less than eight hours in the Emergency Department, and can expect to have a length of stay of less than 3 weeks. The final disposition for the majority of patients is 'discharge to home', with a further 21.85% proceeding to rehabilitation at the conclusion of their acute episode of care. Forty-three percent (%) of patients are admitted to the Intensive Care Unit (ICU) and of those, 32.64% will stay in ICU for more than a week.

This report provides the basis for understanding the burden and patterns of injury in Australia. Future reports will provide more sophisticated information including geospatial mapping and benchmarking to further identify trends that will improve clinical care and knowledge.

ABOUT THIS REPORT

The Australian Trauma Registry is a crucial part of the system of care for severely injured patients. It will enable clinicians, administrators, injury prevention experts and policy makers to improve trauma care through better targeting of injury prevention, monitoring and improving clinical care to improve rehabilitation and re-integration back into the community.

Establishing the ATR has been a long and careful process. This report demonstrates high quality, credible analyses of major trauma across Australia.

The inaugural ATR report was released in 2014, reporting on data from the 1ST January 2010 to the 31st December 2012. Twenty-five of the 27 collaborating sites were able to contribute data for that reporting period, with the aggregate numbers presented in calendar years. A decision was made by the AusTQIP Steering Committee that future reporting would be made in financial years, to reflect hospital funding cycles. This reporting period will therefore include the extra six months increment completing the move from calendar years to financial years.

The report is predicated on the date of injury, which is in line with the inaugural report and accepted practice in other trauma registries. Some contributing sites extract and submit their data based on the date of admission, which may be several days after the date of injury for a small number of cases. It is expected that over time, this will be remediated across all sites.

Data has been collected from 1st January 2013 onwards to continue from where the previous data collection ceased. Not all sites have been able to contribute data for the entire two and a half year reporting period. Because of this - and the variety of systems utilised by the state and trauma registries that contribute to the ATR - the data is of varying quality. There are caveats to this effect in the Methodology section and in the comments relevant to each measure.

The AusTQIP-ATR Steering group convened a Reporting and Publication meeting on the 28th March 2017 that invited stakeholders from all collaborating sites to determine their expectations and suggestions for future reporting and publications. The development of process indicators is a primary concern for the trauma community and was a subject of detailed discussion at the meeting. The main outcome was that this report would not attempt to report site specific Key Performance Indicators. The site representatives at the meeting determined that the data in the Registry was not yet robust enough to support accurate indicators of this type (Appendix A).

The AusTQIP-ATR Steering group acknowledges the considerable body of work done by the AusTQIP program in 2011, with two discussion forums being held at The Royal Australasian College of Surgeons (RACS) that year. The workshops resulted in a submission to the Australian Commission for Safety and Quality in Health Care in February 2012 (Appendices B and C). The Steering group also acknowledges the work currently being done by the RACS Trauma Committee on process indicators and is looking forward to reporting on those more comprehensively.

CONTRIBUTING SITES

The following table shows all the sites that are either signatories to the Collaboration Agreement, have contributed data to the Registry, intend to contribute data to the Registry or a combination of all three.

Table 1: Sites contributing to the ATR.

Site	State	State submitting body	Comments
Canberra Hospital	Australian Capital Territory	N/A	Original collaborator
John Hunter Hospital	New South Wales	NSW Institute of Trauma and Injury Management	Original collaborator
John Hunter Children's Hospital	New South Wales	NSW Institute of Trauma and Injury Management	Original collaborator
Liverpool Hospital	New South Wales	NSW Institute of Trauma and Injury Management	Original collaborator
Royal North Shore Hospital	New South Wales	NSW Institute of Trauma and Injury Management	Original collaborator
Royal Prince Alfred Hospital	New South Wales	NSW Institute of Trauma and Injury Management	Original collaborator
St George Hospital	New South Wales	NSW Institute of Trauma and Injury Management	Original collaborator
St Vincent's Hospital	New South Wales	N/A	Original collaborator
Sydney Children's Hospital	New South Wales	NSW Institute of Trauma and Injury Management	Original collaborator
The Children's Hospital at Westmead	New South Wales	NSW Institute of Trauma and Injury Management	Original collaborator
Westmead Hospital	New South Wales	NSW Institute of Trauma and Injury Management	Original collaborator
National Critical Care and Trauma Response Centre Royal Darwin Hospital	Northern Territory	N/A	Original collaborator
Gold Coast University Hospital	Queensland	N/A	Original collaborator
Sunshine Coast Hospital	Queensland	N/A	New contributor to the Registry.
Royal Children's Hospital - Brisbane	Queensland	N/A	Original collaborators that merged during the reporting period. Now submitting as one site.
Mater Children's Hospital	Queensland	N/A	
Lady Cilento Children's Hospital	Queensland	N/A	Merged as above.
Princess Alexandra Hospital	Queensland	N/A	Original collaborator
Royal Brisbane and Women's Hospital	Queensland	N/A	Original collaborator
Townsville Hospital	Queensland	N/A	Original collaborator

Flinders Medical Centre	South Australia	SA Department of Health	Original collaborator
Royal Adelaide Hospital	South Australia	SA Department of Health	Original collaborator
Women's and Children's Hospital	South Australia	SA Department of Health	Original collaborator
Royal Hobart Hospital	Tasmania	N/A	Original collaborator that will submit in the future via the newly established Tasmanian State Trauma Registry
Royal Children's Hospital – Melbourne	Victoria	Victorian State Trauma Registry	Original collaborator
Royal Melbourne Hospital	Victoria	Victorian State Trauma Registry	Original collaborator
Alfred Health	Victoria	Victorian State Trauma Registry	Original collaborator
Princess Margaret Hospital for Children	Western Australia	WA State Trauma Registry	Original collaborator. Now submitting as Perth Children's Hospital
Royal Perth Hospital	Western Australia	WA State Trauma Registry	Original collaborator

ATR GOVERNANCE

The original AusTQIP - ATR program structure and committee membership is shown as an appendix of the inaugural report. The resumption of the program in January 2016 required a review of the governance structure, committee membership and terms of reference. This was achieved in early 2016. Both committees have continued to meet regularly. The revised governance structure and Committee memberships can be seen at Appendix D.

ATR FUNDING

The ATR resumed its activity in January 2016 with a $50,000 interim grant from The Alfred Foundation. Prime Minister Malcolm Turnbull announced Federal Government funding of $450,000 for three years in December 2016. This joint Bureau of Infrastructure, Transport and Regional Economics (BITRE) and Department of Health (DoH) funding will provide the ATR with the opportunity to consolidate its operations, to assist the injury reduction vision of the Federal Government and also that of the World Health Organisation's Decade of Action for Road Safety 2011 – 2020.

ATR ACHIEVEMENTS

The inaugural ATR report in 2014 included a timeline of the AusTQIP program's achievements since its commencement in 2010. The program went into recess after the release of the inaugural report, and resumed in January 2016. During the resumption phase, updated processes and protocols were put in place, and a purpose-built database moved into production mode. Data collection recommenced in June 2016.

A revised version of the data dictionary, the Bi-National Trauma Minimum Dataset (BNTMDS) Data Dictionary Version 1.50, has been released. The sites have been instructed to refer to this version for extraction and submission of their 16/17 financial year data onwards.

A Completeness Report that has informed the level of collection and capture of each field was released in November 2016.

METHODOLOGY

The ATR has well established inclusion and exclusion criteria that have not changed since the data was first collected at the start of the AusTQIP program. The rationale behind the criteria are well documented in the BNTMDS Data Dictionary, which is the primary reference for the Registry.

The criteria are:

INCLUSIONS	EXCLUSIONS
• ISS > 12 based on Abbreviated Injury Scale (AIS) coding • Death following injury	• Delayed admission greater than 7 days after the date of injury. • Poisoning or drug ingestion that does not cause injury. • Foreign bodies that does not cause injury. • Injuries secondary to medical procedures. • Isolated neck of femur fracture. • Pathology directly resulting in isolated injury. • Patients ≥ 65 years of age who die with superficial injury only and/or had co-existing disease that precipitates injury or is precipitant to death (e.g. stroke, renal failure, heart failure, malignancy).

The ATR collects data on 67 variables, which comprise the BNTMDS. The data is collected by each site according to their own established processes. The data is extracted by each site, also according to its own process, and submitted either directly to the ATR or to the centralised body that submits to the ATR on its behalf.

Data is submitted via a Secure File Transfer Protocol (SFTP), which each site or centralised body can access with a unique username and password. The purpose-built ATR database requires that the data is submitted in three comma-separated values (CSV) files that are formatted according to a specific template. On submission, the files are subjected to a two-stage validation process that generates error reports that are checked by the ATR data manager as part of routine data cleaning. The ATR data manager will liaise with the sites to correct errors and ensure optimum quality. At this stage the ATR will provide the site with feedback on the completeness and quality of the data.

Once the data is of a sufficient standard, the system will re-process the files and insert them into the database (Appendix E).

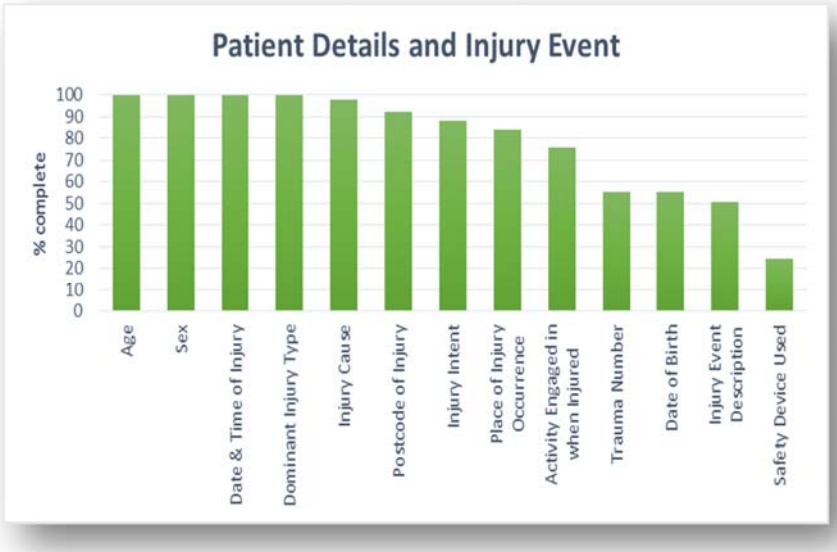
Measures in this report have been obtained using standard Microsoft Office products.

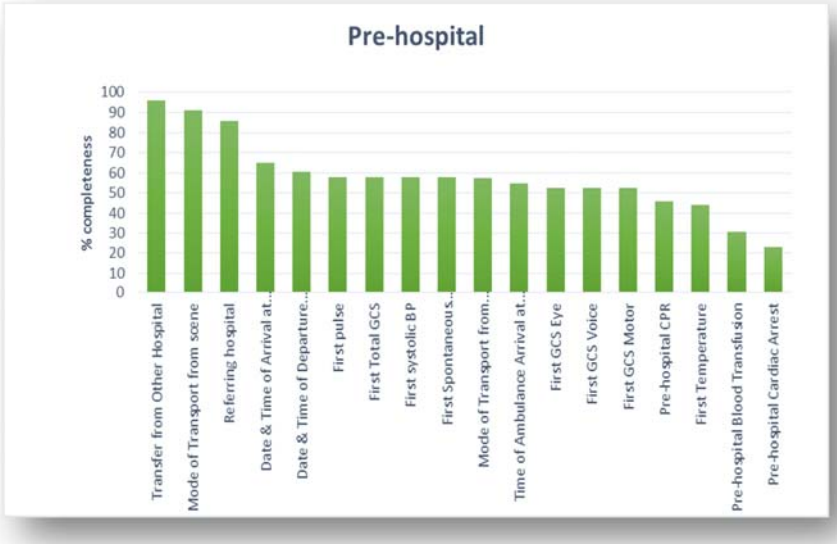
COMPLETENESS

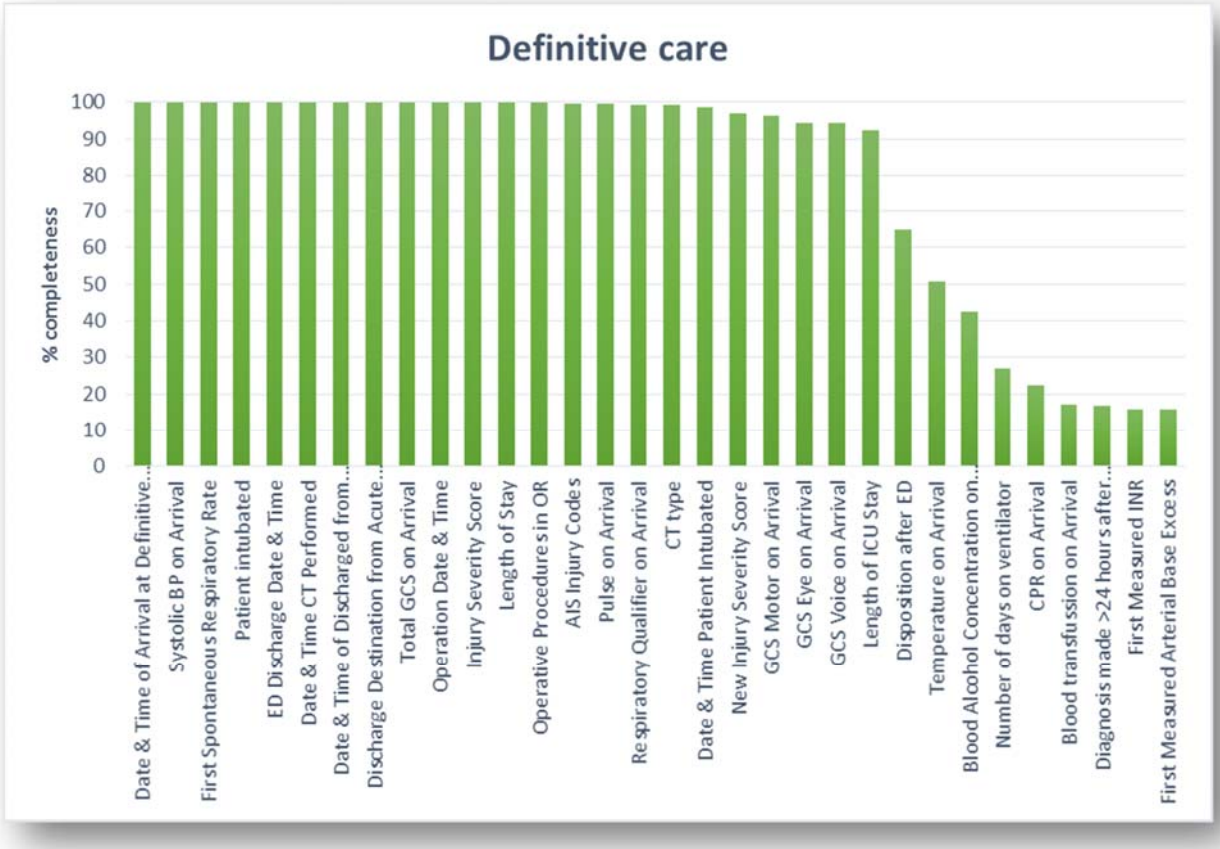
A Completeness Report that examined every field in the dataset for the time period 1st January 2013 to 30th June 2015 was released in November 2016. This provided a valuable insight into the challenges experienced by each site to provide the required information. The Completeness Report was distributed to all stakeholders. Each site was de-identified and referred to only by an alphabetic code. Each code was provided to the relevant site on request so they could understand and interpret their own completeness. A full completeness report will be prepared again for 15/16 financial year data as a further quality improvement activity.

