



# Gold Coast Health Trauma Service Report 2018-2021



**For further information about this document, please contact:**

Gold Coast University Hospital Trauma Service, Department of Health, GPO Box 48, Brisbane QLD 4001.

[gch.trauma.service@health.qld.gov.au](mailto:gch.trauma.service@health.qld.gov.au)  
07 5687 0231

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**Gold Coast Health Trauma Service Report 2018-2021**

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**Acknowledgement of Country**

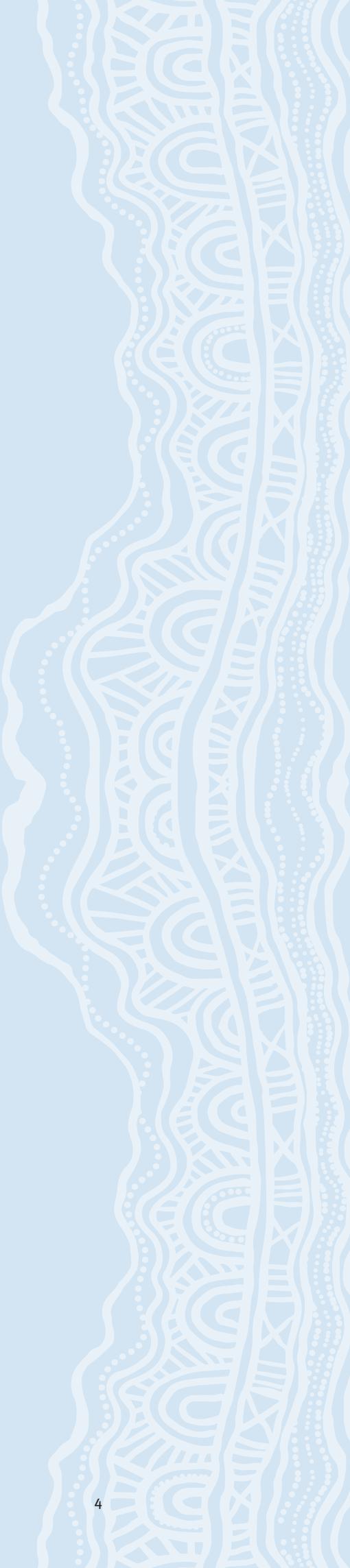
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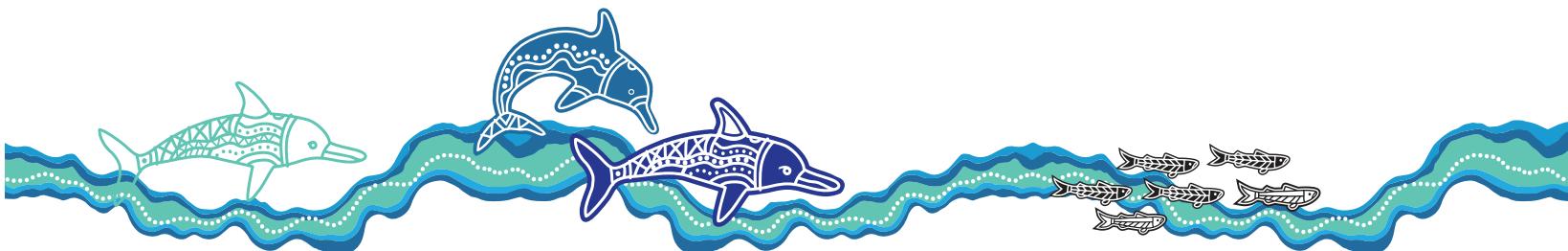


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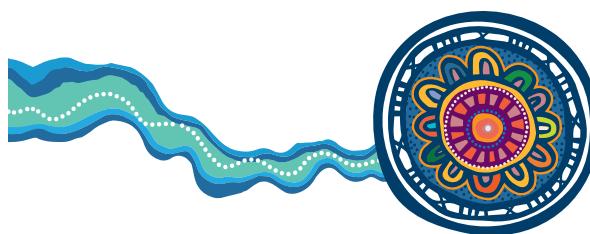
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# Pre-amble

All data presented is based on admission date as the primary identifier of year and time frames.

Throughout this report the definitions utilised, unless otherwise specifically stated, refer to the Bi-National Minimum Data Set v 1.51 as published by the Australia New Zealand Trauma Registry (ATR).

The information presented here is related to the Seriously Injured. This is defined as meeting the ATR inclusion and exclusion criteria.

## Inclusions:

All patients of any age admitted to hospital with either:

- Injury Severity Score (ISS) >12 (based on AIS 2005 Update 2008) or
- Death following injury

## Exclusions:

- Patients with delayed admissions greater than 7 days after injury
- Poisoning or drug ingestion that does 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 ( $\geq 65$  years of age) 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).

(BNTMDS, 2016)

## Data Disclaimer

All reasonable care and effort has been made to ensure accuracy of data. All data is entered based on availability within the source material, some of which may not have been available at time of validation and reporting.

## Royal College of Surgeons Trauma Verification

In 2018 visit from RACS Trauma Verification team GCUH was awarded Level 1 Trauma Service.



Figure 1 RACS Trauma Verification Visit with GCUH Trauma Service and Certificate



# Service Location

Gold Coast Hospital and Health Service

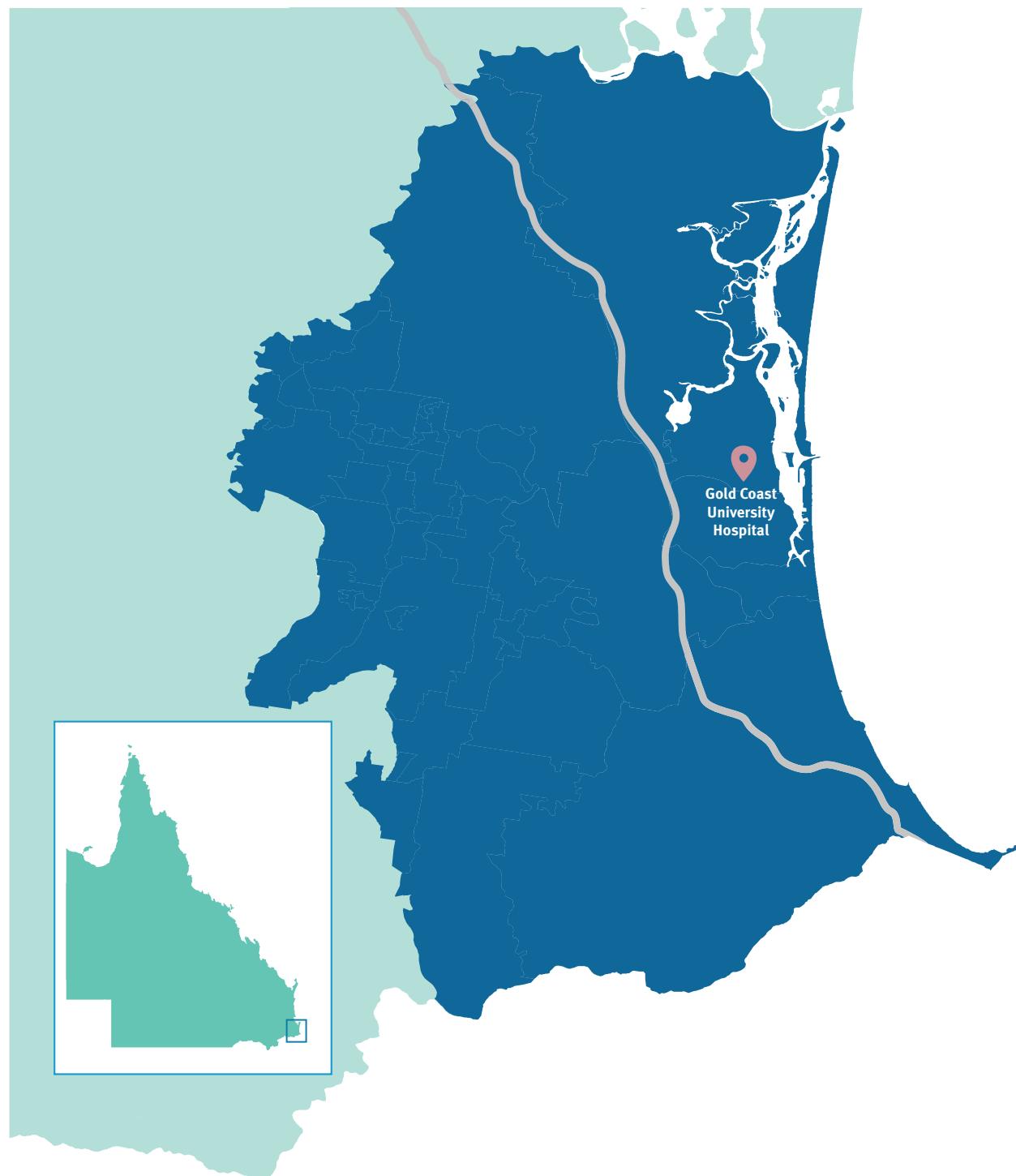


Figure 2 Location, Gold Coast Health Region, Gold Coast Hospital and Health Service, Queensland, Australia