The report revealed a wide variation in the completeness of each field. This variation has inevitably impacted on the quality of the data that is available for analysis by this report. The following charts show the overall completeness of each field, and provides a useful context to each of the measures.

Figure 1: Completeness of all ATR variables.






Definitive care
% completeness
100
90
80
70
60
50
40
30
20
10
0
Date & Time of Arrival at Definitive...
Systolic BP on Arrival
First Spontaneous Respiratory Rate
Patient intubated
ED Discharge Date & Time
Date & Time CT Performed
Date & Time of Discharged from...
Discharge Destination from Acute...
Total GCS on Arrival
Operation Date & Time
Injury Severity Score
Length of Stay
Operative Procedures in OR
AIS Injury Codes
Pulse on Arrival
Respiratory Qualifier on Arrival
CT type
Date & Time Patient Intubated
New Injury Severity Score
GCS Motor on Arrival
GCS Eye on Arrival
GCS Voice on Arrival
Length of ICU Stay
Disposition after ED
Temperature on Arrival
Blood Alcohol Concentration on...
Number of days on ventilator
CPR on Arrival
Blood transfussion on Arrival
Diagnosis made >24 hours after...
First Measured INR
First Measured Arterial Base Excess

MEASURES

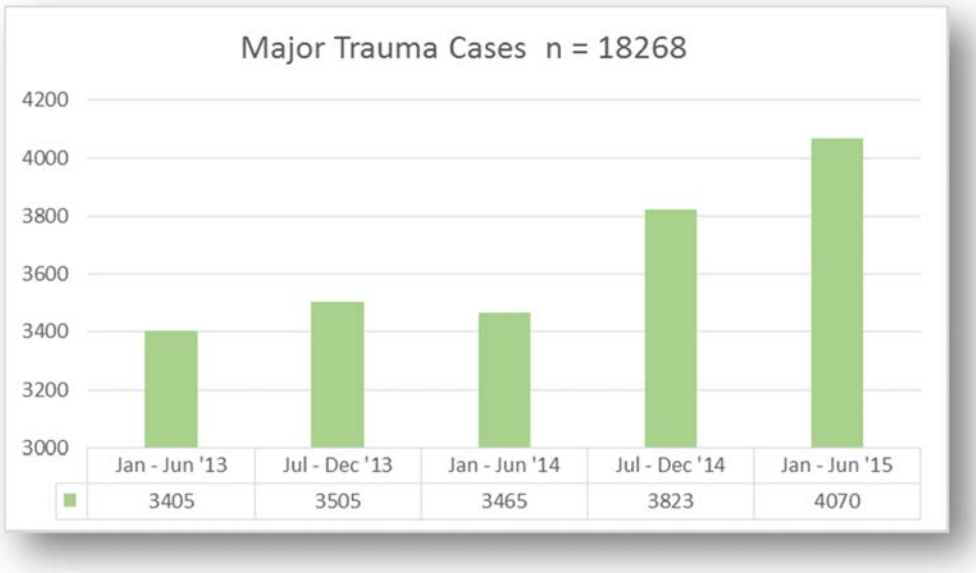
As previously stated the data is of varying quality and is highly dependent on the collection and extraction practices at each site. No benchmarking or in depth statistical analysis has been attempted for this reason. This report will provide data quality notes and exceptions when relevant.

Volume of reported cases

This figure demonstrates the total number of eligible records submitted to the ATR during the reporting period. It is configured in 6 monthly increments, to reflect the change from reporting of calendar years to financial years.

The contributing sites are all designated trauma centres, thus, within the limitations of data completeness, this chart represents the majority of major trauma admitted to trauma centres across Australia during this time period.

Figure 2: Number of records submitted to the ATR for the reporting period 1st January 2013 to 30th June 2015.



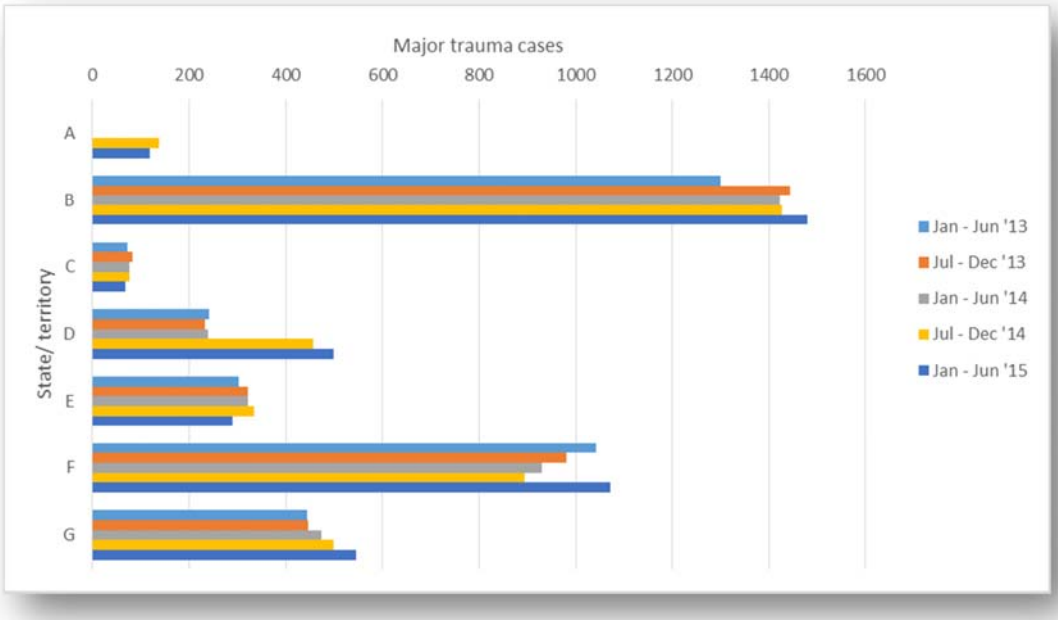
Please note the following:

- Four sites did not report any data up to and including the end of the 2013/2014 financial year, thus the aggregate numbers from the 1st January 2013 to 30th June 2014 are for 22 out of 26 sites.
- Two of those sites did not submit any data during the 2014/2015 financial year, thus the aggregate numbers are for 1st July 2014 to the 30th June 2015 are for 24 out of 26 sites.

The increase in cases is most likely due to improved data completeness, although a small increase would be expected due to changes in incidence of certain injuries, such as older people with falls[2].

The chart below demonstrates the contribution of each state/territory to the biannual aggregate numbers. One state was unable to submit any data for the entire reporting period, therefore has been excluded from this chart. The states/territories have been de-identified and are indicated by an alphabetic character. This chart is not intended as a benchmark. It is included for interest only and to express the spread of trauma cases admitted across the country.

Figure 3: Major trauma records by state.



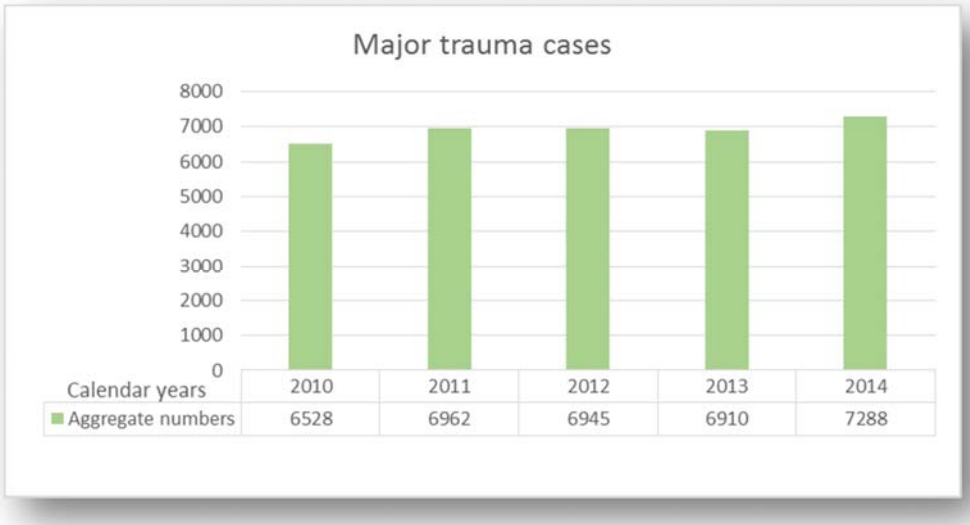
Please note the following:

- State/Territory A did not submit data for the period January 2013 – June 2014.
- State/Territory D – no data from certain sites Jan 2013 to Jun 2014, explaining the significant increase in data from July 2014.

Comparison with previous years

Very little comparison is possible with the inaugural report, due to the change in reporting from calendar years to financial years and changes in methodology. It is possible, however, to compare aggregate numbers for each calendar year on this occasion. Future reports will not attempt to demarcate the end of the calendar year, therefore no further comparison will be undertaken.

Figure 4. Major trauma cases 2010 to 2014.



Please note the following:

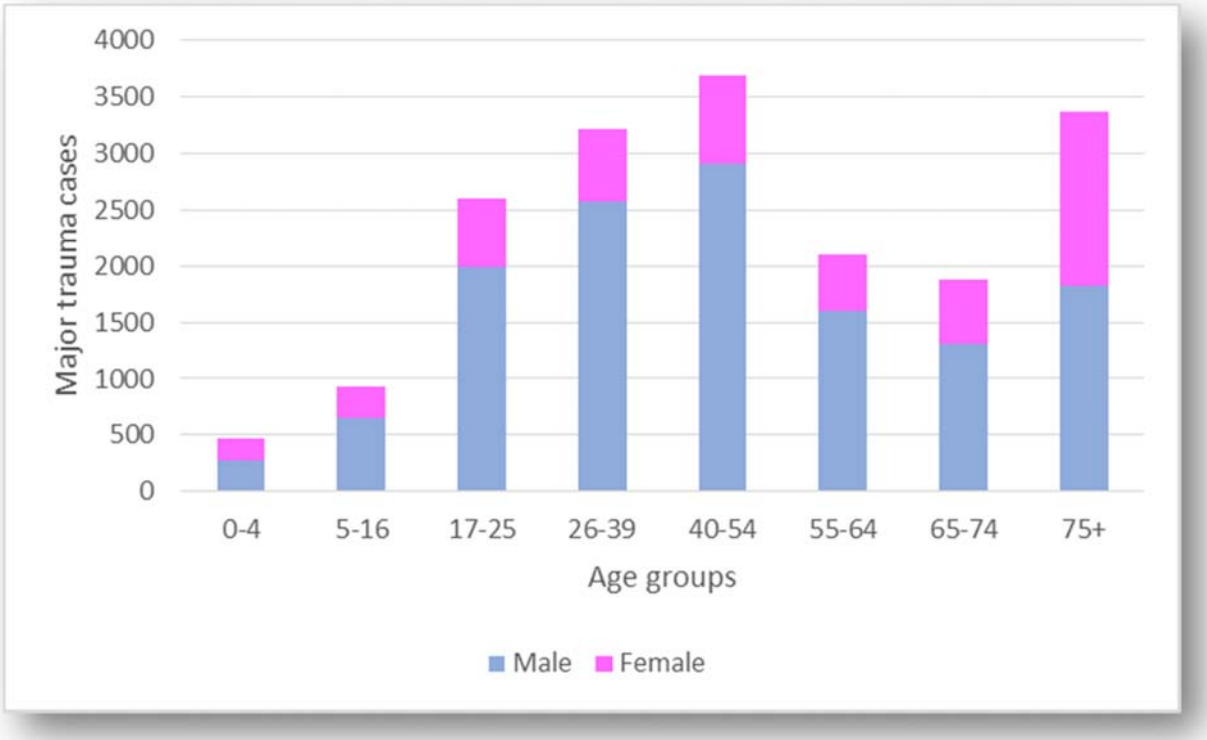
- Footnotes for the data in the inaugural report states that data was incomplete for all of the reported years i.e. 2010, 2011 and 2012. It is not known how many, or which sites did not submit complete data.
- Four sites did not submit data for the whole calendar year of 2013 and up to the end of that financial year, that is, the first half of the 2014 calendar year.
- Two of these sites did not submit any data for the remainder of the 2014 calendar year.

This comparison is included for interest only. It is interesting to note that the aggregate numbers increased in 2014 from 2010 to 2012 despite the known gaps in completeness. This suggests that collection and/or submission practices improved at the sites overall, and is encouraging for ongoing data collection.

Major trauma by age and gender

The following chart shows the aggregate number of major trauma patients reported to the ATR, categorised by age and gender.

Figure 5: Major trauma by age and gender.



These numbers confirm that the majority of major trauma patients are male, and the proportion is approximately 70% male to 30% female. Interestingly, the very young and very old have more equal proportions. Very young children undertake similar activities regardless of their gender and are exposed to the same risks. In the oldest age group, a contributing factor is that women live longer than men (http://www.aihw.gov.au/deaths/life-expectancy) and thus there are less men in the general population.

The raw data indicates that the 75+ age group has the second highest numbers of major trauma. In this report we are unable to provide a population denominator and therefore unable to calculate incidence,

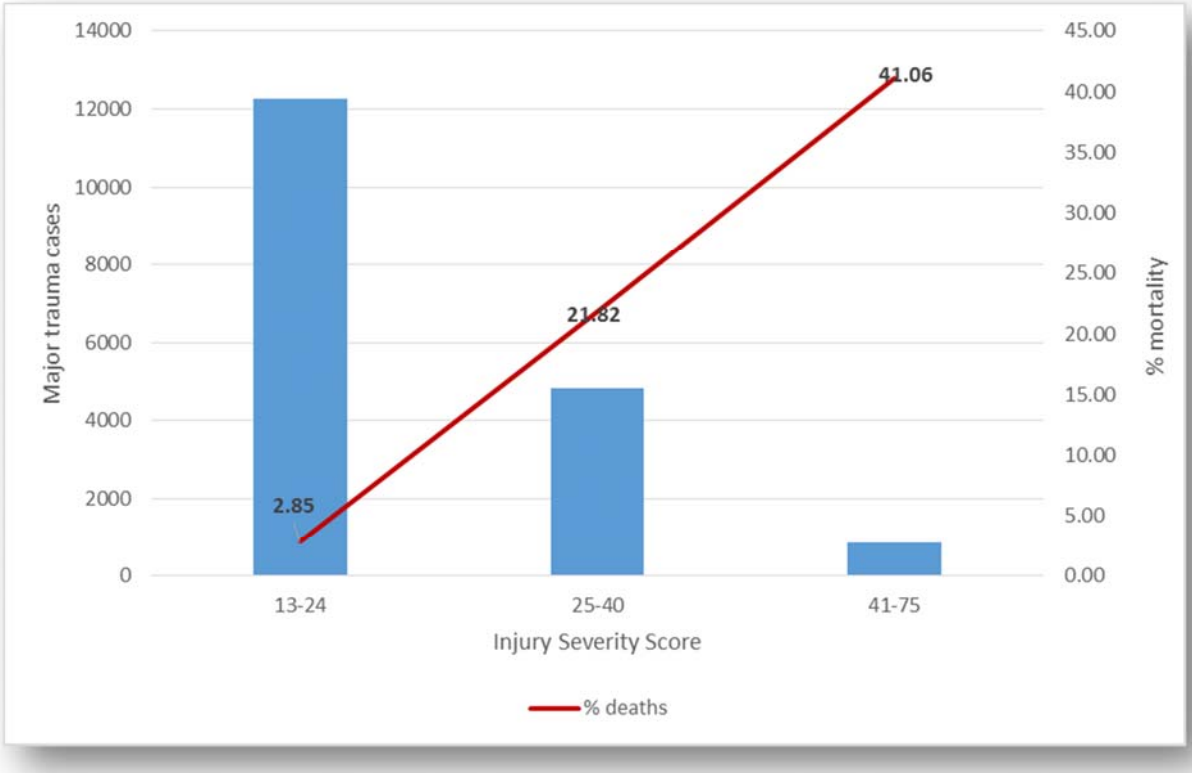
however it has been reported elsewhere that the annual incidence in major trauma patients in this age group is increasing[2].

Major trauma by Injury Severity Score (ISS)

All cases reported to the ATR have an Injury Severity Score, which is derived from the Abbreviated Injury Scale (AIS) codes that have been allocated to each individual injury. Injury coding is undertaken by trained coders at each site for their own registry and all codes and the ISS are submitted to the ATR as part of the required minimum dataset. The field is mandatory to ensure that meaningful analysis of the burden of injury can be undertaken.

The chart below shows the distribution of ISS in the major trauma cases that have been submitted to the ATR. Only cases with an ISS greater than or equal to 13 are included in this chart. Any cases with an ISS of less than 13 are only reported to the ATR if the patient died, therefore the mortality in that ISS group is always 100% and does not add value to this information.

Figure 6: ISS and mortality.

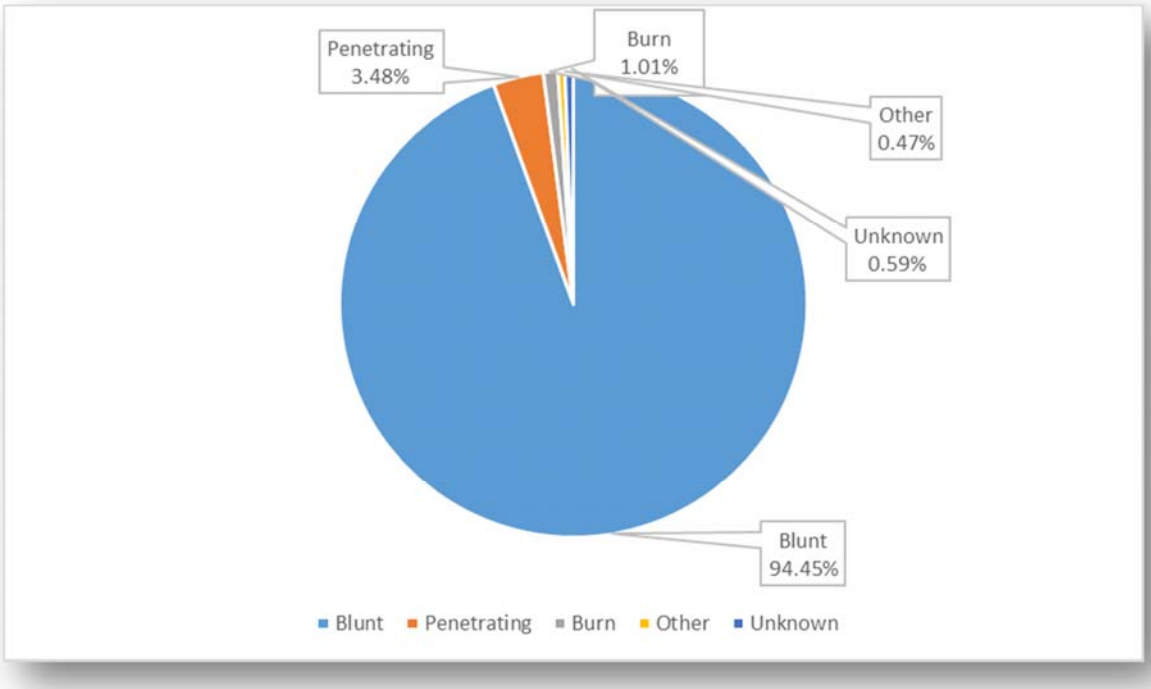


Most patients had an ISS ranging from 13-24 with a very small number in the most severely injured group from 41-75. Not surprisingly, the mortality increased as severity increased. The actual number of trauma deaths was greatest in the 25 – 40 range (n = 1,056). However mortality rates were highest within the ISS 41-75 category at 41.0%, compared with 21.8% and 2.8% in the ISS 25-40 and ISS 13-24 groups respectively.

Types of injury

Injury types fall into four main categories. These are blunt, penetrating, burns and other. The other category includes mechanisms such as asphyxia, hanging, drowning and electrocution that are a threat to respiratory and cardiac function. The chart shows the proportion of each type of injury across Australia.

Figure 7: Injury type profile for major trauma.

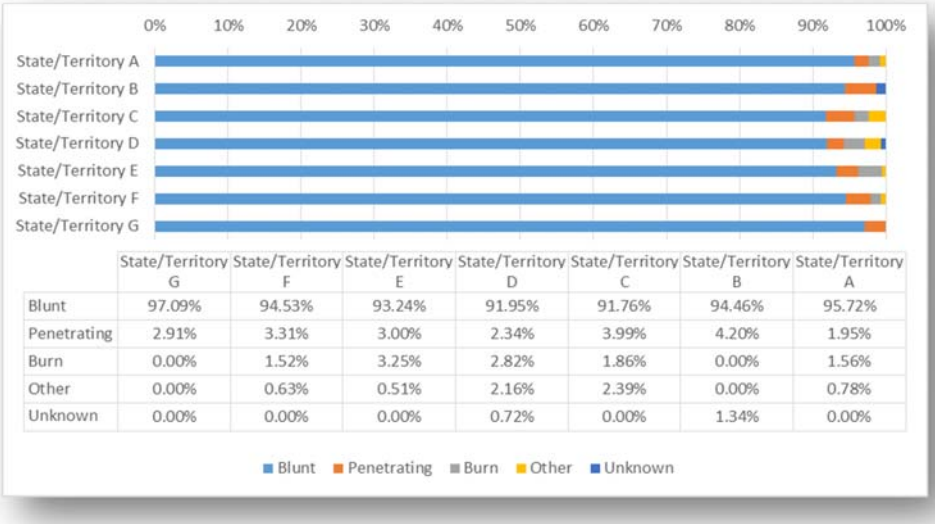


The overwhelming majority of trauma is blunt, 94.45% overall. In Australia, the majority of blunt trauma occurs on the roads, or as a result of falls. The particular causes of blunt trauma will be explored later in this report. This concurs with the VSTR report and the known trauma profile in Australia.

The next largest category is penetrating trauma, which occurs as a result of gunshot or stabbing. Burns and other types of injury account for less than 2% of the trauma.

The chart below shows injury type by state. The states are de-identified and ordered in the same manner as the volume of cases by state has been reported above.

Figure 8: Injury type profile by state.

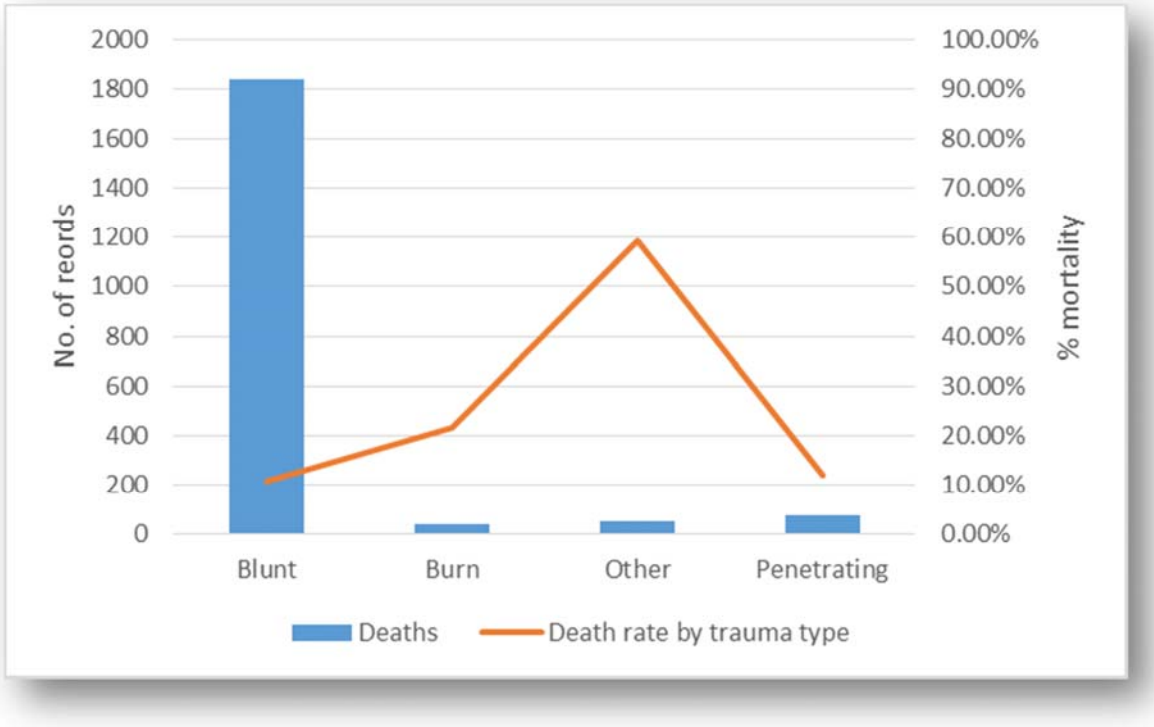


	State/Territory G	State/Territory F	State/Territory E	State/Territory D	State/Territory C	State/Territory B	State/Territory A
Blunt	97.09%	94.53%	93.24%	91.95%	91.76%	94.46%	95.72%
Penetrating	2.91%	3.31%	3.00%	2.34%	3.99%	4.20%	1.95%
Burn	0.00%	1.52%	3.25%	2.82%	1.86%	0.00%	1.56%
Other	0.00%	0.63%	0.51%	2.16%	2.39%	0.00%	0.78%
Unknown	0.00%	0.00%	0.00%	0.72%	0.00%	1.34%	0.00%

Whilst penetrating trauma is not the same public health issue as blunt trauma, it is more of a concern in some states than others, with rates shown above varying between less than 2% to over 4%.

The resultant mortality from differing trauma types is of interest, as the assumption may be that some types of trauma are more deadly than others. The chart below shows a comparison of the incidence of trauma types compared with the death rate from that trauma type.

Figure 9: Injury type and mortality.



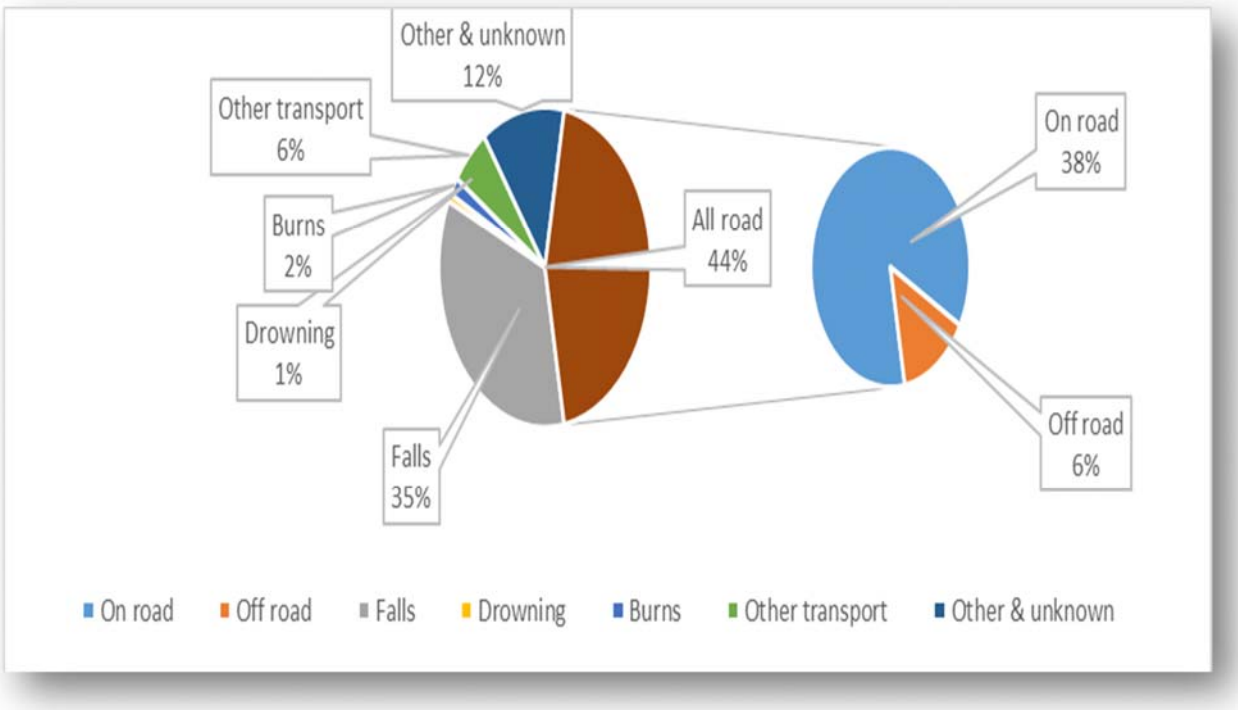
As expected the vast majority of deaths occur as a result of blunt trauma. Blunt trauma has a mortality of 10.66%. Burns and other trauma have mortalities of 21.74% and 59.30%. This could be explained by only high risk burns cases meeting Registry criteria, and other types of trauma, such as asphyxia, hanging, drowning and electrocution, having a high mortality due to the admission criteria and immediate threat to life. Although penetrating trauma can be lethal, the mortality rate of 11.79% for hospital admission is only slightly higher than for blunt trauma.

Thirty-one deaths recorded the type of trauma as unknown. The mortality rate for unknown trauma type is 28.9%. It is possible that these cases patients suffered multiple injuries in events with a combination of trauma type, for example, a motor vehicle accident (blunt) with an ensuing fire (burns). This will be monitored in future reports.

Causes of injury

Having made the observation that the overwhelming type of trauma in Australia is blunt, the causes of blunt trauma are varied. Of particular interest to policy makers is road trauma, which has been acknowledged by the Federal Government. The chart below shows the causes of injury that have been categorised according to ICD10-AM external cause codes.

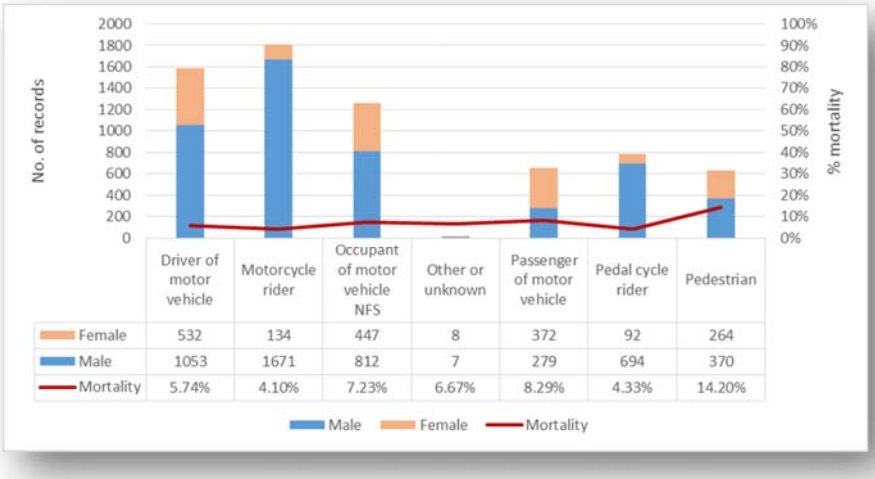
Figure 10: Causes of injury.