### GCUH Trauma Service catchment

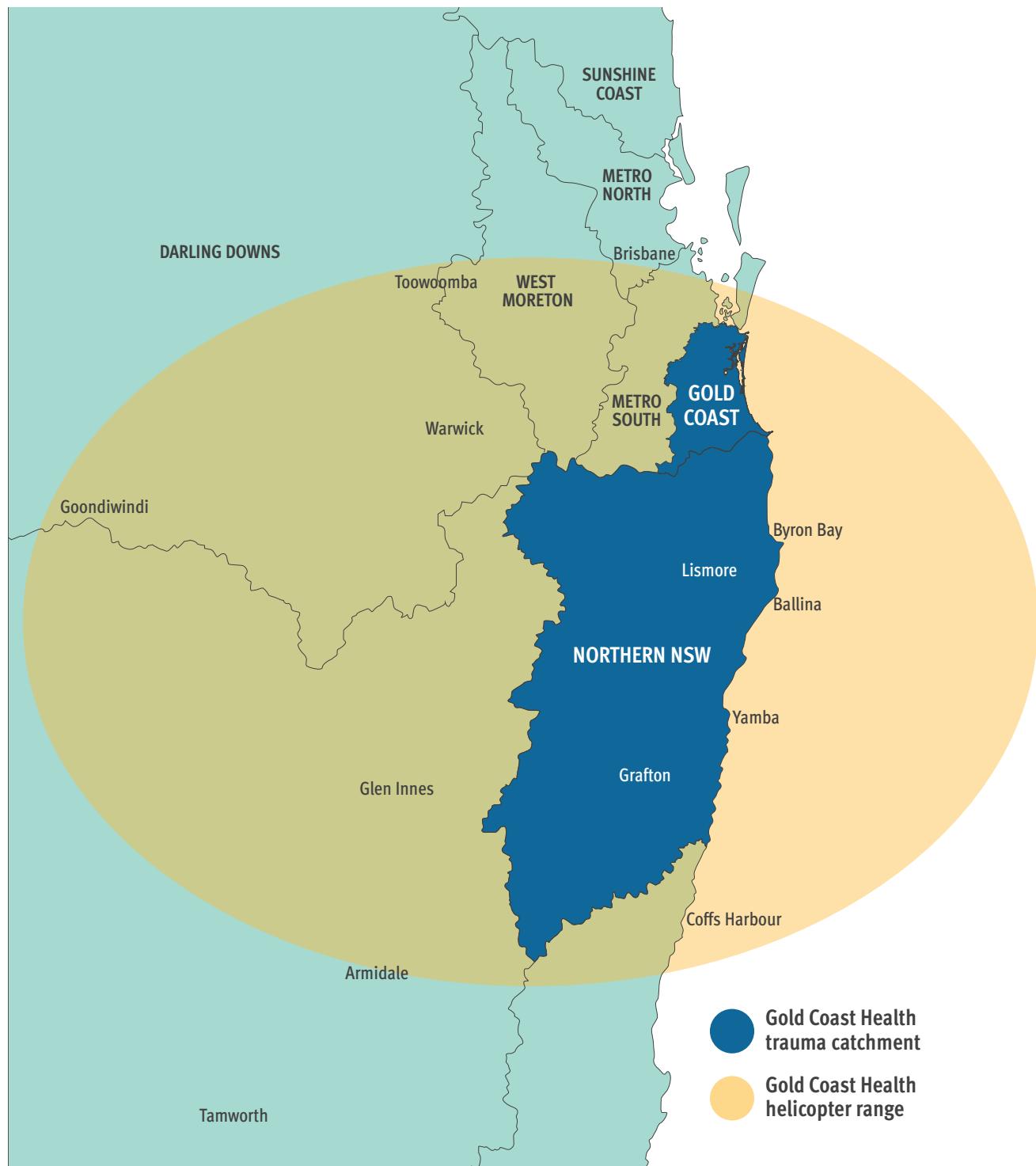
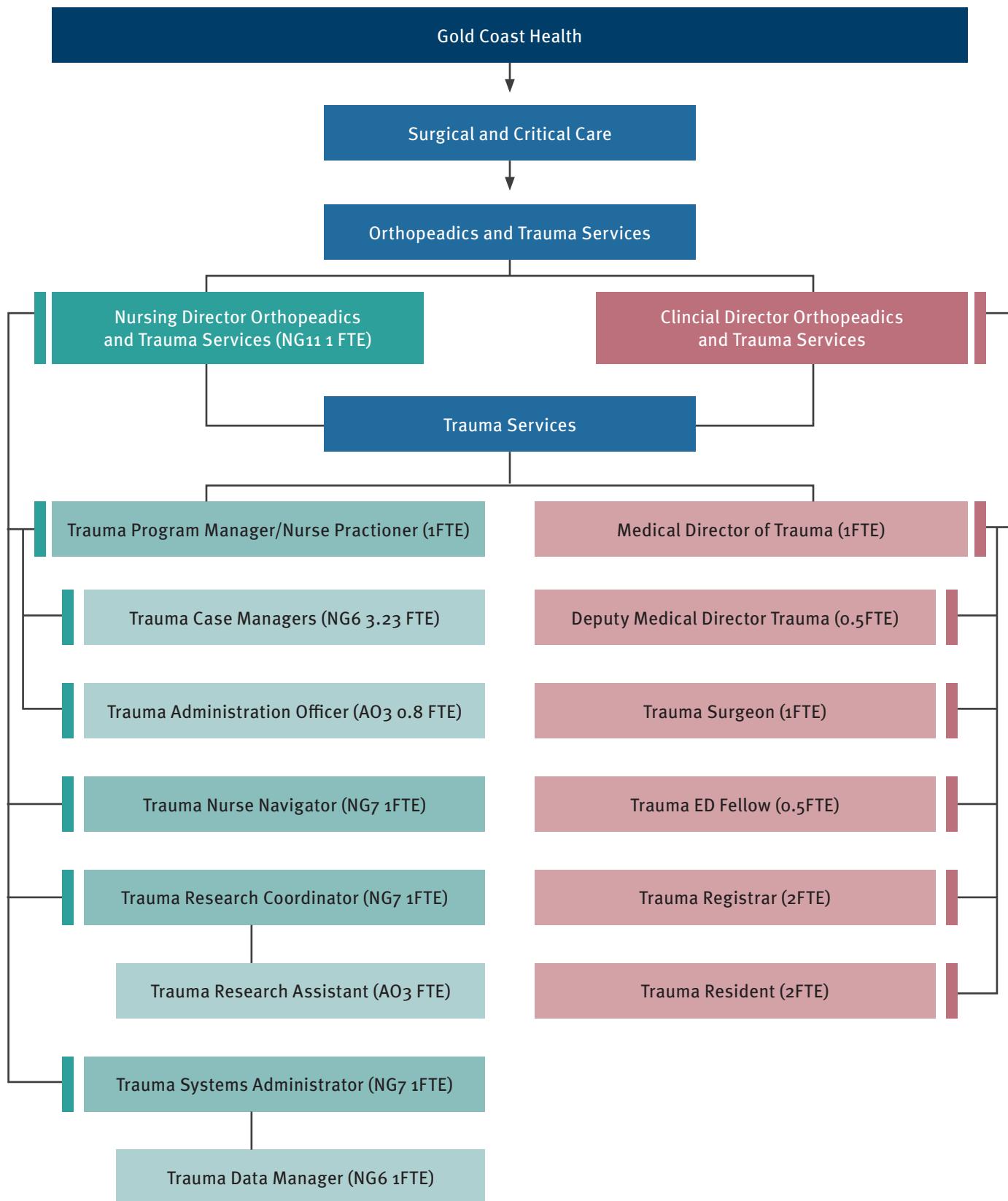


Figure 3 Catchment approximate for GCUH Trauma Service including Northern NSW.

# Organisational Chart



# Trauma Committees





# Programs

## Outpatient

The Gold Coast University Hospital Trauma Service provides a unique follow up program including acute clinical review in a Nurse Practitioner led clinic, ongoing case management post discharge by a Nurse Navigator and functional follow up and hospital avoidance program at 6 and 12 months. All three follow up programs have separate clinic codes in ESM and generate activity.

### Trauma Connect Clinic

Trauma Connect Clinic was set up in 2019 and services approximately 160 appointments per annum. The Trauma Nurse Practitioner reviews the following patients in this clinic:

- Chest trauma requiring follow up (Persistent pleural effusion or pneumothorax)
- Rib fixation patients (As required, 4-week review with CXR and 12-month review with low volume CT chest)
- Splenic embolisation patients (As required, Red Cell Morphology at 2 weeks then 6-month review with Multiphase CT Abdomen)
- Patients requiring ongoing analgesia management and weaning
- Ongoing specialised dressing care
- Follow up of incidental findings

### Trauma Nurse Navigator Clinic

Trauma Nurse Navigator is in contact with clients in multiple outpatient clinics, in-person reviews, phone reviews, telehealth, and home visits.

Trauma Nurse Navigator case manages 50 + patients per year and, at present, has a case list of 74 patients. These cases range in stages of navigation from Intensive through Managing, Maintaining and then Transitioning.

The aim is to discharge clients from Trauma Nurse Navigation by twelve months however many clients require further onboarding to manage ongoing complex Trauma issues beyond this time frame

### Trauma Service Follow-up program

We implemented a Trauma Service Follow-up program (TSFU) into our existing clinical trauma service in 2019. The TSFU is delivered by the clinical staff of the multi-disciplinary trauma service which includes nurses and allied health (physiotherapist and occupational therapists). The aims of the TSFU are to (i) collect long-term outcome data on the major trauma patients who were treated at the hospital; (ii) provide insight into the long-term outcomes of major trauma patients attending our centre; and if the program was found to be feasible (iii) provide a platform on which future interventions in relation to the ongoing care of major trauma patients may occur. The program was modelled on the methods used by Victorian State Trauma Outcomes Registry and Monitoring Group (VSTORM), however, it differs in that it is implemented by the clinical team who were involved in the care of the patients. The TSFU is novel in Australia in that it was specifically designed to be embedded within. In 2020 had a follow up rate of 85.5% and 77.8% at 6 and 12 months respectively.

## Research

The Trauma Research and Registry group has been established since 2017. Its remit is aligned with the GCHHS Research Strategy and Roadmap (2019-2022) and aims to embed research as core business, build research capacity within the trauma service, strengthen existing research partnerships and actively seek and commence new collaborations and establish a sustainable research culture.

The Trauma Research strategy is centred around six pillars of research (left image) from roadside to recovery and include Pre-hospital, Acute and Critical Care, Rehabilitation, Post discharge and the Trauma Registry, which is vital to the contribution of data integrity and provision of accurate and timely data and prevention which includes the PARTY program. Projects both in a research and Quality Improvement (QI) capacity cover all the pillars of research to ensure engagement with all areas of the trauma patient journey.

Members of the group attend research meetings with both Critical Care and Emergency Departments, as well as divisional and GCHHS Research Committee meetings to ensure collaboration and coordination of projects. The Trauma Service has a

continued and visible presence at conference both locally, nationally, and international with over 100 presentations since 2014 and almost 50 articles published in peer reviewed journals. Since the commencement of the group, the trauma service has been part of over \$5.5million in research grants, with over \$600,000.00 led by a member of the trauma research group.

The Trauma Service partners with Griffith and Bond Universities and supervises students undertaking Doctor of Medicine, Doctor of Philosophy and Public Health programs to develop research skills, increase and embed research within the wider healthcare workforce and support the development of new knowledge. To date we have partnered with three PHD candidates, 1 public health student and over 20 Doctor of Medicine students from Griffith and Bond Universities.

In addition to university partners, Trauma Service research has collaborated with the Australia and New Zealand Intensive Care Society in multi-site international clinical trials; Pre-hospital retrieval teams (Queensland Ambulance Service and LifeFlight); Hospital Health Services both throughout Queensland, New South Wales, South Australia. The service also partners with the National Trauma Research Institute and the Chest Wall Injury Society.