Road causes of injury have been extracted according to the ICD10-AM codes specified in the Federal funding agreement, and split further into on road and off road categories. The percentage of road trauma concurs with the VSTR, but is less than that reported by the NZ-MTR[3]. These proportions are 42% and 52% respectively. Falls are the second largest cause of injury in Australia, which when combined with road trauma accounts for 79% of all trauma in Australia.

The mortality rate of trauma is of intense interest to policy makers and public health advocates. The chart below shows the numbers and mortality of road trauma classified as 'on road', and split into the categories denoted by the ICD10 codes.

Figure 11: 'On road' trauma and mortality.



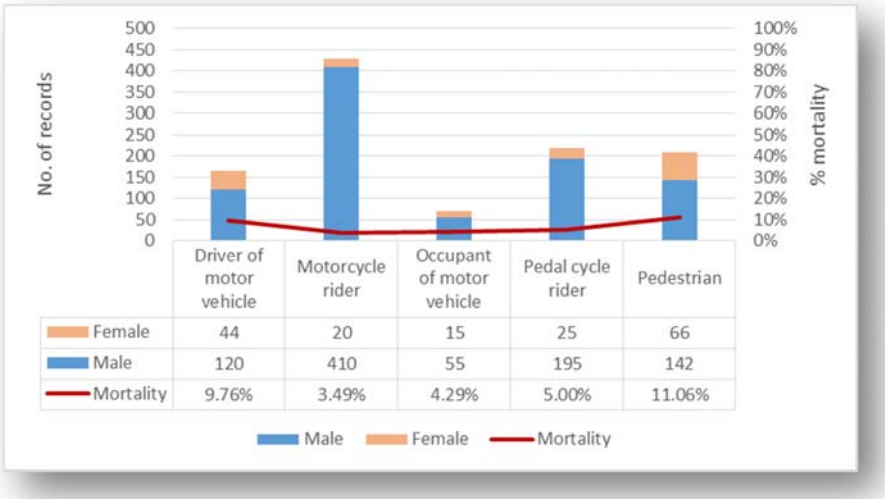
	Driver of motor vehicle	Motorcycle rider	Occupant of motor vehicle NFS	Other or unknown	Passenger of motor vehicle	Pedal cycle rider	Pedestrian
Female	532	134	447	8	372	92	264
Male	1053	1671	812	7	279	694	370
Mortality	5.74%	4.10%	7.23%	6.67%	8.29%	4.33%	14.20%

As is consistently the case, males are over represented in the numbers, except in the category of passenger in a motor vehicle. This may reflect the societal norm of the male half of a couple tending to be the driver (www.theguardian.com/lifeandstyle/2013/nov/22/who-drives-car-him-or-her).

The mortality of road trauma is 6.46%, which is less than that of trauma overall, see Mortality. This is surprising considering the impact that road trauma has on the community. The notable exception to this is that of pedestrians, where the mortality rises to 14.20 %. This indicates that pedestrians are a particularly vulnerable group of road trauma.

The 'off road' chart paints a similar picture, except that driver mortality is higher and more reflective of the overall trauma mortality. There was a very small number (5) of unspecified off road users that incurred no deaths. They have been excluded from this chart as they do not add any value to the information.

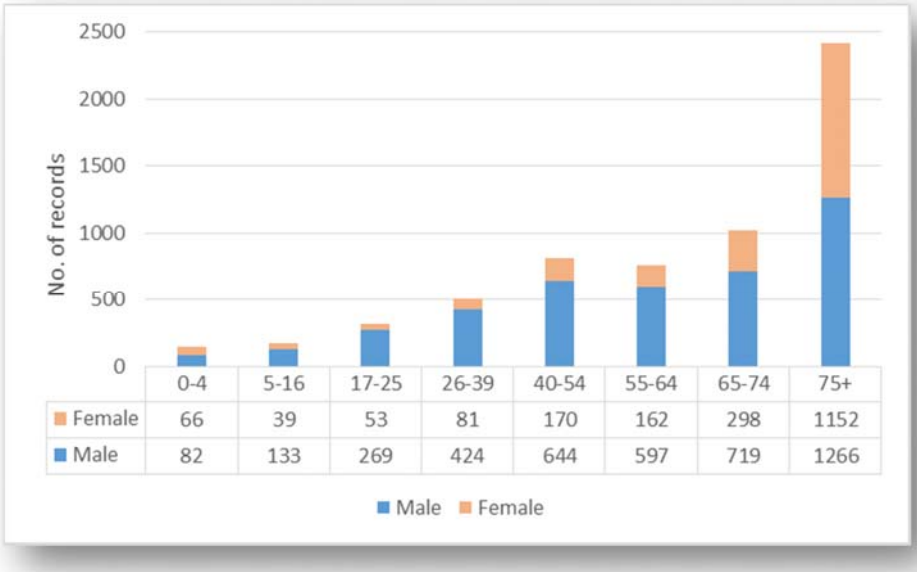
Figure 12: 'Off road' trauma and mortality.



	Driver of motor vehicle	Motorcycle rider	Occupant of motor vehicle	Pedal cycle rider	Pedestrian
Female	44	20	15	25	66
Male	120	410	55	195	142
Mortality	9.76%	3.49%	4.29%	5.00%	11.06%

The incidence of falls is of mounting interest to policy makers as it is known to be increasing and has been shown to be the second largest cause of blunt trauma. The patient's age was reported as unknown in two records, thus these have been excluded from the chart.

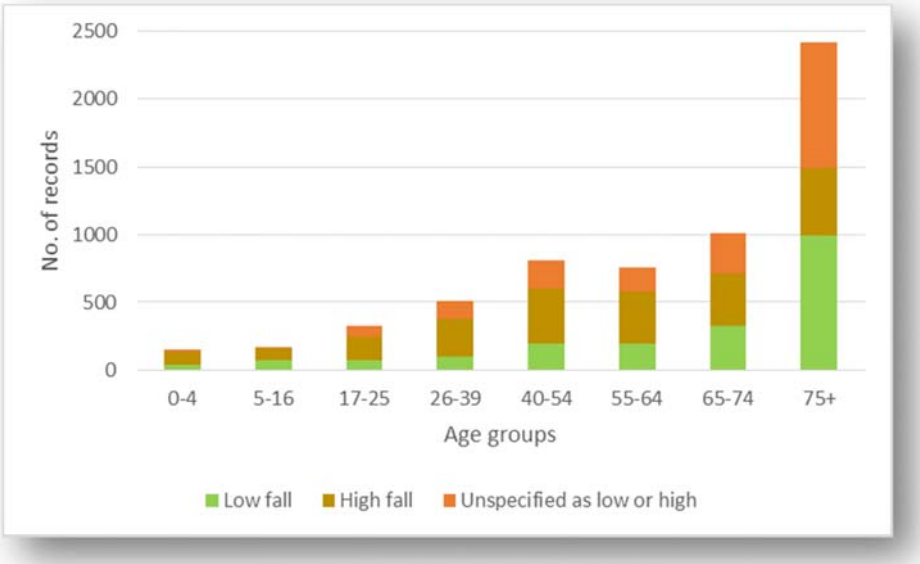
Figure 13: Falls cases.



The increasing incidence with age reflects the trends that have been shown in other reports. Once again, males are over represented in all the age groups, with the overrepresentation being more pronounced in the middle groups. This is similar to the observations made where major trauma is shown by age groups.

For the purposes of this report, the ICD10 codes have been categorised into low and high falls, where low falls are deemed to be falls on the same level, from tripping or stumbling. The below chart shows the proportion of falls in each age group that are low, high or unspecified as low or high.

Figure 14: Proportion of high, low and unspecified falls.

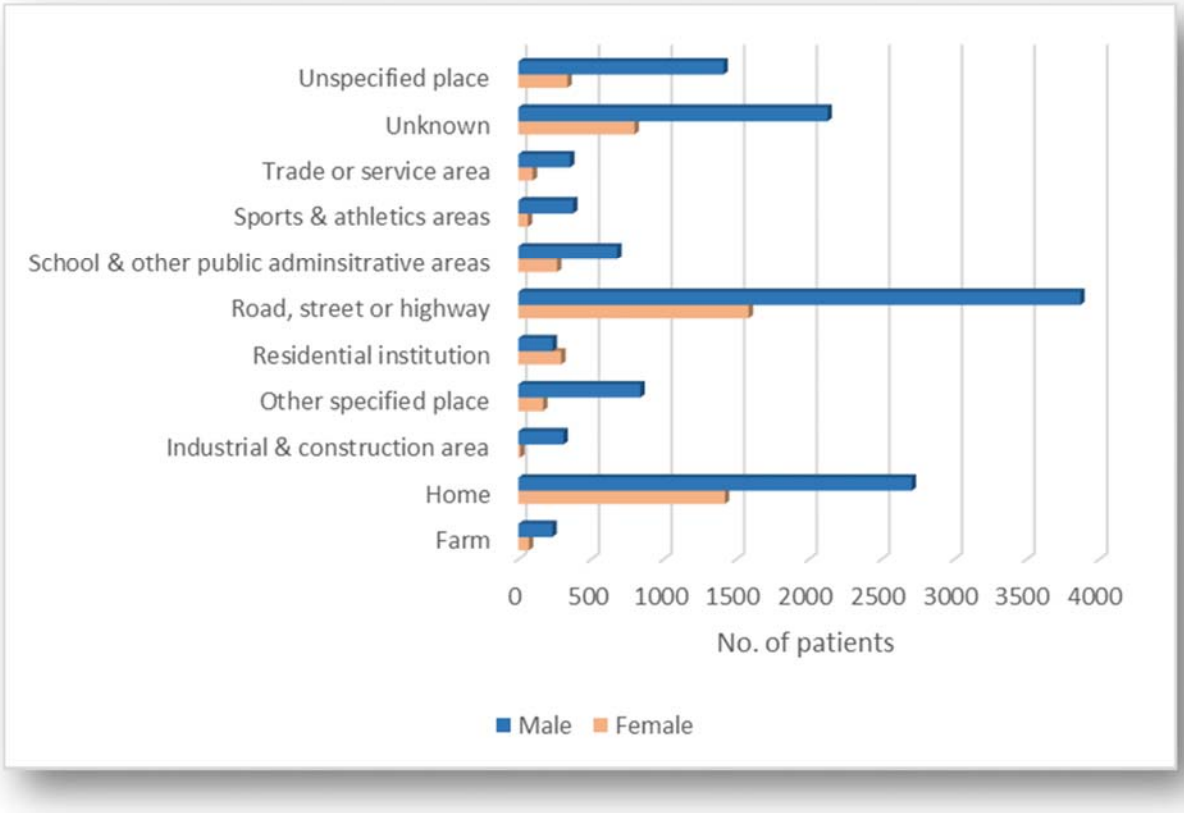


The incidence of low falls is seen to dramatically increase with age. This is to be expected as frailty increases as people get older. However, it must be noted that also with age, there is a problematic increase of cases that have been coded as unspecified as either low or high. This would reflect the difficulties that hospital coders have with inadequate documentation such that they are unable to determine a more specific code. The picture therefore could be that the standard of documentation slips with older patients, thus raising the possibility that age and comorbidities confuse the clinical picture and impact on the quality of care.

Place of injury

The place of injury in the ATR dataset is captured as an ICD10 code. The following chart describes the places where patients have incurred their injuries.

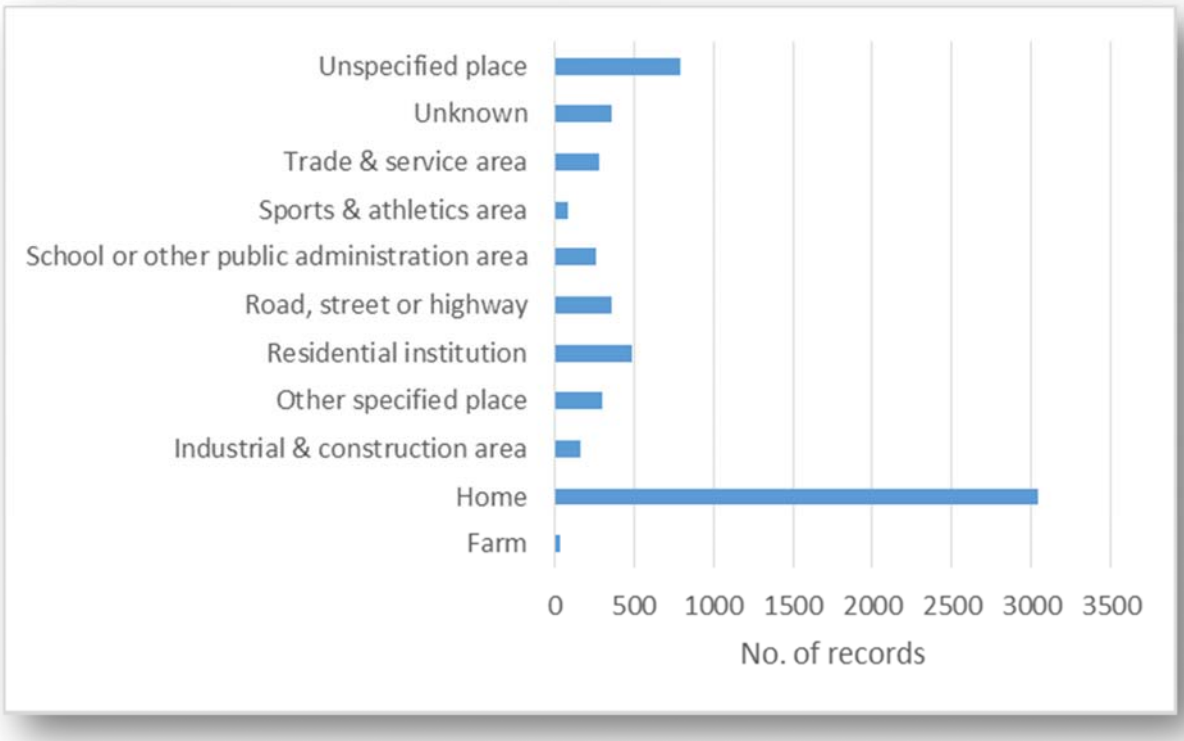
Figure 15: Places of injury.



The chart shows that the most dangerous place in Australia to be is on the roads. This concurs with the greatest incidence of trauma having been shown to be road trauma. The next most dangerous place to be is in the home, which correlates with the next highest incidence of trauma being falls. However, it is concerning to note that the third highest number of patients have had a place of injury reported as unknown. This is a data collection training issue and will be monitored closely in future cleaning and quality reports. Furthermore, the fourth highest number of patients have been coded as having an unspecified place of occurrence, which again would reflect inadequate documentation such that the coder has been unable to allocate a specific code. These unknown and misreported values comprise over 25% of reported values for this field. This is important and needs more work.

The majority of falls do, in fact, occur in the home, as suggested above, with the next highest known place being in a residential institution. This is logical when considered with the increase of falls in the elderly.

Figure 16: Place of occurrence of falls.



Unfortunately, this chart again demonstrates the number of cases that are reported with unspecified or unknown places where falls have occurred. With falls becoming a major community concern, every effort should be made to ensure that good quality data is available.

Days of the week that injuries occur

The days of the week that incur a higher volume of injuries is an important measure that assists with planning and allocation of resources.

Figure 17: Days of the week that injuries occur.

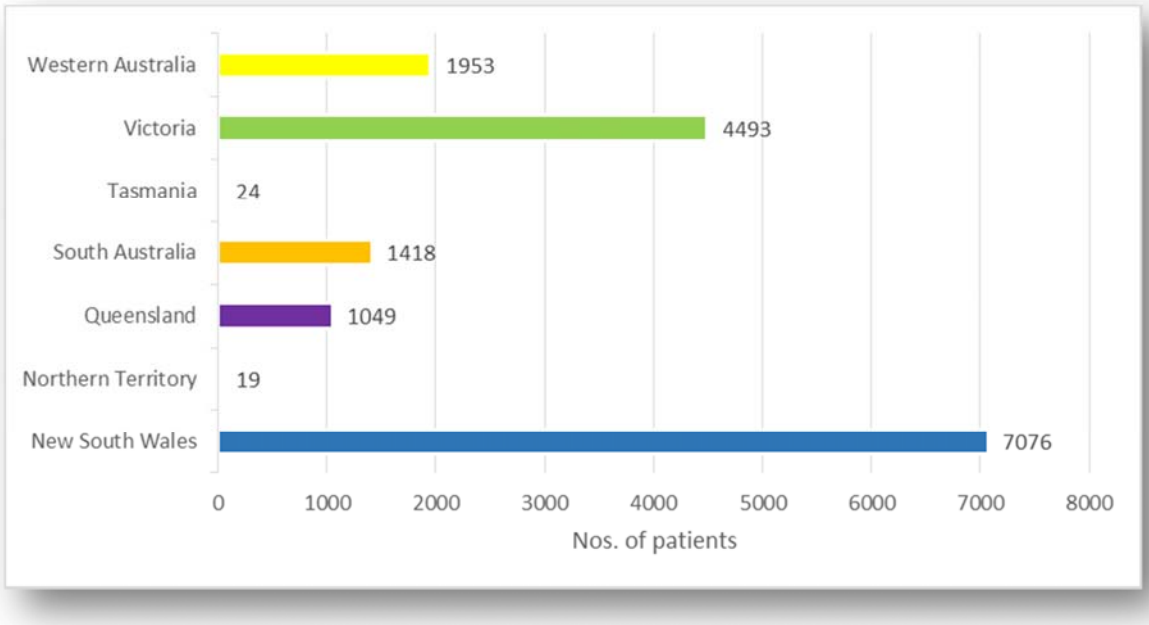
The greatest number of injuries are incurred on the weekends. This correlates with the VSTR report, which also shows that the busiest day for Trauma Services is a Saturday.

Location of injury

The postcode of injury is an optional field in the BNTMDS, with blanks acceptable for unknown and overseas locations of injury. The field is therefore heavily dependent on good quality source data and is difficult to validate in completeness and quality reports. Of the 18,268 patients who suffered a major trauma, 2,236 patients (12%) did not have a postcode reported.

Within the constraints of the quality of the data, and the de-identification of sites, the chart below is a representation of the most reported postcodes of injury. The chart does not represent in any way the sites that have reported these postcodes, as patients can be transferred anywhere in the country to access appropriate care.

Figure 18: Location of injury events by state.



The postcodes have been mapped to 345 Local Government Areas (LGAs) in Australia and placed into a colour coded 'heat map' table (Appendix F).

The ATR will be undertaking a body of work to explore reporting geospatial coordinates in the future. This is the 'gold standard' of reporting location of injury and is a medium to long term goal.

Injuries sustained

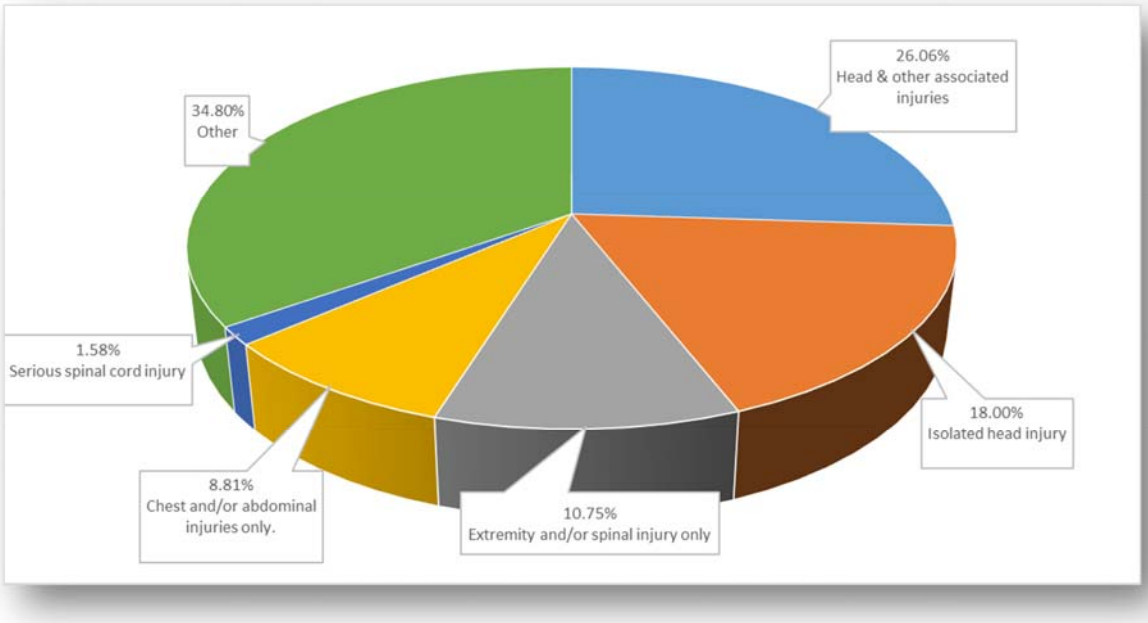
The injuries that the patients sustained have been divided into five groups. The table below shows the distribution and definition of each group, and the number of cases.

Table 2: Numbers of cases in injury groups.

Injury group	Definition of AIS codes	Number of cases
Head and other associated injuries.	• Head with AIS severity > 2 AND • Other body system with AIS > 1.	4,760
Isolated head injury	• Head with AIS > 2 only. i.e. no other body system with an AIS severity > 1.	3,289
Extremity and/or moderate spinal injury.	• Extremity with AIS > 1 AND • Spinal injury with AIS 2 or 3	1,964
Chest and/or abdominal injuries only.	• Chest with AIS > 2 AND/OR • Abdomen with AIS > 2.	1,609
Serious spinal cord injury with or without other injury.	• Spinal injury with AIS > 3	289

The below chart shows the contribution of each group to all trauma injuries.

Figure 19: Proportion of injury groups in all trauma.



The Other group includes burns, people injured in multiple body systems and combinations of injuries that do not fit into the above groups. All of these proportions concur with the VSTR report, except for serious spinal injuries, which may be accounted for by differences in methodology or admission to specialist hospitals that are not major trauma services.

Transfers and transport modes

The numbers of patients that have been transported directly to a major trauma service where they will receive definitive care, when compared with the numbers of patients that have been transferred from another facility, impacts on planning and allocation of resources, and is particularly important in view of the vast distances that patients may have to travel to receive appropriate care.

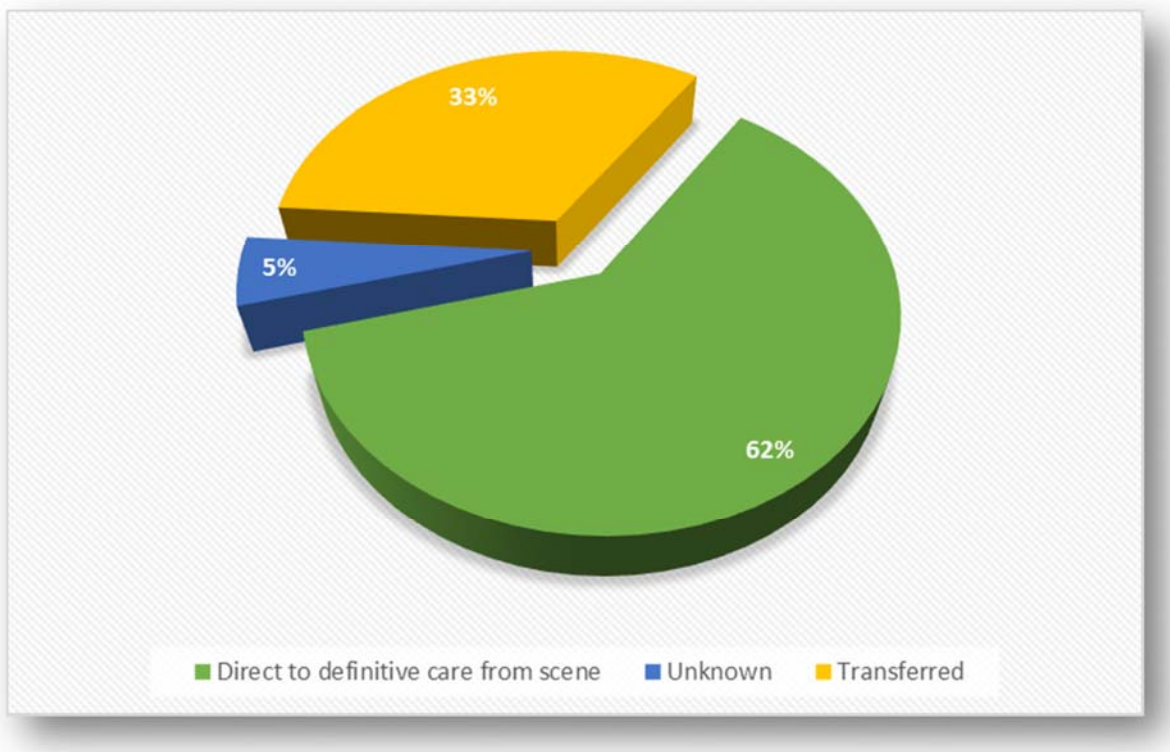
The following table shows the aggregate numbers of patients that were transported directly to definitive care, those that were transferred from another facility and those that are reported as unknown.

Table 3: Patients that have been transported to definitive care directly from the scene, to an interim facility or unknown.

	Transported from scene to definitive care	Transferred from an interim facility to definitive care	Unknown
Total patients	11,223	6,092	953

Pleasingly, only 5.22% of patients have been reported as unknown whether or not they were transferred. The below chart, therefore, is a good representation of the transfer patterns in Australia.

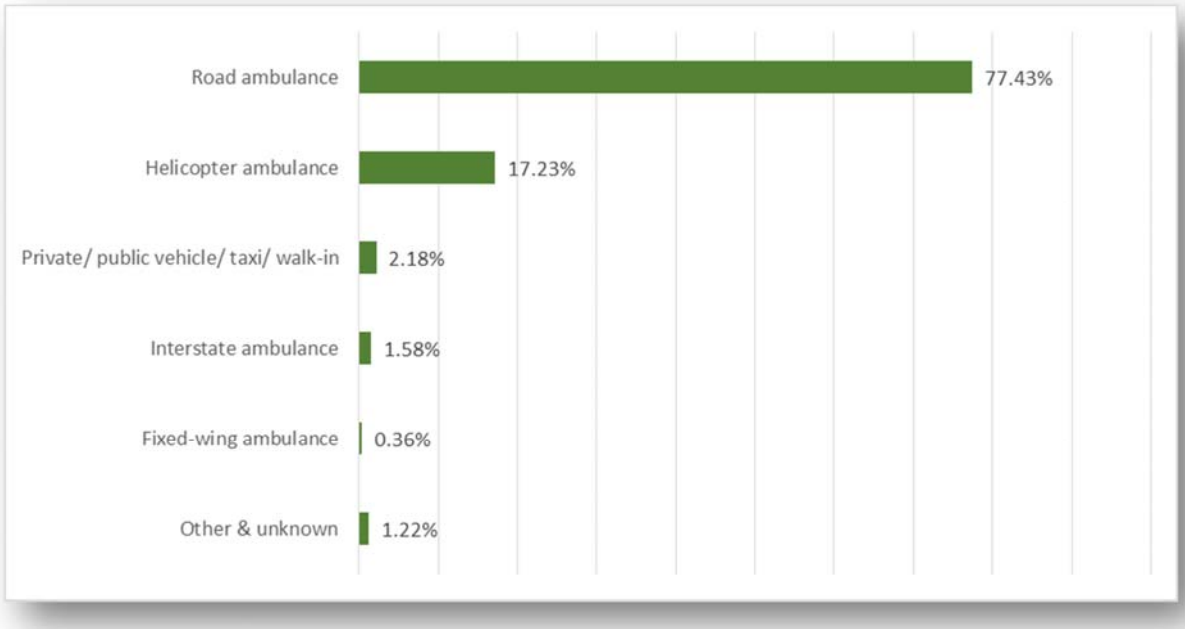
Figure 20: Proportions of patients transported directly to definitive care, to an interim facility or unknown.



More work needs to be done on the patterns of transfer in particularly remote locations, and to determine the effect on the outcomes for these patients.

Closely aligned with transfer patterns in Australia is the mode by which patients are transported from the scene of injury. The chart below has been filtered for patients that are not transferred, to optimise the accuracy of the data capture and to eliminate the possibility of the field mistakenly capturing the mode of transport between hospitals.

Figure 21: Modes of transport for patients admitted directly to definitive care.



The data shows that the majority of patients are transported from the scene of the injury event by road ambulance. The next most utilised transport mode is that of helicopter at 17.23%. This is less than that reported by the Victorian State Trauma Registry[2], but is within the expected variation.

These observations would be more meaningful if they were correlated with both the location of the injury event and whether or not the patient was transferred. This is not within the scope of this report at this time, however as previously stated in the Location of Injury section, the ATR will move to capturing geospatial coordinates. This will improve the understanding of transport and transfer patterns across the country.

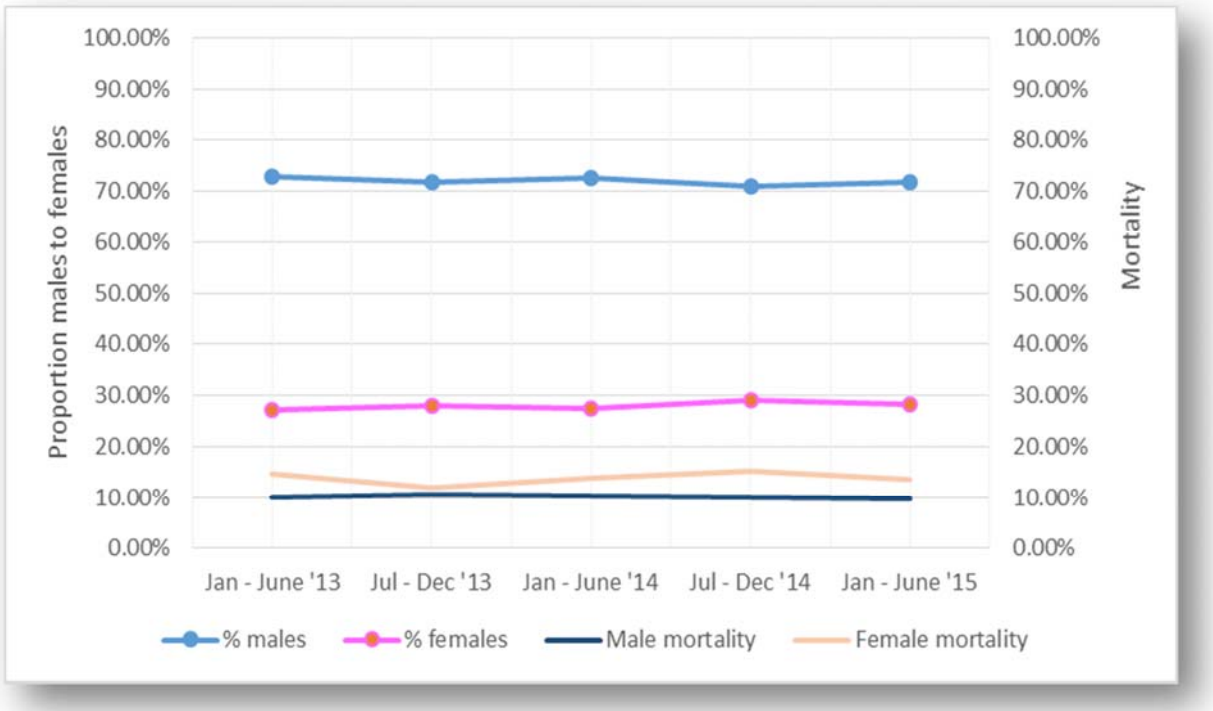
PROCESS INDICATORS

Mention has been made previously in this report of the importance of process indicators to the trauma community and the work that has been done in determining which indicators are appropriate. The below measures are those that the ATR is able to report on at this time.