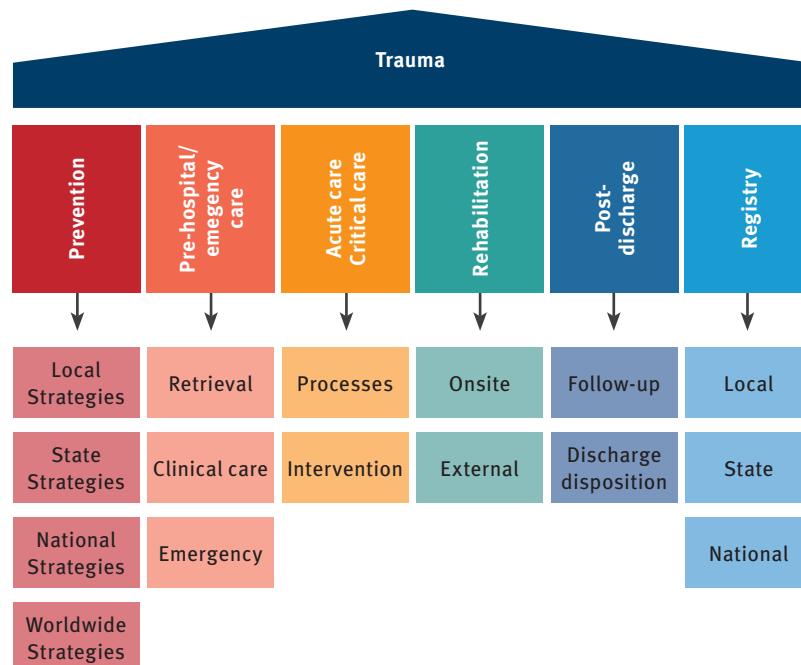


Figure 4 Six pillars of research, Trauma Service

## Research outputs

CWIS 2021

Three-dimensional volume-rendered computed tomography application for follow-up fracture healing and volume measurements pre-surgical rib fixation and post-surgical rib fixation

Don Campbell, FACS, Nicholas Arnold, BAppSc (MedRad Tech), Elizabeth Wake, BSc(Hons), MN, John Grieve, FRANZCR, Sylvio Provenzano, FRACS, Martin Wulschleger, FRACS, and Bhavik Patel, FRACS, Queensland, Australia

TRAUMA

Royal Australian College of Surgeons

Outcomes of rib fractures in the geriatric population: A 5-year retrospective, single-institution, Australian study

Emma Cooper Elizabeth Wake Charlie Cho, Martin Wulschleger and Bhavik Patel

\*Intensive Care Unit, Gold Coast Hospital and Health Service, Southport, Queensland, Australia  
†Faculty of Health Sciences and Medicine, Bond University, Robina, Queensland, Australia  
‡Trauma Unit, Gold Coast University Hospital, Southport, Queensland, Australia and  
§School of Medicine, Griffith University, Southport, Queensland, Australia

European Journal of Trauma and Emergency Surgery  
<https://doi.org/10.1007/s00068-021-01652-w>

ORIGINAL ARTICLE

Substitution of ROTEM FIBTEM A5 for A10 in trauma: an observational study building a case for more rapid analysis of coagulopathy

Alexander Blayney James McCullough <sup>1</sup>, Elizabeth Wake <sup>2</sup>, Kerin Walters <sup>1</sup>, Don Campbell <sup>2</sup>, Debbie Ho <sup>1</sup>, Erick Chan <sup>1</sup>, Aashish Chalasani <sup>1</sup>, James Winearls <sup>1,3,4,5</sup>

International Surgery Journal  
Campbell *et al.* *Int Surg J* 2021 Aug; 8(8):2374-2382  
<http://www.ijssurgery.com>

eISSN 2349-3305 | pISSN 2349-2902

Original Research Article

Experience with clinical pathway for management of high grade blunt splenic injuries: a prospective study in adults at two tertiary trauma centers

Don Campbell <sup>1</sup>, Elizabeth Wake <sup>1</sup>, John Grieve <sup>2</sup>, Muddassir Rashid <sup>2</sup>, Martin Wulschleger <sup>1</sup>, Bhavik Patel <sup>1\*</sup>

Division of Trauma, Gold Coast University Hospital, Southport, Queensland, Australia  
Division of Radiology, Gold Coast University Hospital, Southport, Queensland, Australia

ORIGINAL ARTICLES

Fibrinogen Early In Severe Trauma studY (FEISTY): results from an Australian multicentre randomised controlled pilot trial

James Winearls, Martin Wulschleger, Elizabeth Wake, Zoe McQuilton, Michael Read, Catherine Hurn, Glenn Ryan, Melita Trout, James Walsham, Anthony Holley, Shane George, Wayne Dyer, James McCullough, Gerben Keijzers, John Fraser, Jeffrey Presneill and Don Campbell

RESEARCH

Evaluation of Patient Information Material in the Consent Process for Surgical Stabilization of Rib Fractures

Gary S. L. Hung, MBBS Ben Gardiner, BN, RN Bhavik M. Patel, MBBS, MS, MPhil, FRACS

Figure 5 Research publications examples from 2021

	2018	2019	2020	2021
10 trauma-related peer-reviewed articles in PubMed-listed journals in a 3-year period	6	16	14	11
Trauma staff have academic affiliations with a tertiary institution	Y	Y	Y	Y
Trauma Service facilitates and supervises research	Y	Y	Y	Y
Contribution to national and/or international multicentre research	Y	Y	Y	Y
Regular presentations of original trauma research at conferences	44	26	18	12
Demonstrates peer-reviewed funding for trauma research (applications)	16	1	5	1