Mortality

Mortality is a critical indicator that is heavily reported by most registries in most disciplines. The below graph shows proportion of males to females in six monthly increments, and the associated mortality.

Figure 22: Mortality by gender for reporting period.



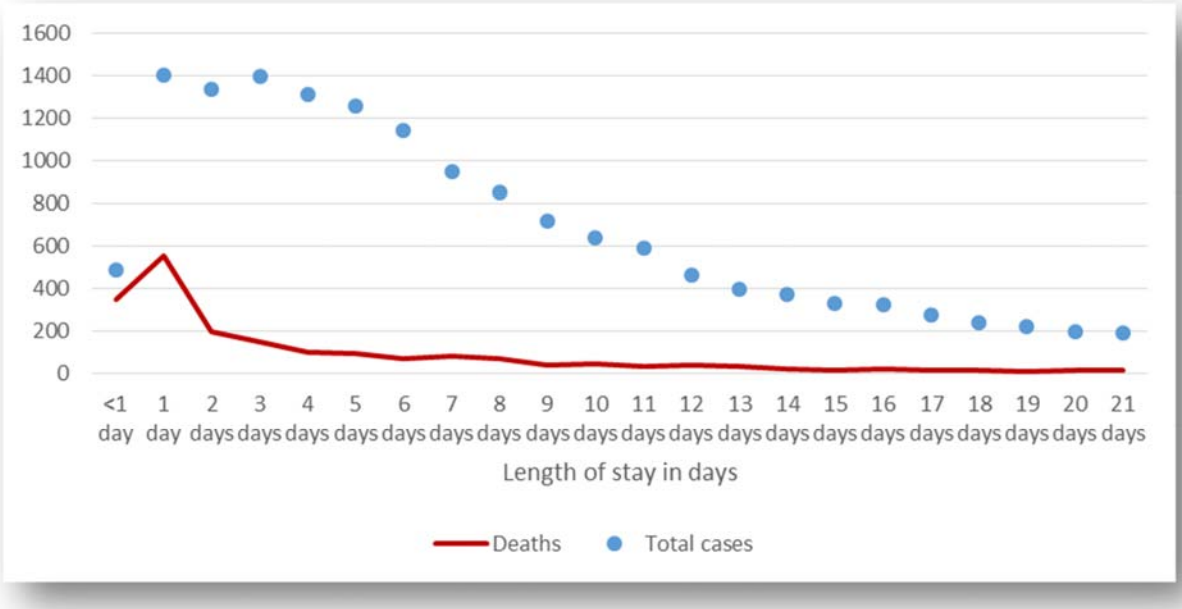
The rates varied only very slightly during the reporting period and showed consistently that the proportion of males to females sustaining major trauma is just over two to one. This graph shows the average percentage of males injured as 71.96% and the percentage of females injured as 28.04%.

Females have a slightly higher mortality at 13.88% compared to 10.07% for males. This compares with the overall mortality for the reporting period of 11.14%.

Length of stay

Length of stay is a process indicator that has ramifications for evaluating outcomes of patients, and also for planning and allocation of resources. The following chart shows the reported lengths of stay for each record, and the declining mortality as the days progress.

Figure 23: Length of stay and mortality.



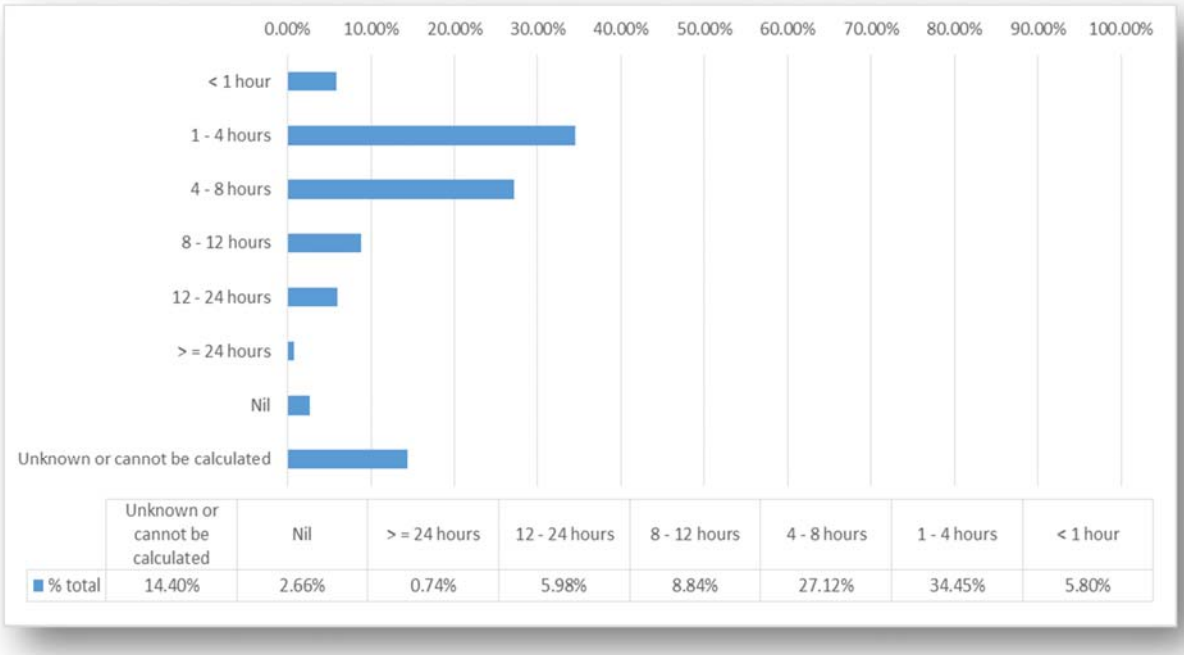
The data shows that 70.1% of patients with a length of stay of less than one day died. This suggests that these deaths occurred in the Emergency Department, operating theatre or soon after admission. The first 24 hours are critical to a good outcome for the patient.

Eighteen percent of patients had a length of stay of greater than three weeks, with the longest recorded stay being 413 days. Unknown lengths of stay were reported for 305 patients and these have been excluded from the analysis.

Time in the Emergency Department

The time that is spent in the Emergency Department can be a measure of the timeliness and efficacy of the care delivered in those first crucial hours. This field is calculated from the reported date and time of arrival to ED and the reported date and time of departure from ED. The below chart shows the categories of the time spent in ED.

Figure 24: Time spent in the Emergency Department.



	Unknown or cannot be calculated	Nil	> = 24 hours	12 - 24 hours	8 - 12 hours	4 - 8 hours	1 - 4 hours	< 1 hour
% total	14.40%	2.66%	0.74%	5.98%	8.84%	27.12%	34.45%	5.80%

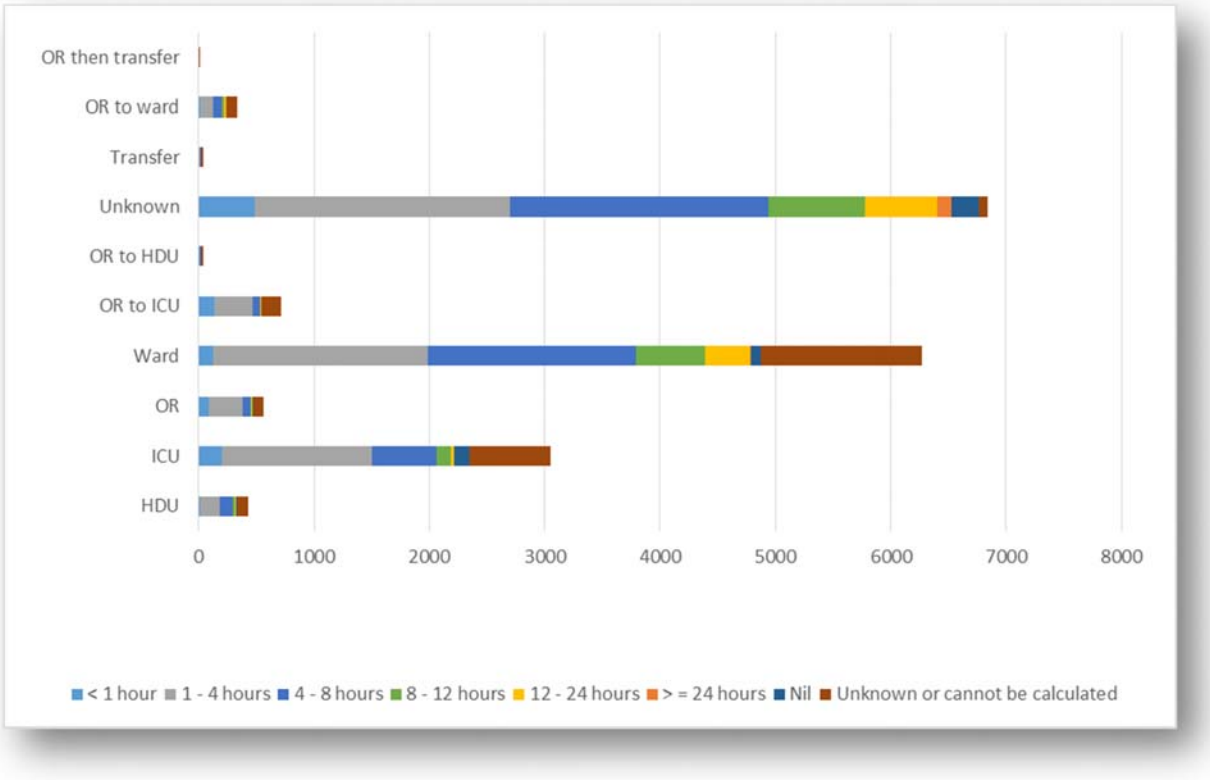
Approximately one third of patients can expect to spend between one and four hours in the Emergency Department. Next frequent is a stay of over four and up to eight hours. A significant number of cases cannot have their lengths of stay in the ED calculated as either the Arrival Date and Time, ED Discharge Date and Time, or both, were reported as unknown.

The median length of time spent in the Emergency Department is 4.07 hours. The average length of time spent is 5.24 hours. The cases that have been reported as not having spent any time in ED may have been transfers that were admitted directly to an inpatient ward.

Disposition from Emergency Department

The logical next indicator to be considered following on from the length of time spent in the Emergency Department is the disposition from the department, that is, the place to where the patients proceeded after their initial episode of care. The chart below shows the dispositions, comprised of the categories of the lengths of time spent in the ED prior to that disposition.

Figure 25: Disposition from the Emergency Department

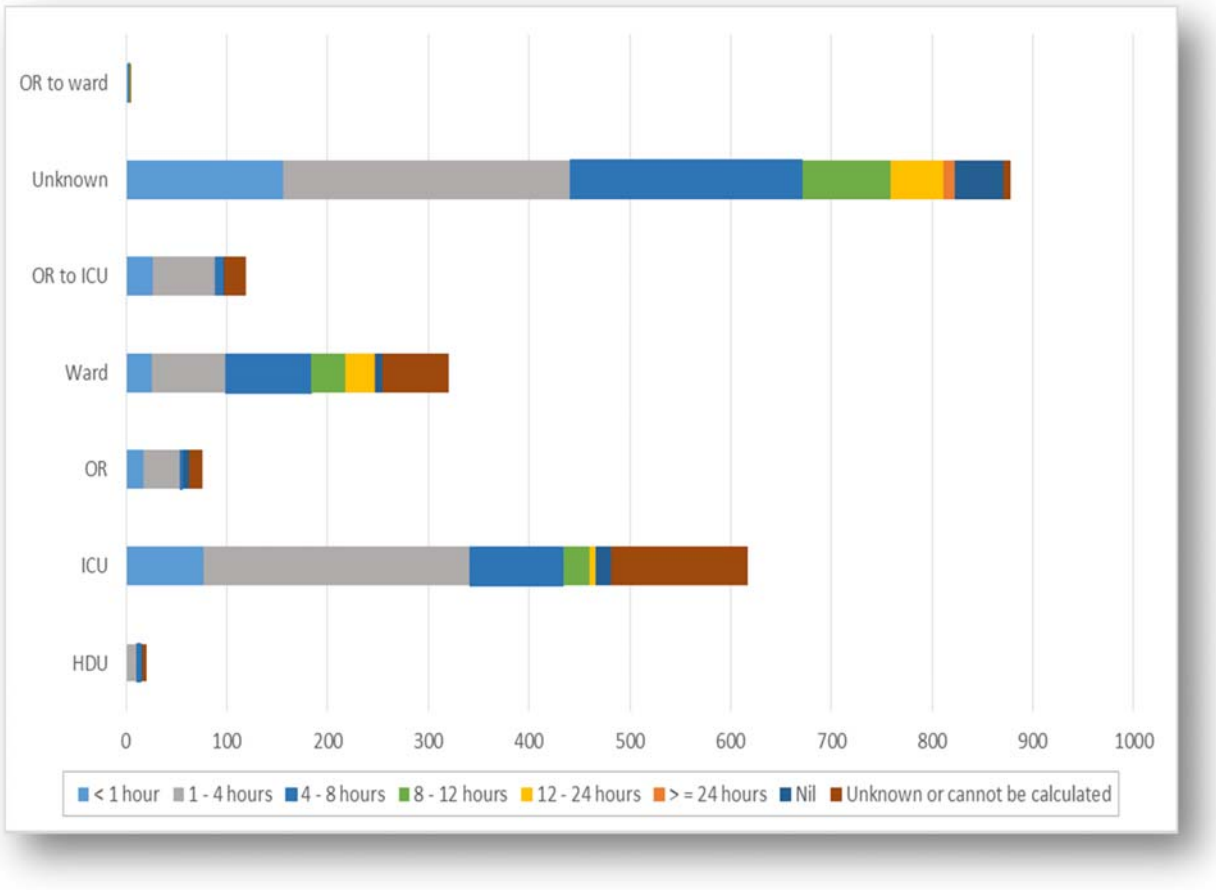


The disposition from the ED that is reported as unknown is 37.43%. This field is an important indicator, but would seem to be inadequately reported. It will therefore be monitored in future reports.

No deaths were reported as having occurred in the ED. This is clearly not the case, and will be reviewed. The greatest number of unreported dispositions are those that spend less than 8 hours in the Emergency Department, which raises the possibility that these unknown dispositions include the deaths that have otherwise not been reported. This misreporting may be a mapping issue and will be monitored in future data submissions.

The Discharge Destination field in the dataset has been reported more fully, therefore it is possible to filter the dispositions from ED to those where the patient's outcome is known to be death.

Figure 26: Disposition from ED for patients that died.



The chart shows that 43.12% of in hospital deaths were reported as having unknown destinations from ED. Furthermore, the majority of these unknown destinations occurred with lengths of stay of less than 24 hours. Whilst it is still not possible to determine from this how many deaths occur in the ED, 345 deaths had lengths of stay less than one day, thus it would be reasonable to assume that these all occurred in ED.

Length of stay in ICU

The length of time that a patient spends in the Intensive Care Unit is a measure of the severity of their injuries and the level of treatment that they require. Unfortunately, a large minority (17.29%) of patients were reported to have an unknown length of stay in ICU. Of those where a length of stay is known, 56.91% were reported to have not been admitted to the ICU at all.

The below table shows the numbers of patients known to have been admitted to the ICU, with their lengths of stay categorised into time spans. Please note that a stay of 24 to 48 hours is considered to be between one and two days, that is, that the patient did not stay longer than 2 days.

Table 4: Patients admitted to the Intensive Care Unit.

< 24 hours	24 – 48 hours	2 – 6 days	1 week +
84	1,363	2,939	2,125

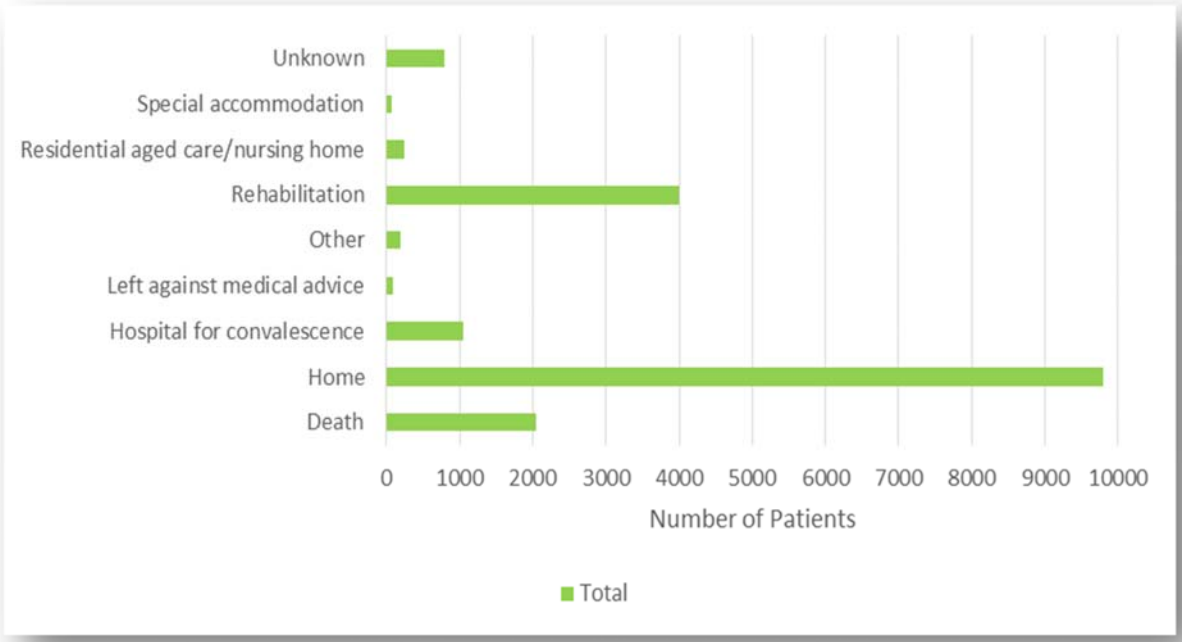
The below chart does not show whether or not a patient was still in the ICU at the time of their death. It does show, however, that mortality peaks for patients who have a reported length of stay of less than or equal to 48 hours. This suggests that the death occurs within that period, and then the rate falls thereafter. The data shows that over 70% of patients that died had been admitted at some point to the ICU.

Figure 27: Mortality for patients with known lengths of stay in the ICU.

Discharge destination

The patient's trauma journey does not end at the time of discharge from the definitive episode of care. It may, however, be regarded as the 'end of the beginning', as the acute phase of their treatment has been concluded. They may face many months, perhaps years, and possibly a lifetime of further recovery. The discharge destination indicates only to where the patient will proceed at that point.

Figure 28: Discharge destination for all patients.



The aggregate data revealed that this field was well reported, with only 4.33% of values being unknown overall. However, a state by state analysis showed that unknown values ranged between zero and 65.87%. It is clearly problematic for a fundamental field such as discharge destination to be reported as unknown, therefore this is a data collection training or mapping issue that will be monitored in the future.

Most patients (53.62%) went home at discharge from definitive care. The next highest destination was rehabilitation (21.85%) with the third highest destination, sadly, being death.

A small number of patients (5.79%) were reported as having been transferred to another hospital for convalescence, however feedback has been received from the sites that some of this number will include patients that have been transferred for ongoing acute care. This is because patients can be transferred anywhere in the country to access appropriate care, and to date the ATR has not had an acceptable value in the Discharge Destination field that captures this. The new version of the dictionary that will be used for the collection of data from the 1/7/2016 onwards has addressed this and provided a suitable value that will reflect this circumstance.

APPENDICES

Appendix A. Reporting and Publication Meeting summary.

AUSTRALIAN TRAUMA QUALITY IMPROVEMENT PROGRAM

AusTQIP

Reporting and Publication Meeting Summary

Date / time:	Tuesday 28th March, 2017 @ 13.00 hours AEST
Location:	Australian Institute of Health & Welfare, 1 Thynne St, Bruce, ACT
Chair:	Peter Cameron
Attendees:	Belinda Gabbe; Kate Curtis; James Harrison; Rebekah Ogilvie; Siobhan Isles; Ian Civil; Rodney Judson; Cameron Palmer; Tracey Daelman; Elissa Scriven; Hardeep Singh; Ben Gardiner; Chris Clarke; Jenny Hargreaves
Attendees via telephone:	Kate King; Tony Joseph; Katina D'Onise; Bernadette Kenny; Zsolt Balogh; Mark Fitzgerald
Scribe:	Jane Ford
Apologies:	Ailene Fitzgerald; Brett Sampson; Cliff Pollard; Kirsten Vallmuur; Daryl Wall; Olivia Zheng; Don Campbell; Grant Christey; Helen Mead; Jacqueline Winters; John Crozier; Michael Reade; Mimi Morgan; Nick Rushworth; Richard Morris; Roy Kimble; S. V. Soundappan; Sandy Zalstein; Andrew Keygan; Scott D'Amours; Sudhakar Rao; Maxine Burrell; Susan Adams; Sue McLellan; Warwick Teague; Bill Griggs; Oran Rigby; Helen Jowett
Notes:	The proceedings were not formal minutes, as the meeting was designed as a discussion forum without a fixed agenda. The discussion was documented as accurately as possible, either as a summary paragraph, or a series of bullet points. It was intended as a comprehensive record of the proceedings and resulting actions of the meeting. Specific questions were put to the meeting, as per the previously distributed meeting plan. These are listed, with the agreed answers, following the summary of the outcomes. The meeting notes were circulated to the participants for comment, then distributed widely to the entire ATR network.
Executive summary of outcomes of the meeting:	1. The ATR will not attempt to report KPIs nor benchmarking at this time. 2. The report will instead refer to process indicators. 3. A list of potential process indicators to be distributed to stakeholders for comment.

4. A full completeness report will be prepared for 15/16 data.

5. Quarterly quality reports will be routinely provided to the sites.

6. The BNTMDS Trauma Data Working Group to be re-convened with formal representation from New Zealand.

7. A feasibility study of collecting geospatial x/y coordinates will be undertaken in 2018.

8. The webpage on the NTRI website to be updated.

9. An ATR website to be developed in due course.

10. 2 papers to be written forthwith. Mark Fitzgerald and Peter Cameron to coordinate authors.

11. ATR administration will attend to the agreed correspondence and tasks as soon as possible.

12. The ATR and the AIHW will convene a working group to facilitate estimation of Australia wide injury incidence data.

Meeting questions and answers

1. Do we migrate 2010 – 2012 data in and report on 1/1/2010 – 30/6/2015?
The meeting decided the data were not comparable and thus reporting would not be possible for the entire time period. Comparative snapshots or descriptions can be made, with a caveat regarding data quality.

2. What are the required data items?
A report plan was distributed to the meeting. A vigorous discussion ensued about the data items as documented above. No objections were received to the format, but to ensure relevance it will be reviewed to reflect the outcomes of the meeting.

3. Will standard mortality rates be reported in this first report?
No. See the discussion on KPIs and clinical indicators.

4. How far do we go with clinical indicators?
Neither KPIs nor benchmarking will be reported at this time, as the data is not yet robust enough. A list of potential process indicators will be compiled and circulated to stakeholders for consideration.

5. Will we report on pre-hospital indicators?
Yes, with a caveat regarding data quality.

6. Will we use the AIHW to populate incidence data?
Yes, as much as possible. A salient point is that the AIHW collects a considerable amount of data without granularity. It can be used to report population incidence at this point in time, however, more work needs to be done on closing that knowledge gap. This is of particular importance in the pursuit of further funding.

7. What are appropriate deadlines, both for submission and reporting?
To optimise data rigour, submissions should be received quarterly, so that quarterly quality reports can be fed back to the sites. Feedback received from the sites at the

time of meeting is that quarterly submissions cannot be made by the end of the third month following the end of the quarter, but may be possible by the end of the fourth month. The ATR will continue to seek advice from the sites as to realistic submission deadlines, however it must be understood that timely reports depend on timely submissions.

8. Will we report calendar years or financial years?
Reporting will be undertaken for financial years, as these usually tie into costings and changes to policies and procedures.

Appendix B. RACS TQI Workshop – Discussion forum 1 outcomes.

Royal Australasian College of Surgeons
Trauma Quality Improvement Workshop - November, 2011
Outcomes summary of Discussion Forum 1 - Identifying priorities for trauma quality improvement efforts in Australia

RANK	ISSUE	NUMBER OF VOTES	RELATED ISSUE	NUMBER OF VOTES
1	After hours decision making	45		
2	Surgeon involvement	44		
3	Lack of trauma bed cards	39		
4	Communication	30	Documentation and communication	24
			Documentation (patient record)	21
			Standard language of care	7
5	Senior clinical leadership in trauma reception	30		
6	Lack of standarisation of clinical guidelines	29		
7	Early access to rehab (two-way communication)	29		
8	Clinical competence	26		
9	Loop closure	23	Closing the loop	22
10	Recruit and retain	20		
	Governance	17		
	Clinical capacity constraints	15	Service capacity constraints	7
	Nutrition	15		
	Timely access to theatre	12	Access to OT	7
	Pain relief	11		
	Recognition and compliance of interhospital transfers	8		
	Patient accountability	7		
	Intercostal catheters	5		
	Trauma education and training	4	Education/communications	4
			Education	3
	Compliance with pre-hospital destination protocol	3		
	Time to review by consultant in ICU	2		
	Compartment syndrome	2		

Appendix C. RACS TQI Workshop – Discussion forum 2 outcomes.

Royal Australasian College of Surgeons
Trauma Quality Improvement Workshop - November, 2011.
Outcomes summary of Discussion Forum 2 - 'Measuring trauma care saves lives too' - trauma clinical indicators and comparing trauma data in Australia

RANK	INDICATOR CATEGORY	INDICATORS FROM WORKSHOP	NUMERATOR	DENOMINATOR	ADULT / PAED	RATIONALE	No. of STATES COLLECTING FILTERS
1	Intubation of comatosed patient	On arrival GCS < 8	Intubation				8
		GCS < 9 in ED not intubated	Not intubated	All patients with a GCS< 9 in ED/arrival	Both	Safe secure airway, prevent hypoxia	
		GCS < 9 RSI < 10min on arrival who subsequently die	Patients with GCS < 9 who are intubated	Number of patients GCS < 9	Both	Definitive airway protection	
		Airway management	GCS < 9 not intubated within 10 minutes of arrival	Patients with GCS < 9	Both	Patients with GCS < 9 can not self manage airway - poor outcomes	
		GCS < 9 and no ETT	Patients with GCS < 9 and no ETT	Patients with GCS < 9	Both	Need to secure airway	
2	Time to laparotomy	Penetrating torso trauma with haemodynamic instability > 1h to theatre for laparotomy	> 1h to laparotomy	All patients with penetrating torso trauma and haemodynamic instability	Adult	Identify cases with unfavourable outcomes	5
		SBP < 90mmHg with abdominal injury, < 1 h to laparotomy	> 1h to laparotomy when SBP < 90 mmHg	Patients who have laparotomy with SBP < 90mmHg	Both	Time to definitive haemmorrage control	
		Time to laparotomy > 2h	Patients who have laparotomy > 2h after admission	All patients who have laparotomy	Both	Assess theatre availability	
3	Missed Injuries	Missed injury	Diagnosis made >24h, AIS >3 risk of compartment sydrome	All major trauma patients	Both	ACC	4
		Missed injuries	Patients with injuries diagnosed > 72h after admission (not initially suspected)	All trauma patients	Both	Increase morbidity and mortality: disability, increase length of stay, time in rehab, cost, OT etc	
		Missed injury AIS>2	Total trauma patients	Identified patients	Both		
4	Complications	Complications	Patients with pressure sores grade 2 and above	All trauma patients	Both	Increase length of stay eg spinal injury patients (3 months), time, cost etc	1
		Severe complications	Patients with severe complications	All major trauma patients	Both	Safety	
		Development of DVT	Patients with DVT	All major trauma patients	Adult	Prevention of complications	
5	Death	Death with decreasing probability of death	All deaths with decreasing probability of death	All deaths	Both		1
		Death	Death in hospital	All major trauma	Both	Identify preventable cases for peer review	
		Death	Number of deaths	Number of admissions	Both		
	Other	Unplanned ICU admission			Both		4
		Craniotomy > 4h from arrival in ED (extradural haemorrhage or subdural haemorrhage)	Craniotomy > 4h	All patients with extradural haemorrhage or subdural haemorrhage	Both	Assess effect on outcome	5
		Time to head CT for GCS < 14 in < 1h	Patients who have head CT in < 1h with GCS < 14	Patients who had head CT GCS < 14	Both	Disposition and consults and/or operative intervention	7
		> 3h spent at referring hospital	Patients > 3h (or 4h) at referring hospital	All transfers	Both	Quality timeliness of care, trauma system integrity, accountability- compliance	4
		Time to theatre	Time to theatre with an open fracture	All major trauma patients requiring emergency theatre	Both	Appropriateness, accessibility	4
		Hypothermia	Patients with body temperature < 35C	All major trauma patients	Both	Prevention of coagulopathy	2
	Other	GCS < 9 and no ICP insertion	Patients with GCS < 9 and no ICP	All patients with GCS < 9	Both	Prevention of secondary brain injury	0
		ED length of stay	All patients ISS>15 via ED length of stay > 2h	Patients in ED ISS>15	Both	Compromised outcome	0
		Length of stay in acute hospital	Length of stay	All major trauma patients	Both	Efficiency, effectiveness	0
		Discharge destination	Patients discharged to: home, rehab, death etc (AIS > 4?)	All major trauma patients	Both	Appropriateness	0
		SBP < 90mmHg with pelvic fracture, angiogram > 1h	Patients who have angiogram > 1h with SBP < 90mmHg	All patients who have angiogram with SBP < 90mmHg	Both	Time to definitive haemmorrage control	0
		Time to non-urgent orthopaedic intervention < 24h	Patients with ankle fracture who had OT > 24h after admission	All closed ankle fractures	Both	Provides insight into how orthopaedic care is provided, quality indicator, decrease complication rate through slow mobilisation	0