Table 1 Research RACS Trauma Verification requirements, GCUH 2018-2021

## Research mid-year snapshot 2021

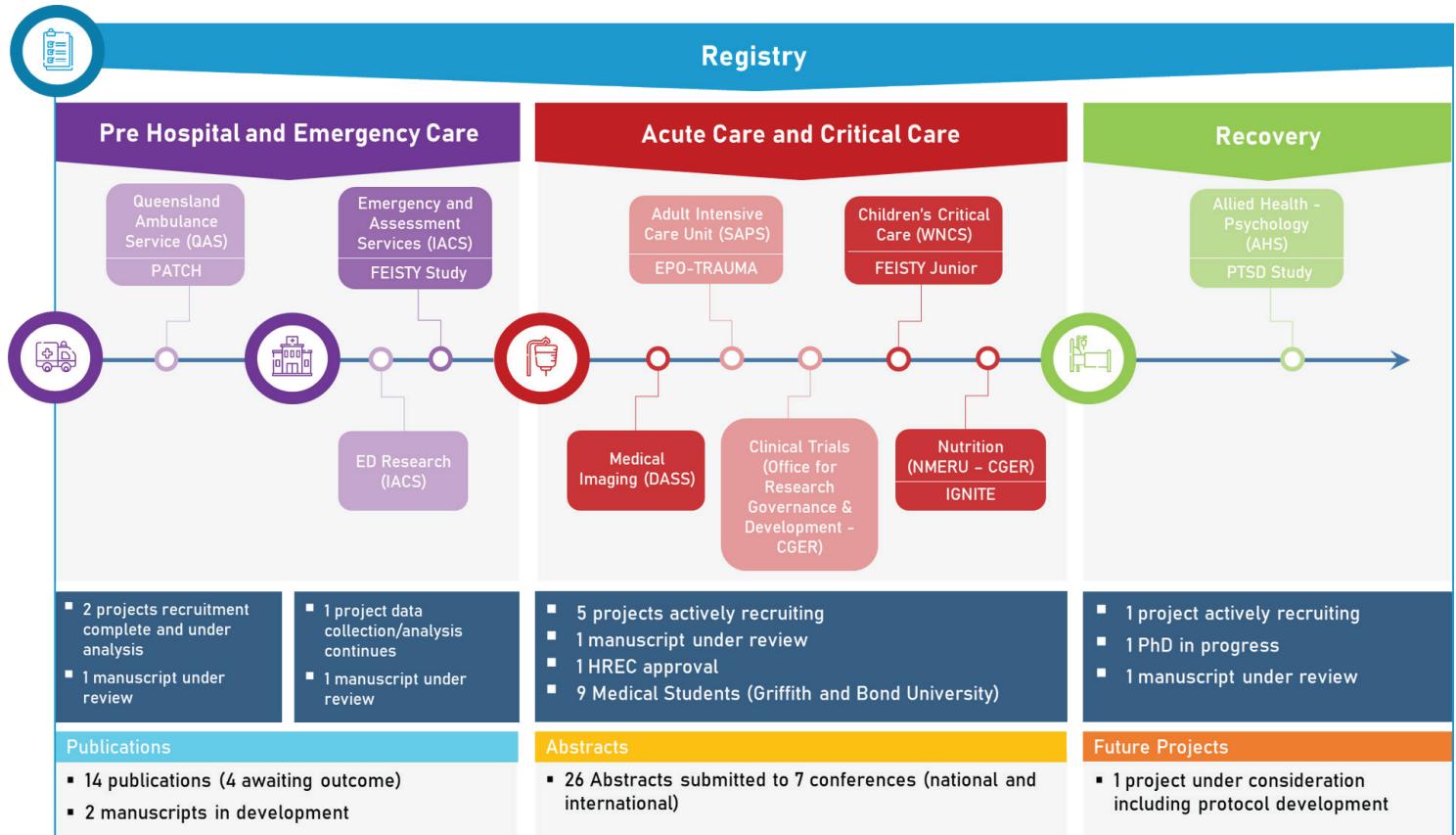


Figure 6 Research Mid-Year Snapshot 2021

## Recruitment Rates 2018 - 2021

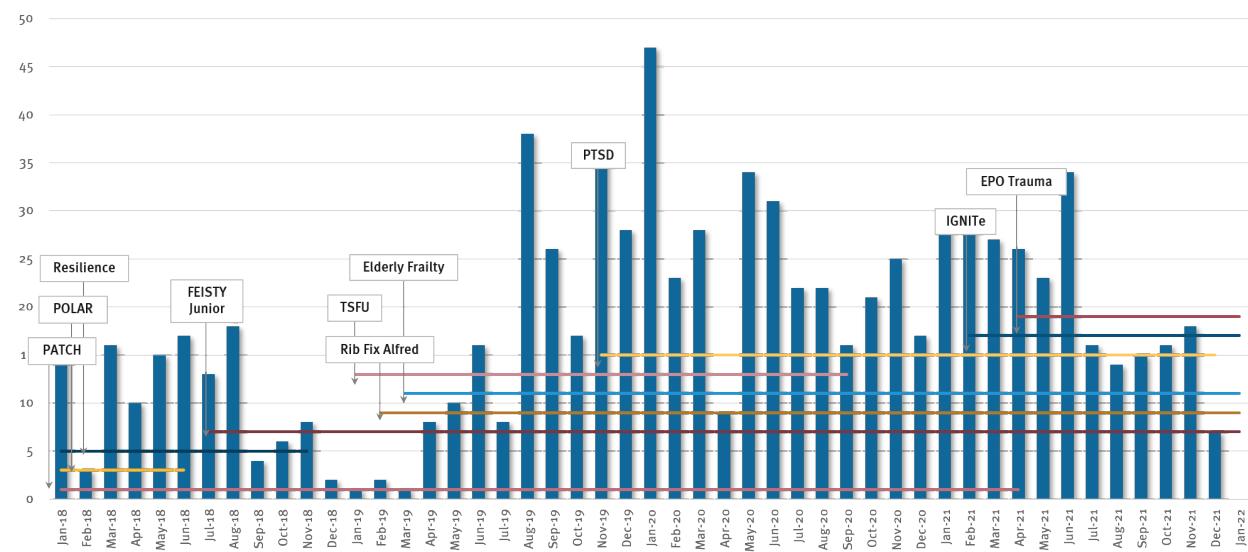


Figure 7 Research – Overall Trauma Studies and Recruitment Rates

## Total Monthly Follow Up Rates 2018 - 2021

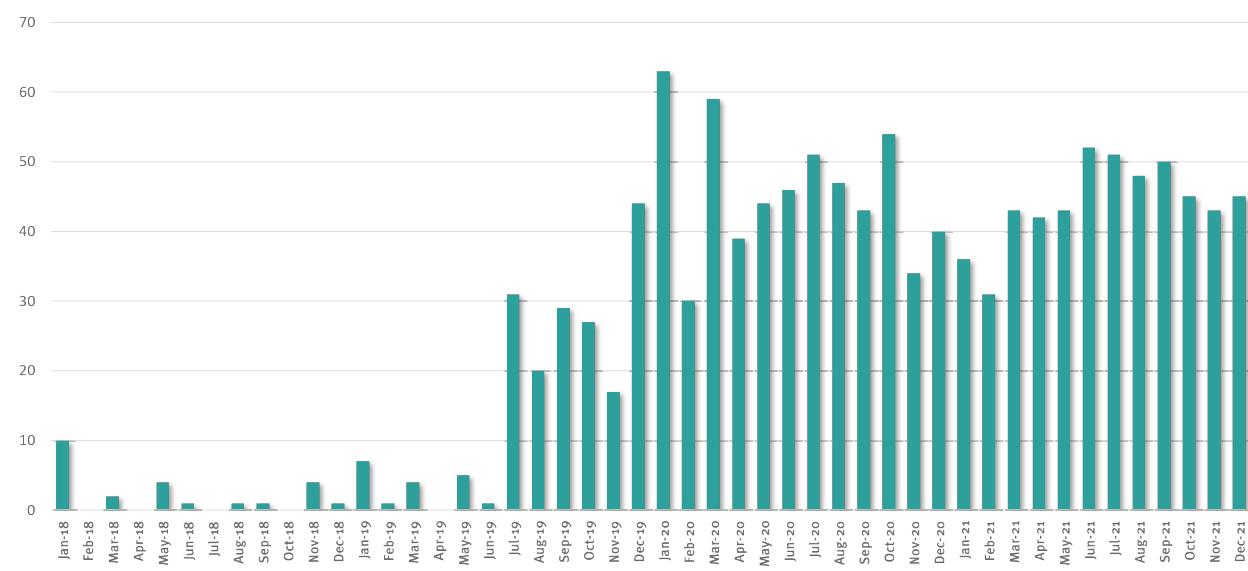


Figure 8 Research – Trauma Service Follow Up program, 2018-2021

## P.A.R.T.Y.

### Prevent alcohol and risk-related trauma in youth

Since 2015 Gold Coast Hospital Health Service (GCHHS) Trauma Service has proudly presented the Prevent Alcohol and Risk related Trauma in Youth (P.A.R.T.Y.) program at Gold Coast University Hospital (GCUH) and continues to do so to date.

This is a full day interactive hospital-based Trauma prevention program delivered to an audience of up to 36 students from Grade 10 to 12. The content follows the experience of the Trauma patient from pre-incident through to the possibility of lifelong disability or death with the aim of generating positive behavioural change in youth.

In 2019 P.A.R.T.Y. program received the Australian Road Safety Awards “School Programs Award” and the penultimate “Founder Award for Outstanding Achievement”.

In the past 4 years (2018-2021) we have held a total of 34 school programs and 5 programs for the relatives of GCHHS staff aged between 14 and 20 years. A total of 933 youth have attended this program between 2018 to 2021.

The program is conducted by Trauma Service and Trauma Ward (C6E) Nursing and administration staff.

Presenters range from Queensland Ambulance Service (QAS), Emergency Department Staff Specialists, Oral Maxillofacial Surgeons, Trauma Surgeons, Pharmacist, Social Work, Occupational Therapy, Speech Therapy and Physiotherapy Staff.

The program incorporates presentations, interactive discussions, resuscitation, ICU, Fatal Vision, Occupational Therapy, Physiotherapy and Speech Pathology scenarios.

Two trauma survivors and a mother who has endured the loss of her daughter also present their stories and provide frank discussions with our attendees giving a first-hand account on the effect Trauma has had on their lives. These generous people give a tangible perspective.



Figure 9 2021 Trauma Service P.A.R.T.Y. Team Members, (L-R: AO Sarah Czuchwicki, RN Tayla Doyle, NN Matthew Scott (Nurse Navigator / P.A.R.T.Y. Coordinator), RN Louisa McDonald.)

Together with the help, support and enthusiasm of many more people (including Venue Management, our local Café, Doctors Orders, our own hospital GCUH Food Services providing catering and Dock Masters providing bus parking facilities) we are fortunate to deliver a powerful dynamic in-hospital educational experience to our local youth. We have steadily increased our program numbers from 14 in 2018 to 17 in 2021 including 2 programs per year specifically for GCHHS staff's children. These programs for GCHHS Staff's children generate much positive feedback and anecdotal evidence of the long term effect of the program and behavioural change of participants. Many P.A.R.T.Y. program participants have subsequently returned as healthcare professionals who have since been active in the delivery of the GCUH P.A.R.T.Y. program.



## Trauma Survivors Network

The Trauma Survivors Network (TSN) is a program of the American Trauma Society (ATS USA) – Gold Coast University Hospital (GCUH) is the first Australian participating facility. GCUH commenced collaboration with the ATS USA in 2020.

The TSN program works to:

- Bring together trauma survivors and families to connect with one another and share support and information about the recovery process
- Enhance survivor skills and self-efficacy to manage day-to-day challenges
- Establish a network of state-of-the-art, hospital-based peer support programs and other resources for trauma survivors and their families
- Train health care providers to deliver the best care and support to patients and their families and friends
- Build a community of advocates dedicated to improving prevention efforts, trauma outcomes and trauma systems

TSN is a community of patients and survivors looking to connect with one another and rebuild their lives after a serious injury. The underlying goal of our resources and programs is to ensure the survivors of trauma a stable recovery and to connect those who share similar stories.

Please be assured that the TSN website is non-commercial and provides a private and secure way to communicate with other trauma survivors. <https://www.traumasurvivorsnetwork.org/pages/home>

Gold Coast held its first Trauma Survivors event in May 2021 celebrating Trauma Survivor's Day with plans to continue in 2022.



Figure 10 GCUH Inaugural Trauma Survivors Day 19th May 2021

## Education

### Trauma Service Inservice

Trauma Service Inservice's for nursing, medical and allied health staff are conducted on a monthly basis engaging presenters from both within our service and externally.

### Trauma Radiology Review

Weekly Radiology review meetings discussing cases of interest are presented weekly by our Medical Imaging department.

### Trauma Simulation

Trauma Simulation exercises are held monthly by Dr Victoria Brazil (Emergency Department) and Clare Scott CNC Simulation and the GCUH Simulation team. These range from external incidents to Emergency Department, Radiology and onwards to operating theatres, ICUs or the ward. These exercises engage all multidisciplinary team members involved in trauma care and have been very effective in enhancing communication, understanding and engagement between stakeholders' whilst generating changes in process and system management.

### Trauma / Griffith University Anatomy Lab

Trauma Lab sessions, in conjunction with Griffith University, have been instigated in 2021 by Dr Bhavik Patel (GCUH Trauma Surgeon). To date three of these have been conducted by Trauma, Cardio Thoracic, Orthopaedic and Vascular surgeons have been presented to Trauma and Surgical staff. Techniques practised have been thoracotomies (sternal and clam shell), pelvic packing and open femoral vascular access.

### Griffith University Medical Students Trauma Education Evening

Dr Don Campbell and Dr Bhavik Patel have also provided an evening of education for Medical Students of Griffith University in 2021. This included presentation, interactive discussion and anatomy lab practice in techniques such as intercostal catheter insertion, eFAST examination, pelvic binding, splinting and tourniquets.



*Dr Bhavik Patel, Trauma Surgeon*

### Trauma Mass Casualty Incident exercises

Three Trauma Mass Casualty Incident exercises (organised by Dr Bhavik Patel) have been conducted annually also ranging in scope from external incident site to Emergency Department and on to Operating Theatres and ICU.

### Fellowship education

Fellowship education is provided by Trauma Service to both Emergency Department and Surgical trainees on a monthly basis.

### GCHHS Trauma Grand Rounds

GCHHS Trauma Grand Rounds presentations have been conducted as follows one in 2018 and twice in each of 2019 and 2020.

### Trauma Education to Wards/Units

Intensive in-service Trauma Education sessions were presented to nursing staff of our Trauma Ward (C6E) in preparation for their transition from Orthopaedics to Trauma and again with the recent transition to a Trauma/Cardio Thoracic ward. Inservice education is also delivered to Emergency, ICU, Peri-operative and ward staff on a wide range of Trauma care topics.



Figure 11 Christmas 2021 Gold Coast Hospital Foundation CEO Ben Cox with Trauma Staff Members Matthew Scott (Santa) and Sarah Czuchwicki (Miss Clause).

### Trauma Nursing Workshops

Trauma Nursing Workshops are held three times per year. Originally, these were a two-day workshop covering all Trauma to all body regions. In 2021, these were reduced to a one-day workshop due to rostering implications. No workshops were held during 2020 due to COVID-19 restrictions. A total of 187 Nursing staff have attended these workshops between 2018-2021

### Early Management of Severe Trauma (RACS)

Early Management of Severe Trauma (EMST) is a three-day course catering for 16 medical and 4-8 Nursing participants. EMST is now presented at GCUH three times per year. Two courses per year were presented in 2018 and 2019. Three courses were booked for 2021 however one was cancelled on the second day of the course due to a Qld Government COVID lockdown.

### Always There

Matthew Scott (Nurse Navigator) facilitates simulation scenarios for the GCHHS 'Always There' Peer Support program providing education and guidance to our GCHHS peer support network.

### Conferences

Trauma Kate Dale (Nurse Practitioner / Program Manager) and Ben Gardiner (CNC Trauma Registry) are Board Members of Australasian Trauma Society (ATS). Kate was on the Scientific and Planning committees for the 2021 Virtual ATS Conference. Kate, Ben and Liz Wake (Research CNC) are frequent presenters at international conferences. Trauma staff are supported and encouraged to attend Australian based Trauma related conferences.

### Community Engagement and Education

GCUH Trauma Service provides education to the community in several formats.

We have presented a graphic display in our foyer highlighting the risk of falls from ladders and providing information to reduce these risks.

We have also developed and coordinated Mass Casualty Incident scenarios for the Gold Coast Group Qld Rural Fire Service on two training evenings and a rotational full day exercise in August 2020 for over 200 volunteer fire fighters (images on next page). We were invited to present this again in 2021 however this was cancelled due to COVID 19 restrictions.

Trauma Service has also presented at the Queensland Orthopaedic Nursing Special Interest Group (QONSIG) evening in 2018 and the Gold Coast City Councils Careers Expo in Health in 2019.

Our Trauma Service has a great relationship with the Gold Coast Hospital Foundation, including our staff supporting in events and donor tours.

## Magnet®

Trauma Service is actively engaged with the ANCC MAGNET® program with magnet ambassadors Matt Scott and Leah Blandford. Trauma service received positive feedback from the Magnet assessors regarding our organisation and passion for our service. Gold Coast Health was recognised by ANCC in 2020.



## Awards

Matt Scott, Trauma Service, has won the GCH Golden Gala Award for Empowering People in 2018 and the Rotary International (Ashmore) Pride of Workmanship award in 2020.

In 2019 Queensland P.A.R.T.Y. program received the Australian Road Safety Awards "School Programs Award" and the penultimate "Founder Award for Outstanding Achievement".



Figure 12 State Emergency Service Rural Fire Service Volunteers, Emergency Services Cadets Britney Wylie & Josiah Trevor with Louisa McDonald RN (GCUH), Bec Nowland RN (GCUH) at the Rural Fire Service Group Exercise (Mass Casualty Simulation), Mudgeeraba Showgrounds 1 Aug 2020



## Trauma Nurse Navigator

The Trauma Service Nurse Navigator is a highly experienced Trauma Nurse with an in-depth understanding of the health system. The role provides comprehensive advanced clinical and professional practice to deliver positive patient-centered outcomes. The Navigator can assist with negotiating the patient journey both within the hospital and externally to other HHS, interstate, primary health care providers, community agencies and GPs.

The intended target client group for this model of care is primarily major Trauma clients with an Injury Severity Score (ISS) of > 12 who are predicted to have ongoing issues relating to chronicity, complexity, fragility and/or intensity of care.

The main Navigation inclusion criteria that this client group meets are described in the terms below.

- **Chronicity** - Whilst Trauma, by its sudden and unexpected nature, does not fit the norm of chronicity in the scope of medical disease it does in some cases result in chronic issues or outcomes for the client. The burden of Traumatic injury or insult can result in lifelong disability or disease.
- **Complexity** - Multi trauma is complex in that can affect multiple body systems and functions and require the input and care of multiple teams of Medical, Nursing and Allied Health staff, both within the Health Service and beyond.
- **Fragility** - This may be relevant to physical, mental, emotional or social fragility. This is the term which is most notable in current experience gained in Trauma Navigation.
- **Intensity of care** - For most Trauma Clients this term is most evident in the early stages and tends to decrease over time as injuries heal and clients adapt to their resulting outcomes.

### Benefits for navigated patients

- Trauma Service Nurse Navigator role offers one-point contact for navigated Trauma patients
- Reduction in ED presentations
- Reduce the stress on patients and carers who are living with complex healthcare needs
- Support families with practical and specific advice related to care and equipment
- Able to identify when urgent attention is required which then facilitated safe care for patients
- Make time to listen to patient concerns and identify priorities

## Trauma Registry

This report builds on our previous 2014-2017 Trauma Service Report; reference tables published in that report are utilised throughout this report and are a credit to the whole Trauma Service team, especially the Clinical Case Managers, Trauma Surgeons (Dr Bhavik Patel and Dr Jason Free) and our Data Managers (Rebecca Haigh and Tuppence Hanson-Adrian).

The registry utilises the Australian Commission on Safety and Quality in Health Care, Framework for Australian Clinical Quality Registries (2014) as the guiding framework for operations, design, security, and technical requirements. Requests for information from the registry is governed via Section 150, Hospital and Health Boards Act 2011 overseen by the Registry and Research Advisory Committee and Ethics at GCHHS. In Queensland, the Hospital and Health Boards Act 2011, authorises the collection of clinical information for the purposes of quality assurance and clinical management.

For this reporting period the Australia New Zealand Trauma Registry Bi-National Trauma Minimum Data Set Version 1.5/1.51 was utilised. In addition to this the Queensland Trauma Data Collection, Tier 1 Traumatic Injury Data Set-Definitions published in January 2021 available via QH Intranet or by request.

AIS coding of injuries in the GCUH registry is restricted to Certified AIS2005(o8) Coders that have maintained currency with recertification at least every four years.

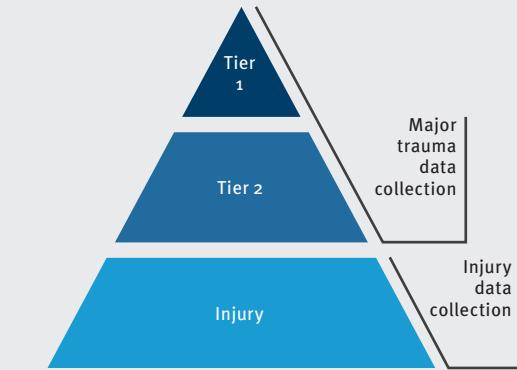
The Gold Coast Trauma Registry hosts and supports multiple sites within Australia including Townsville, Mackay, Mount Isa, Sunshine Coast University Hospital and Tasmania Health.

The Gold Coast Trauma Registry also provides support to the Queensland Trauma Data Collection project on behalf of Queensland Trauma Clinical Network, Healthcare Improvement Unit, Clinical Excellence Branch Queensland Health.

Gold Coast University Hospital Trauma Service Data Collection Model is based on the Queensland Trauma Burden Definition (see Appendix).



Figure 13 Dr Don Campbell Order of Australia (OAM) for Services to Trauma at Government House Queensland



### Trauma data collection model

#### Tier 1. Major trauma

*(Australia and New Zealand trauma definition)*

**Inclusion:** admitted patients who subsequently die after injury, or who sustain major trauma (defined as an Injury severity score greater than 12) are included.

**Exclusions:** 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; older adults ( $\geq 65$  years of age) 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).

#### Tier 2. Significant trauma

Patients that have a mechanism of injury with any the following criteria:

- requiring mechanical ventilation
- admission to intensive care or critical care unit
- transferred to or received from another facility for further care
- intracranial, intrathoracic or intraabdominal surgical procedure, fixation of pelvic or spinal fractures, or requiring any interventional radiological procedure.

### Australia New Zealand Trauma Registry (ATR)

ATR Board Member: Dr Don Campbell OAM (inset).

Bi-National Minimum Trauma Data Set Working Group Member: Ben Gardiner.

Submissions to the Australian and New Zealand Trauma Registry are provided by GCUH within 45 days at the end of the quarter (local target). Currently, the request by the ATR is prior to 120 days e.g., Q1 data (July to Sept 2021) data is due end of January (which was submitted by GCUH by mid Nov 2021).

Our time frame for data collection is based on validation rules for the ATR as 80% within 48 hours of patient admission, >90% within 10 days of admission. Monthly review is undertaken by the end of the subsequent month to ensure data integrity is optimal and ready for reporting.

### GCUH Trauma Verification Participants

The following team members have participated as RACS trauma review members to other hospitals during 2018-2021; Martin Wullschleger, Don Campbell, Kate Dale and Ben Gardiner.

## Trauma Ward

As part of the Orthopaedic and Trauma Services in the division of Surgical and Critical Care, C6East - Cardiothoracic, Acute Trauma & Surgical (CATS) in-patient unit (IPU) is a 28-bed unit that consists of four double rooms and twenty single rooms.

C6East utilises a team nursing model of care, with a 1:3.5 nurse to patient ratio, working in teams of two nurses caring for eight patients, with an additional nursing staff available to assist in all areas as required. This model of care is flexible with the acuity within the unit, e.g., ICU stepdown patients post cardiac surgery and/or high acuity trauma patients that may require 1:1/1:2 care.

C6East receives elective Cardiothoracic preadmission patient in preparation for cardiac surgery and manages the post-operative cares in preparation for discharge. C6East receives all single system and multi system trauma patients via ED, OT and/or IHT.

C6East also has the capability for telemetry monitoring for all 28 patients in combination with fixed wall or hard wire monitoring as well.

The occupancy data for the FY 2020-2021 was at 91% with a noted increase in occupancy this FY 2021-2022 already at 96%



Figure 14 Some of the Ward C 6 East Nursing Staff (Feb 2022) and Nurse Unit Manager Allison Homer (in grey)



# Overview

## Overall activity

Both the volume of trauma cases and the volume significantly injured have continued to increase over the past eight years. 2014-2017 case numbers are 6,784 and the period 2018-2021 cases are 10,818 a 159% increase in activity. Whilst the significantly injured have increased from 1164 to 1374 resulting in a 118% increase.

Significant injury indicates ISS>12 or Death due to mechanism as per the Australia New Zealand Trauma Registry Inclusion and Exclusion Criteria (version 1.51) (refer to Preamble Page 6 for details).

### Overall Activity by calendar year

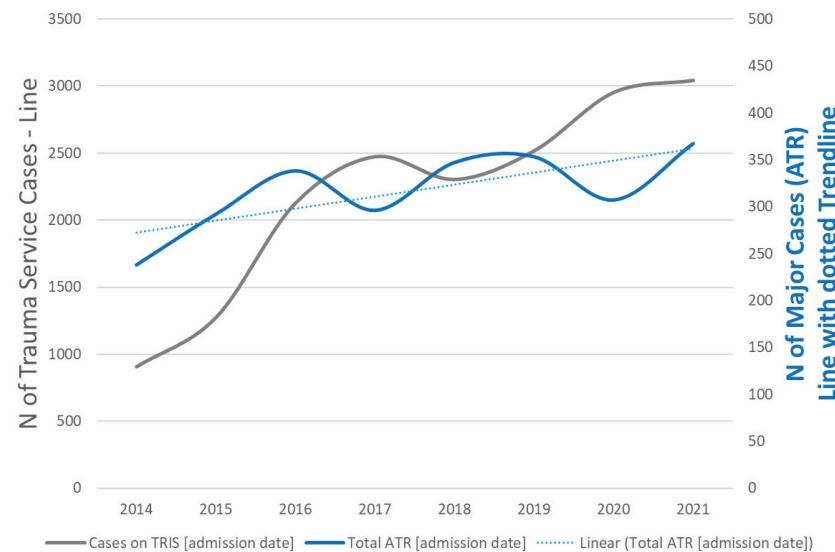


Figure 15 Overall Activity by Calendar year 2014-2021

	2014	2015	2016	2017	2018	2019	2020	2021
Cases	907	1275	2128	2474	2304	2518	2953	3043
Significant Injury n(atr)	238	292	338	296	347	353	307	368