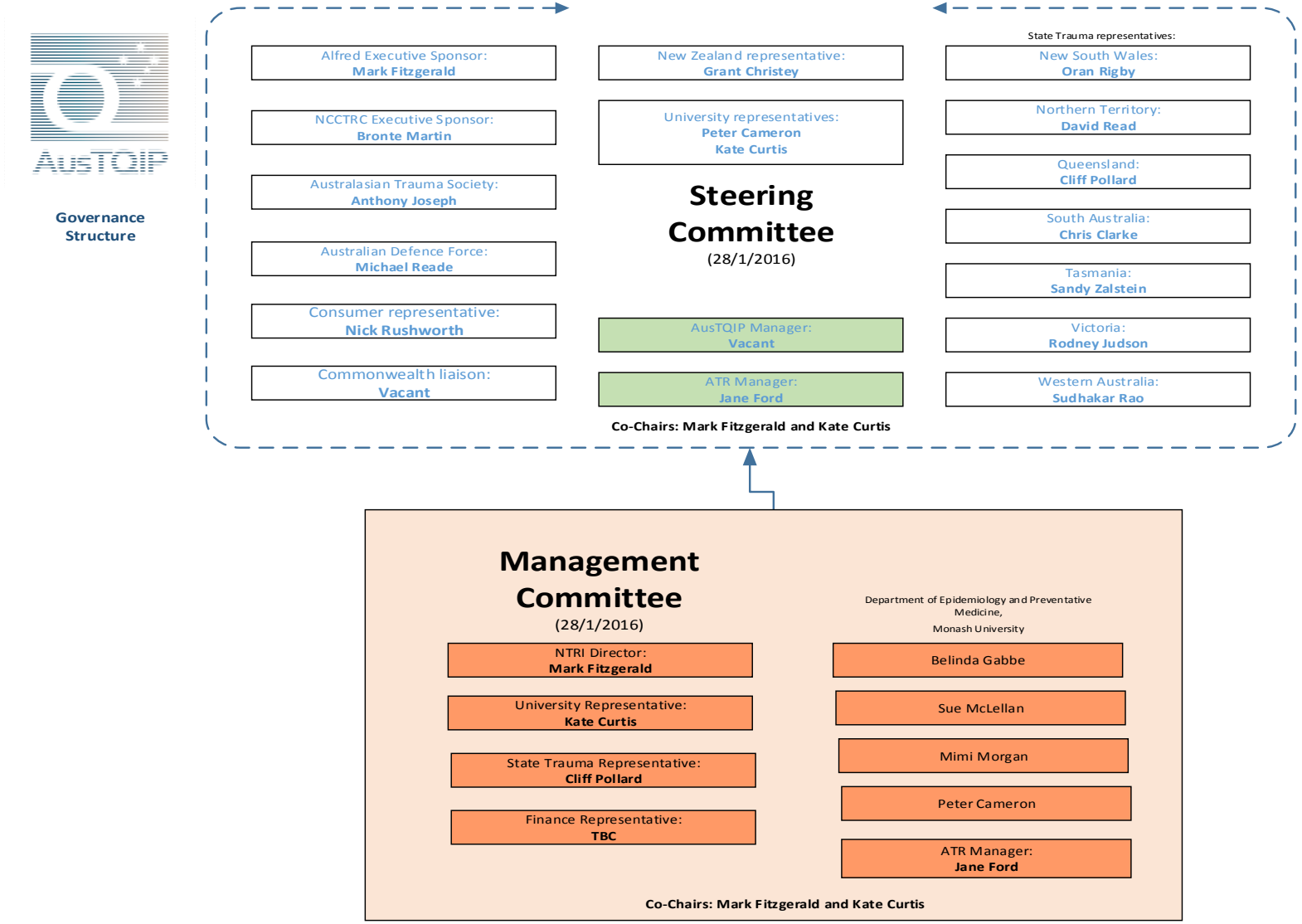
KEY

Blues: Top 5 indicators from workshop, ranked based on: (1) frequency cited at workshop (e.g. 5 groups suggested GCS < 9, 3 groups suggested each of the others) and (2) whether they are currently being collected in Australia

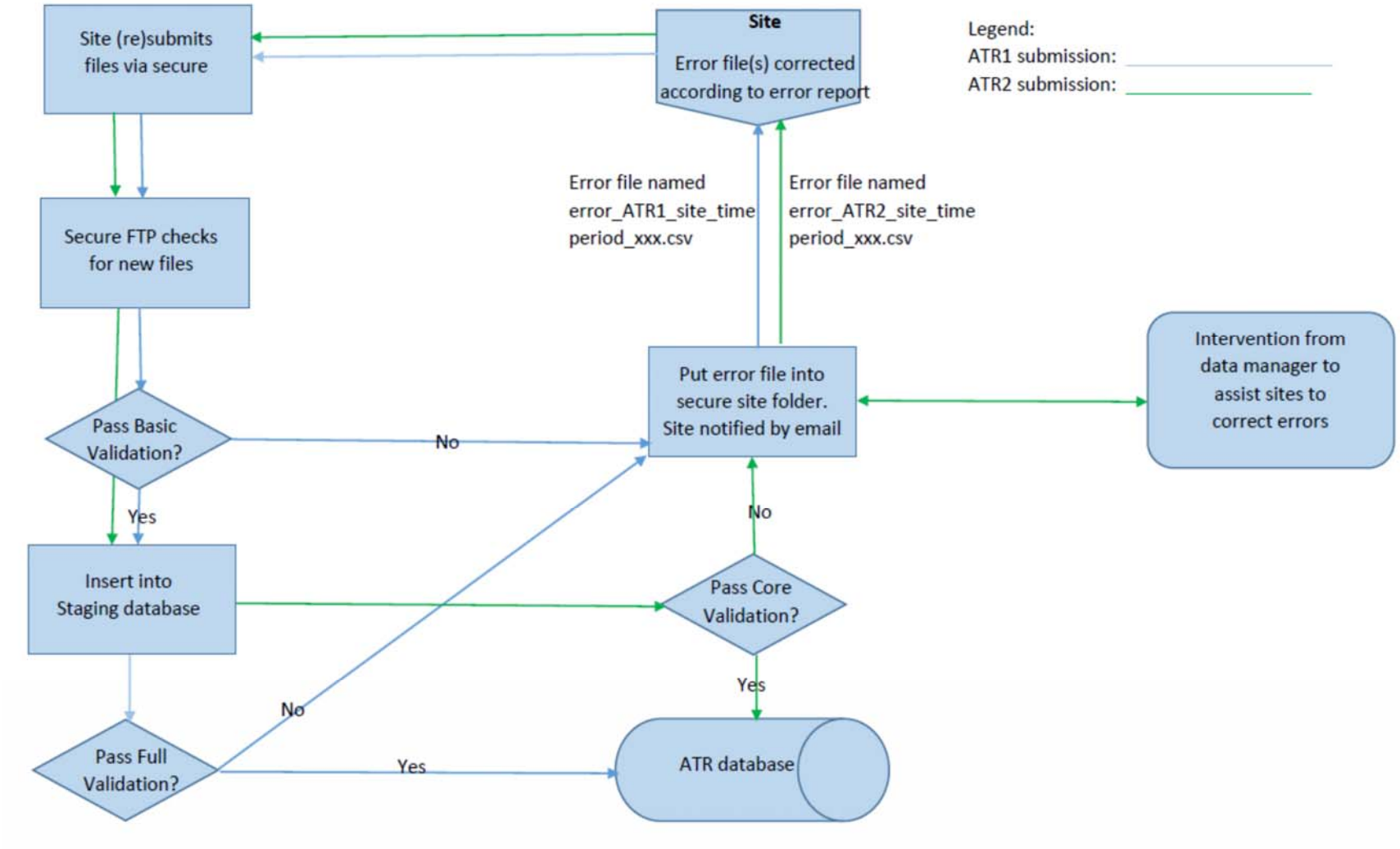
Orange: suggested by only 1 group at the workshop, and collected by at least one hospital across Australia

Yellow: suggested by only 1 group at the workshop, and NOT collected at any hospital in Australia

Appendix D. AusTQIP governance structure.



Appendix E. Data import flow process.



Appendix F. Heat map of postcodes of injury.

	New South Wales	Northern Territory	Queensland	South Australia	Tasmania	Victoria	Western Australia
Blacktown	535						
Brisbane			517				
Bankstown	489						
Cessnock	476						
Brimbank						397	
Melbourne						364	
Lake Macquarie	364						
Sydney	287						
Hornsby	255						
Sutherland Shire	220						
Bayside						219	
Boroondara						200	
Auburn	194						
Hume						194	
Adelaide Hills				194			
Baw Baw						193	
Camden	193						
Ashfield	192						
Armadale							180
Canterbury	179						
Moreton Bay			168				
Joondalup							163
Ku-ring-gai	156						
Casey						153	
Newcastle	148						
Knox						146	
Banyule						144	
Botany Bay	142						
Mornington Peninsula						142	
Greater Geelong						140	
Cardinia						135	
Greater Dandenong						132	
Blue Mountains	129						
Maribyrnong						125	
Alexandrina				118			
Kogarah	117						
Frankston						114	
Randwick	112						
Onkaparinga				112			
Adelaide				112			
Belmont							111
Gosford	110						
Dungog	109						

Canning							107
Darebin						103	
Bathurst Regional	102						
Glen Eira						100	
Shoalhaven	99						
Cockburn							98
Pittwater	89						
Fairfield	89						
Ballarat						89	
Leichhardt	85						
Parramatta	84						
Perth							83
Marion				82			
Holroyd	81						
Mandurah							81
Manly	79						
Charles Sturt				78			
Hobsons Bay						77	
Manningham						76	
Bassendean							74
Lane Cove	73						
Campaspe						71	
Holdfast Bay				71			
Hurstville	70						
Alpine						69	
Waverley	68						
Greater Taree	67						
Burwood	66						
Ashburton							65
Port Stephens	64						
Campbelltown				61			
Kalamunda							60
Greater Bendigo						60	
Goulburn Mulwaree	59						
Bass Coast						58	
Wollongong	58						
Armidale Dumaresq	58						
Port Adelaide Enfield				57			
Mosman	56						
Bellingen	56						
North Sydney	55						
Fraser Coast			54				
Albury	53						
Hunters Hill	53						
Macedon Ranges						53	

Colac-Otway						52	
Port Phillip						52	
Mitchell						52	
Banana			51				
Murray							50
Sunshine Coast			48				
Bayswater							46
Gunnedah	46						
Bland	45						
Shellharbour	45						
Benalla						45	
Golden Plains						45	
Warringah	44						
Cabonne	44						
Karoonda East Murray				44			
Ararat						44	
East Gippsland						42	
Moyne						42	
Boddington							42
Bundaberg			42				
Chittering							42
Greater Shepparton						42	
Barossa				40			
Kiama	40						
Augusta-Margaret River							40
Cambridge							40
Nillumbik						40	
Bunbury							40
Stirling							40
Berrigan	40						
Hepburn						39	
Playford				39			
Chapman Valley							39
Grant				37			
Broome							36
Berri and Barmera				36			
Cooma-Monaro	36						
Rockingham							36
Marrickville	36						
Kempsey	35						
Yarra Ranges						34	
Barunga West				33			
Murrindindi						33	
Mansfield						32	
Albany							32

Mitcham				30			
Mildura						29	
Mundaring							29
Wyong	29						
Latrobe						29	
Moonee Valley						29	
Bogan	27						
Wingecarribee	27						
Central Goldfields						27	
Mallala				27			
Salisbury				27			
Coolamon	27						
Gympie			26				
Kalgoorlie/Boulder							25
East Fremantle							25
Clarence Valley	25						
Swan							25
Willoughby	24						
Coonamble	24						
Ryde	24						
Dandaragan							24
Rockhampton			23				
Wellington						23	
Monash						23	
Glenelg						23	
Gloucester	23						
Bega Valley	23						
Beverley							23
Boyup Brook							22
Boorowa	22						
Muswellbrook	21						
Buloke						20	
Clare and Gilbert Valleys				20			
Gwydir	20						
Gosnells							19
Canada Bay	19						
Gold Coast			18				
Wakool	18						
Balranald	18						
Yankalilla				18			
Busselton							18
Yorke Peninsula				18			
Glen Innes Severn	18						
Dundas							18
Yass Valley	17						

Flinders Ranges				16			
Bruce Rock							16
Anangu Pitjantjatjara				16			
Eurobodalla	16						
Loxton Waikerie				15			
Ipswich			15				
Kingston						15	
South Perth							15
Bombala	15						
Light				15			
Cunderdin							15
Mid-Western Regional	14						
Hindmarsh						14	
Carrathool	14						
Mount Remarkable				14			
Broomehill-Tambellup							13
Melton						13	
Cleve				13			
Lower Eyre Peninsula				13			
Horsham						12	
Upper Lachlan Shire	12						
Dubbo	12						
Griffith	11						
Wangaratta						11	
Claremont							11
Kwinana							11
Corangamite						11	
Barcaldine			11				
Ballina	10						
Greater Hume Shire	10						
Gingin							9
Goyder				9			
Queanbeyan	9						
Dumbleyung							9
Tenterfield	9						
Blayney	9						
North Burnett			9				
Palerang	9						
MacDonnell		8					
Corrigin							8
Coolgardie							8
South Gippsland						8	
Wanneroo							8

Cootamundra	8						
Coorow							8
Liverpool Plains	8						
Naracoorte and Lucindale				8			
Carnamah							7
Derby-West Kimberley							7
Coffs Harbour	7						
Loddon						7	
Woollahra	7						
Logan			7				
Liverpool	7						
Kangaroo Island				7			
Cairns			7				
Central Highlands					7		
Whittlesea						7	
Fremantle							7
Roebourne							7
Conargo	6						
Victoria-Daly		6					
Tumbarumba	6						
Moree Plains	6						
Northern Grampians						6	
Cherbourg			6				
Maroondah						6	
Gawler				6			
Tweed	6						
East Pilbara							6
Lithgow	6						
Southern Grampians						6	
Whitehorse						6	
Cue							6
Wollondilly	6						
Burnside				6			
Brewarrina	6						
Serpentine-Jarrahdale							5
Kyogle	5						
Coober Pedy				5			
Redland			5				
Penrith	5						
Gundagai	5						
Tamworth Regional	5						
Isaac			5				
Lockyer Valley			5				

Goondiwindi			5				
Snowy River	5						
Mount Alexander						4	
Surf Coast						4	
Moira						4	
Port Macquarie-Hastings	4						
Townsville			4				
Somerset			4				
Carnarvon							4
Leeton	4						
Hawkesbury	4						
Junee	4						
Laverton							4
Burnie					4		
Central Desert		3					
West Torrens				3			
Roxby Downs				3			
Forbes	3						
Ceduna				3			
Byron	3						
Copper Coast				3			
Aurukun			3				
Wentworth	3						
Dalwallinu							3
Manjimup							3
Gannawarra						3	
Shark Bay							3
Toowoomba			3				
Gilgandra	3						
Gladstone			3				
Denmark							2
Whyalla				2			
Whitsunday			2				
Cuballing							2
Launceston					2		
Irwin							2
Melville							2
Tea Tree Gully				2			
Bridgetown-Greenbushes							2
Balonne			2				
Dardanup							2
Guyra	2						
Jerramungup							2
Corowa Shire	2						
Cottesloe							2
Dowerin							2
Yarriambiack						2	

Barkly		2					
Collie							2
Harvey							2
Blackall Tambo			2				
Elliston				1			
Indigo						1	
Central Coast					1		
Lachlan	1						
The Coorong				1			
Burke			1				
Pyrenees						1	
Glenorchy					1		
Maralinga Tjarutja				1			
Perenjori							1
Brighton					1		
Menzies							1
Clarence					1		
Mid Murray				1			
Esperance							1
Sorell					1		
Hobart					1		
Barcoo			1				
Winton			1				
Cassowary Coast			1				
Central Darling	1						
Kingborough					1		
Koorda							1
West Coast					1		
Flinders					1		
Huon Valley					1		
Kellerberrin							1
West Wimmera						1	
Kentish					1		
Southern Mallee				1			

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