Table 2 Overall Activity by calendar year

<sup>1</sup>Includes non-major trauma (RACS) requirement

# 2018 - 2021 Gold Coast University Hospital

## DEMOGRAPHICS



severely injured  
**1375 cases**  
(+115%)

**48 yrs**  
median age  
(20% >70yrs)



**38%** trauma  
occurs weekends

**26%** female



## CAUSE of INJURY

**93%**  
blunt trauma

**4%**  
penetrating  
trauma

**29%**  
falls



**56%**  
transport



**5%**  
assault

## INJURED BODY REGIONS



**26%** head  
**43%** chest  
**15%** extremity  
**30%** 2+ regions

## OUTCOMES

**86%**  
direct from scene to  
definitive hospital

**1h 28m**  
median time  
injury → GCUH



**2h 57m**  
median time  
spent in ED

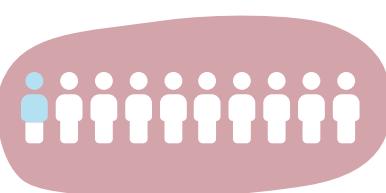


**7d 11h**  
median length of stay



**46%**  
admitted  
to ICU

**2d 8h**  
median length of  
ICU stay



**76%**  
trauma activations



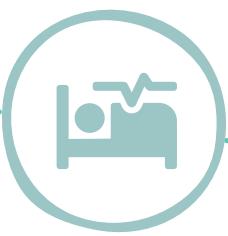
**88%**  
tertiary  
survey  
(67% <24hrs)

**6.8%**  
in-hospital deaths  
(excluding hanging/drowning)

**38mins**  
median time to CT



**72%**  
discharged  
home



## Presentations, Seriously Injured

The seriously injured has increased by 115%, with a 125% increase of cases presenting proportionately as primary admissions (i.e., not via another hospital). This impacts on the initial care of the patient, required resources and multi-team demands including emergency, radiology, interventional radiology, anaesthesia, intensive care, perioperative and surgical management.

Inter-hospital transfers have also decreased by nearly 20%. The reasons for this are multi-faceted which may include an evolving trauma service at Lismore Base Hospital and The Tweed Hospital, the COVID-19 response with border closures.

	2014 -2017	2018-2021
Seriously Injured <i>n(atr)</i>	1165	1375 (115.3%)
IHT in <i>n(i/atr)</i>	226	189 (80.4%)
Primary Admissions <i>n(atr)-n(i/atr)</i>	884	1186 (125.4%)
% Primary Admissions $\frac{(n(p/atr))}{(n(atr))}$	76%	86%

Table 3 Overall presentations of the Seriously Injured 2014-2017 v 2018-2021  
(% is change from previous period)

	2018	2019	2020	2021
Seriously Injured <i>n(atr)</i>	347	353	307	368
IHT in <i>n(i/atr)</i>	59	53	45	32
Primary Admissions <i>n(atr)-n(i/atr)</i>	288	300	262	336
% Primary Admissions $\frac{(n(p/atr))}{(n(atr))}$	83%	85%	85.3%	91.3%

Table 4  
Overall  
presentations  
of the  
Seriously  
Injured by  
calendar year

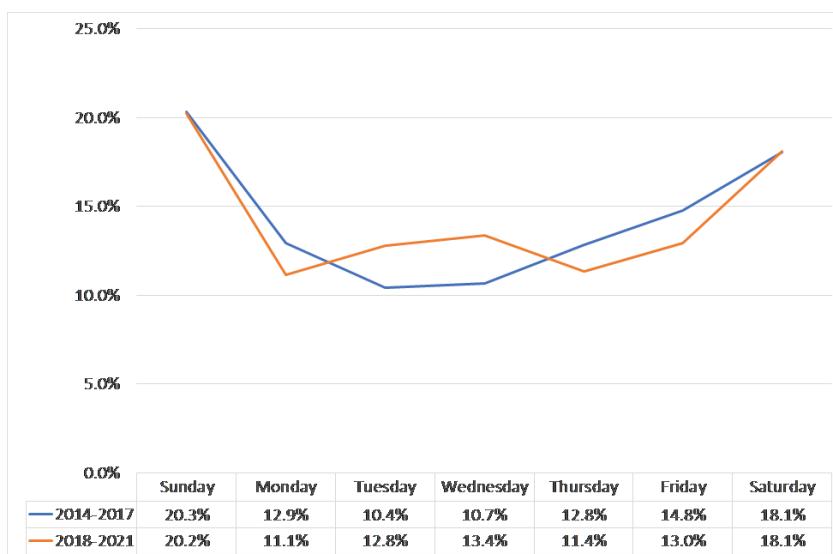


Figure 16 Presentations by day of week, seriously injured, by calendar year 2014-2017 v 2018-2021



## Indicators of Significant Physiological Consequences

This table indicates that proportion of the Seriously Injured are increasing predominately physiologic consequences are age, acidosis and hypotension.

The risk factors as indicators of significant physiological consequences to traumatic injury are identified in Paffrath, Lefering, and Flohé (2014) as age  $\geq 70$ , acidosis base excess, consciousness, hypotension and coagulopathy. Each represents a significant proportion of the Seriously Injured presenting to GCUH.



	2014 - 2017	2018 - 2021
<b>&gt;70 Aging population</b>	<b>13%</b>	<b>20%</b>
 <b>Consciousness</b>	<b>16%</b>	<b>15%</b>
 <b>Coagulopathy</b>	<b>6%</b>	<b>6%</b>
 <b>Acidosis</b>	<b>12%</b>	<b>16.9%</b>
 <b>Hypotension</b>	<b>12%</b>	<b>15.5%</b>

Figure 17 Significant Physiological Consequences 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured n(atr)	347	353	307	368
Age $\geq 70$ years	18.2%	20.1%	19.9%	22.3%
Hypotension <sup>2</sup>	13.5%	15.3%	18.2%	15.2%
Consciousness <sup>3</sup>	10.7%	17.8%	14.3%	16.6%
Acidosis <sup>4</sup>	13.3%	13.6%	18.2%	22.3%
Coagulopathy <sup>5</sup>	4.0%	7.4%	6.2%	4.3%

Table 5 Significant Physiological Consequences by calendar year

<sup>2</sup>( $\text{mmHg}$  (pre-Hospital / on Arrival))

<sup>3</sup>(GCS 3-8 (pre-hospital))

<sup>4</sup>(Base Excess  $< -6$ )

<sup>5</sup>(INR  $\geq 1.4$ )

# Transport

## Method of Transport to GCUH, Seriously Injured

The previous primary method of transport, being road, decreased as a proportion of the seriously injured with proportions increased in both helicopter and walk in ratios. The 2018-2021 helicopter arrivals range from 37-52 per annum with walk-in cases ranging from 18-32 presentations per annum.

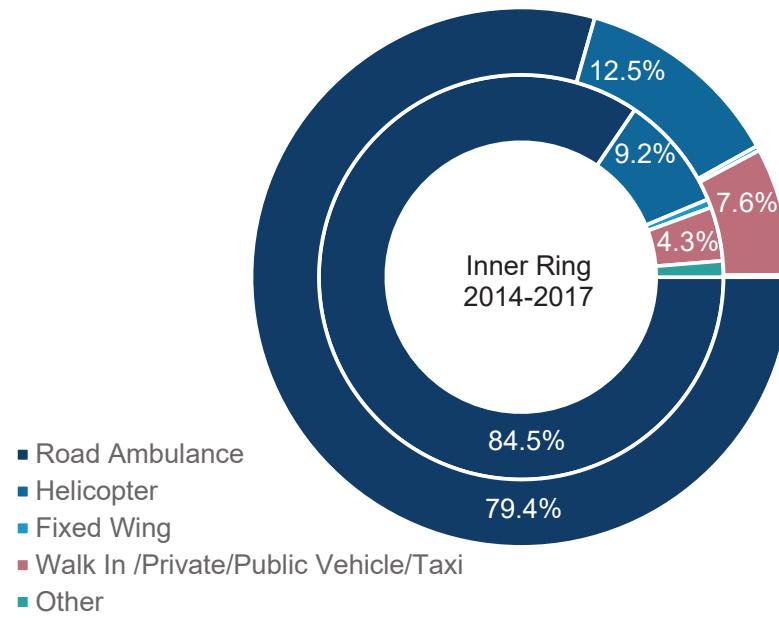


Figure 18 Method of transport to GCUH, Seriously Injured 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured n(atr)	347	353	307	368
Road Ambulance	76.9%	79.6%	75.9%	84.2%
Helicopter	15.0%	10.5%	14.3%	10.6%
Fixed Wing	0.3%	0.8%	0.0%	0.0%
Walk In /Private/Public Vehicle/Taxi	7.8%	9.1%	9.1%	4.9%
Other	0.0%	0.0%	0.7%	0.0%

Table 6 Method of transport to GCUH Seriously Injured, by calendar year



## Transfer to GCUH from Location, Seriously Injured

With an increase in the proportion of transfer from scene, the proportion of referring hospital has steadily decreased in number ranging from 58-39 per annum. This would also be reflected due to the Queensland border access restrictions access during the COVID-19 period 2019-2021.

Australia Wide comparison			
ATR Annual Reports	2015/16 2016/17 2017/18	2018/19 2019/20	
Scene	68%	68.5%	

- Scene
- Referring Hospital
- Home
- Other

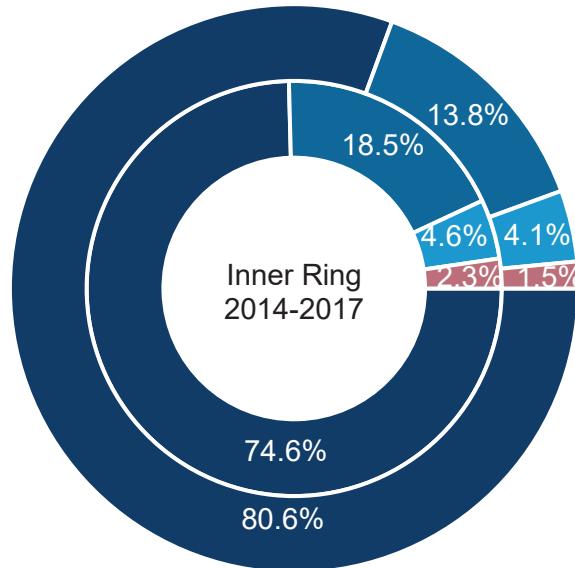


Figure 19 Transfer to GCUH from location, Seriously Injured 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured n(atr)	347	353	307	368
Scene	77.8%	77.1%	81.4%	87.2%
Referring Hospital	16.7%	14.7%	13.7%	10.6%
Home	3.7%	5.1%	4.6%	3.0%
Other	1.7%	3.1%	0.3%	0.8%

Table 7 Transfer to GCUH from location, by calendar year



## Inter-Hospital Transfer to GCUH, Seriously Injured

Inter-hospital transfer (IHT) patients treated at Gold Coast University Hospital (GCUH) have decreased by 5% of the seriously injured. Most of the decrease is associated with NNSWLHD decreasing 5% to 59% of all IHT in the 2018-2021 period.

Inter-Hospital Transfers inbound to GCUH from another acute care facility.

	2014 -2017	2018-2021
Seriously Injured <i>n(atr)</i>	1165	1375
IHT in	226 (19.4%)	196 (14.3%)
By Region		
NNSWLHD	144 (12.4%)	116 (8.4%)
NSW (other)	6 (0.5%)	10 (0.7%)
Qld (Gold Coast)*	50 (4.3%)	64 (4.7%)
Qld (Other)	16 (1.4%)	11 (0.8%)

Table 8 Inter-Hospital Transfer to GCUH, Seriously Injured 2014-2017 v 2018-2021

	2014 -2017	2018-2021
Tweed Hospital	63 (5.4%)	30 (2.2%)
Lismore Hospital	54 (4.6%)	47 (3.4%)
Byron Hospital	5 (0.4%)	13 (0.9%)

Table 9 Top 3 sites for Inter-Hospital Transfer to GCUH (excluding Gold Coast Public) 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured <i>n(atr)</i>	347	353	307	368
Transfer to GCUH ( by Region )				
NSW (NNSWLHD)	39	33	29	15
Qld (Gold Coast) <sup>6</sup>	18	14	16	16
IHT in <i>n(i/atr)</i>	59	53	45	39
% IHT / <i>n(atr)</i>	17.9%	14.4%	16.0%	10.6%
Transfer to GCUH ( <i>n(atr)</i> ) (Top 4 Hospitals)				
Tweed Hospital (NSW)	14	8	7	1
Lismore Hospital (NSW)	10	17	13	7
Grafton Hospital (NSW)	5	2	3	0
Byron Hospital (NSW)	4	6	2	1

Table 10 Inter-Hospital Transfer to GCUH, Seriously Injured by calendar year

<sup>6</sup> Includes other hospitals on the gold coast both public and private.



## Inter-Hospital Transfer from GCUH <48hrs, Seriously Injured



Cases requiring transfer out within 48hrs directly relate to the specialised care offered at other facilities within Queensland. The number of cases transferred out for other specialised care remains below 5% of all seriously injured during both 2014-2017 and 2018-2021.

	2014-2017	2018-2021
Seriously Injured n(atr)	1165	1375
IHT out <48hr n(atr<48)	54 (4.6%)	55 (4.0%)
Burns (RBWH)	16 (1.4%)	14 (1.0%)
Spine (PAH)	24 (2.1%)	26 (1.9%)
Children (QCH)	14 (1.2%)	15 (1.1%)

	2018	2019	2020	2021
Seriously Injured n(atr)	347	353	307	368
IHT out <48hr	10	13	14	18
Burns (RBWH)	1	2	7	4
Spine (PAH)	8	8	4	6
Children (QCH)	1	3	3	8

Table 12 Transfer out from GCUH <48hr by calendar year

Table 11 Transfer out from GCUH <48hr,  
2014-2017 v 2018-2021



# Demographics

## Gender, Seriously Injured

Between the two periods there has been a small increase in the proportion of females in the seriously injured, although males continue to dominate the injury profile of the seriously injured.

Australia Wide comparison			
ATR Annual Reports	2015/16 2016/17 2017/18	2018/19 2019/20	
Male	72%	73%	

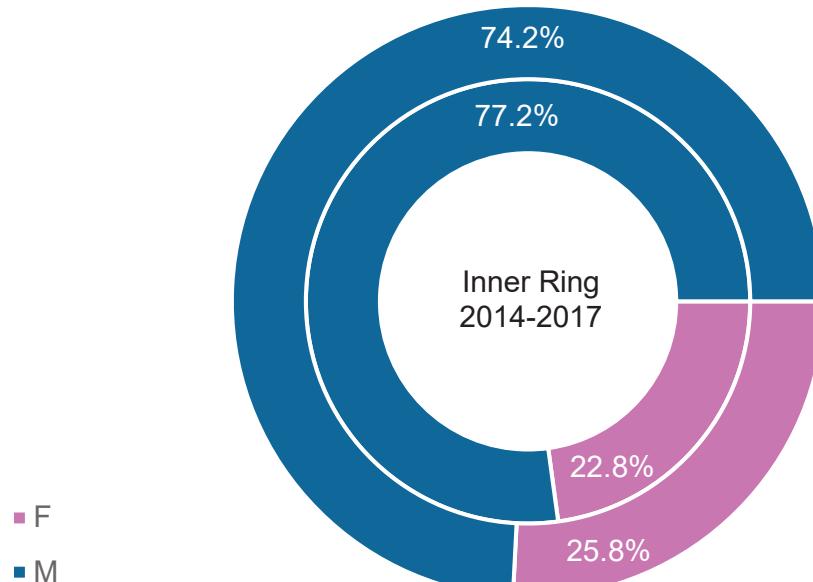


Figure 20 Gender, Seriously Injured 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured n(atr)	347	353	307	368
Female	95	91	81	85
% Female	27.4%	25.8%	26.4%	23.2%

Table 13 Gender, Seriously Injured by Calendar year

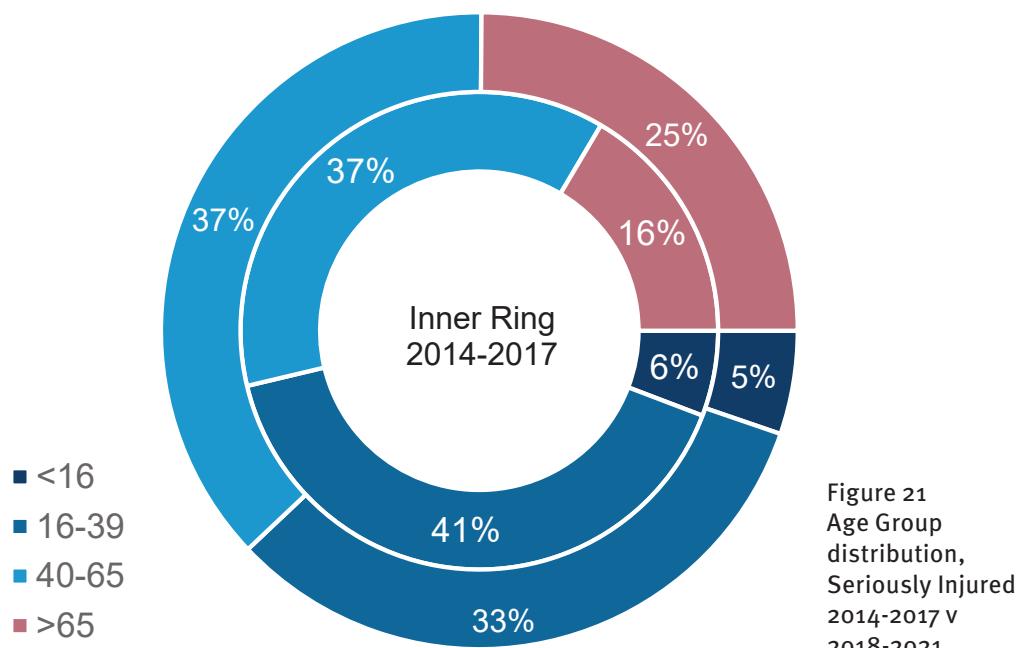
## Age, Seriously Injured

Median age for females was 47 years 2014-2017 rising to 54 yrs 2018-2021, increasing 7 years. For males, in 2014-2017, the median age was 42 yrs which increased 6 years to 48 years for 2018-2021. The seriously injured are increasing in age, in particular females, over the two periods. As the patient age increases so does the consequences of trauma.

	2014 -2017	2018-2021
Seriously Injured n(atr)	1165	1375
Median Age Australia (ATR)	48 <sup>7</sup>	48.5 <sup>8</sup>
Median Age (all)	42	48
Median Age (Female)	47	54
Median Age (Male)	41	46

Table 14 Age seriously injured (Median Age), 2014-2017 v 2018-2021

The age distribution changed between the two periods with the >65 years group growing 9% to 25% of seriously injured. In the >65 groups males account for 17% of the seriously injured.



<sup>7</sup> ATR Annual Report 2015/16, 2016/17, 2017/18 (47, 48 and 49 respectively)

<sup>8</sup> ATR Annual Report 2018/19 2019/20 (49 and 48 respectively)



## Age, Seriously Injured (continued)

	2018	2019	2020	2021
Seriously Injured n(atr)	347	353	307	368
≤16yrs <sup>9</sup>	5.8%	4.8%	5.5%	4.9%
16-39yrs	34.3%	31.7%	33.2%	31.3%
40-65yrs	35.4%	34.6%	38.1%	39.9%
> 65yrs	24.2%	26.9%	23.1%	24.7%

Table 15 Age seriously injured (all genders), by calendar year

	2018	2019	2020	2021
Seriously Injured n(atr)	347	353	307	368
16-39yrs	8.1%	6.8%	5.9%	6.0%
40-65yrs	10.7%	11.9%	10.4%	8.7%
> 65yrs	7.8%	6.8%	7.8%	7.9%

Table 16 Age seriously injured (Female), by calendar year

	2018	2019	2020	2021
Seriously Injured n(atr)	347	353	307	368
16-39yrs	26.2%	24.9%	27.4%	25.3%
40-65yrs	24.8%	22.7%	27.7%	31.3%
> 65yrs	16.4%	20.1%	15.3%	16.8%

Table 17 Age seriously injured (Male), by calendar year

<sup>9</sup> Gender breakdown is not provided due to low numbers (n<10) resulting in potentially re-identifiable information



## Residential Origin, Seriously Injured



Overall, the data reflects the proportions of patients have not changed between the two periods despite the increase in caseload. The Gold Coast is a known holiday destination reflected by the 35% of non-local residents presenting with Serious Injury. This has an impact Trauma Service with regard to repatriation and co-ordination required for ongoing care.

Data is based on residential postal code.

2014 - 2017

61%



Gold Coast

2018 - 2021

63%

21%



New South Wales

23%

13%



Queensland (other)

12%

Figure 22 Residential Origin, Seriously Injured, 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured n(atr)	347	353	307	368
Qld (Gold Coast)	63%	61%	63%	64%
Qld (other)	11%	12%	13%	15%
NSW (NNSWLHD)	18%	20%	21%	15%
NSW (other)	3%	3%	2%	3%
Australia (Other)	2%	1%	<1%	1%
Overseas (other)	2%	2%	1%	<1%
Not Stated	<1%	-	-	<1%

Table 18 Residential Origin, Seriously Injured, by calendar year



# Injury

## Injury Location, Seriously Injured

The proportion of injuries occurring on the Gold Coast has increased by 5% with a continued >20% being from New South Wales. The location of the injury impacts the requirements for transfer to the hospital.

This is based on the postal code of injury.



Figure 23 Injury Location, Seriously Injured, 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured <i>n(atr)</i>	347	353	307	368
Qld (Gold Coast)	69%	68%	70%	76%
Qld (other)	4%	5%	3%	4%
NSW (NNSWLHD)	23%	24%	23%	16%
NSW (other)	2%	<1%	2%	1%
Australia (Other)	<1%	<1%	-	-
Overseas (other)	-	<1%	-	-
Not Stated	1%	2%	3%	2%

Table 19 Injury Location, Seriously Injured, by calendar year



## Injury Intent, Seriously Injured

This reflects the intent of the injury being unintentional >85% with no major shifts in intent over the two time periods.

Intent is provided based on the Australia New Zealand Trauma Registry definitions. Also used are the United States Centre for Disease Control (CDC) intent to ICD10 Code mappings as a guide for clinicians to ensure consistency of data entry.

Australia Wide comparison		
ATR Annual Reports	2015/16 2016/17 2017/18	2018/19 2019/20
Unintentional	86.7%	88%

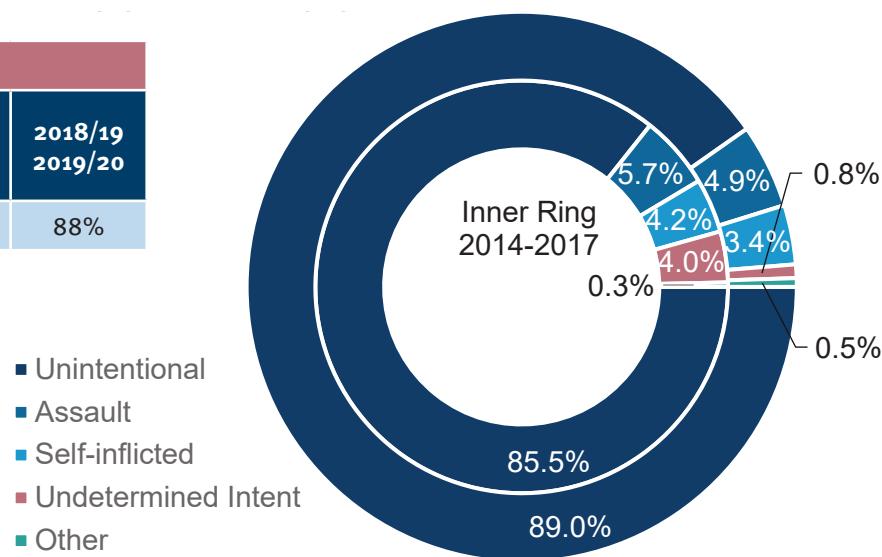


Figure 24 Injury Intent, Seriously Injured, 2014-2017 v 2018-2021 <sup>10 11</sup>

	2018	2019	2020	2021
Seriously Injured n(atr)	347	353	307	368
Unintentional	93%	88%	91%	88%
Assault	3%	8%	4%	6%
Self-Inflicted	4%	3%	4%	4%
Undetermined	<1%	<1%	1%	<1%
Other	<1%	1%	<1%	<1%

Table 20 Injury Intent, Seriously Injured, by calendar year

<sup>10</sup> ATR Annual Report 2015/16, 2016/17, 2017/18 (88%, 87%, and 85.1% respectively)

<sup>11</sup> ATR Annual Report 2018/19 2019/20 (88% and 88% respectively)



## Injury Type, Seriously Injured

This reflects the typical trauma presentation within Australia and New Zealand. At Gold Coast University Hospital, we have blunt injuries >90% with penetrating injury (e.g. gun/ knife) reflected at ~4% of seriously injured.

Intent is provided based on the Australia New Zealand Trauma Registry definitions. Also used are the United States Centre for Disease Control (CDC) intent to ICD10 Code mappings as a guide for clinicians to ensure consistency of data entry.

Australia Wide comparison			
ATR Annual Reports	2015/16 2016/17 2017/18	2018/19 2019/20	
Blunt	95%	94%	
Penetrating	4%	4%	

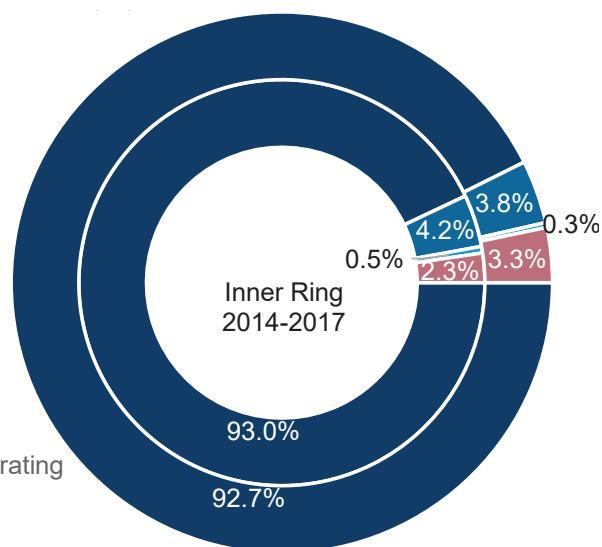


Figure 25 Injury Type, Seriously Injured, 2014-2017 v 2018-2021 <sup>12 13</sup>

	2018	2019	2020	2021
Seriously Injured n(atr)	347	353	307	368
Blunt	94%	92%	93%	92%
Penetrating	3%	5%	4%	3%
Burn	<1%	-	<1%	<1%
Other	3%	3%	3%	4%

Table 21 Injury type, Seriously Injured, by calendar year

<sup>12</sup> ATR Annual Report 2015/16, 2016/17, 2017/18 (95% / 4%, 95% / 3.5% and 94% / 3.7% respectively)

<sup>13</sup> ATR Annual Report 2018/19 2019/20 (94.6% / 3.7% and 94% / 4.3% respectively)



## Body Zone of Injury (AIS)>2, Seriously Injured



This represents a pattern of the distribution of injury by body region. This highlights that the chest injury is the most frequent (43%, an increase of 4%). The comparison between the previous reporting period and current is that the distribution of injury has not significantly changed.

Injury Severity Score (ISS) is an international scoring system for the calculation of severity of injury based on Abbreviated Injury Score (AIS), a standardised formula is then applied to categorise. The ISS is derived via six regions taking the maximal AIS score for each region then square the top 3 values calculating the result.

Where a body region has a Maximal Abbreviated Injury Scale (MAIS)  $\geq 3$ . Below is calculated for each body region separate to the individual divided by the total number=count of AIS  $\geq 3$  region' X' / n(atr).



Figure 26 Body Zone of Injury (AIS>2), Seriously Injured, 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured n(atr)	347	353	307	368
AIS Head > 2	26%	29%	23%	24%
AIS Face > 2	4%	5%	2%	3%
AIS Chest >2	44%	40%	43%	45%
AIS Abdomen >2	12%	10%	15%	11%
AIS Extremity > 2	12%	15%	15%	16%
AIS External > 2	<1%	<1%	1%	<1%
AIS>2 in 2+ body Zones	29%	26%	28%	28%

Table 22 Body Zone of injury, Seriously Injured, by calendar year





## Injury Severity Score, Seriously Injured

The distribution of severity of injury group has not significantly changed between the two periods, with most cases ~70% in the 13-24 ISS range.

ISS is the Injury Severity Score and international scoring system for the calculation of severity of injury based on AIS (abbreviated injury score), a standardised formula is then applied to categorise injury severity.

Australia Wide comparison		
ATR Annual Reports	2015/16 2016/17	2018/19 2019/20
13-15	27.1%	28.6%
16-24	43%	42.8%
25-40	25.1%	24.4%
41+	5%	4.3%

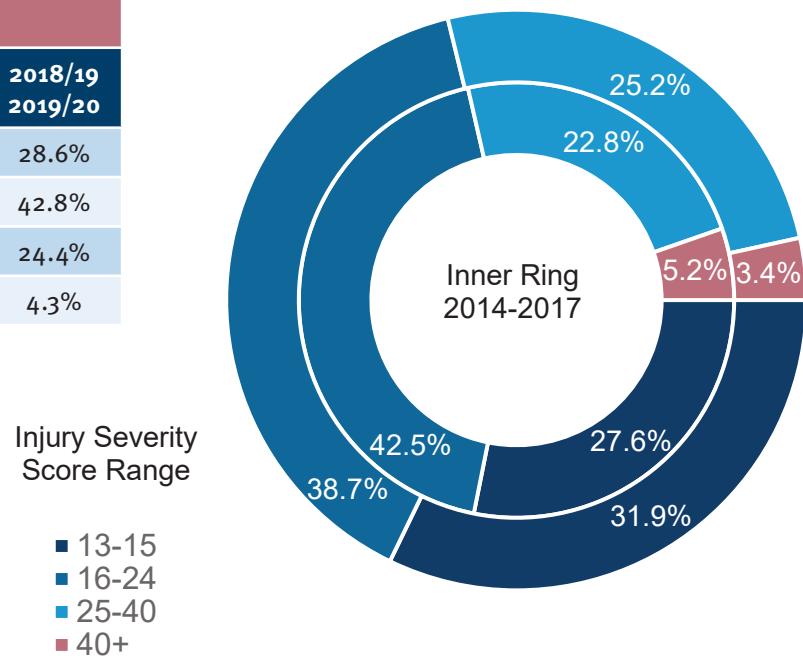


Figure 27 Injury Severity Score, Seriously Injured, 2014-2017 v 2018-2021 <sup>14 15</sup>

	2018	2019	2020	2021
Seriously Injured n(atr)	347	353	307	368
ISS>15	227	242	206	250
ISS 13-15 Serious	34%	31%	32%	31%
ISS 16-24 Severe	38%	41%	39%	38%
ISS 25-40 Grievous	25%	24%	24%	27%
ISS 41-75 Critical	3%	5%	4%	3%

Table 23 Injury Severity Score Range, Seriously Injured, by calendar year

<sup>14</sup> ATR Annual Report 2015/16, 2016/17, 2017/18

<sup>15</sup> ATR Annual Report 2018/19 2019/20





## Mechanism of Injury – High Level, Seriously Injured

Accidents (~90%) continue to dominate the mechanism of injury with transport accidents (56%) being the largest group followed by falls (29%). Overall, the proportion distribution has not significantly changed between the two reporting periods.

This is aggregated data, derived from ICD-10-AM coding of the mechanism of injury. Groupings are outlined in appendix ICD-10 Groupings for Mechanism of Injury of the previous report.

Australia Wide comparison		
ATR Annual Reports	2015/16 2016/17	2018/19 2019/20
Transport	45%	45%
Falls	35%	37%
Assault	-%	5%

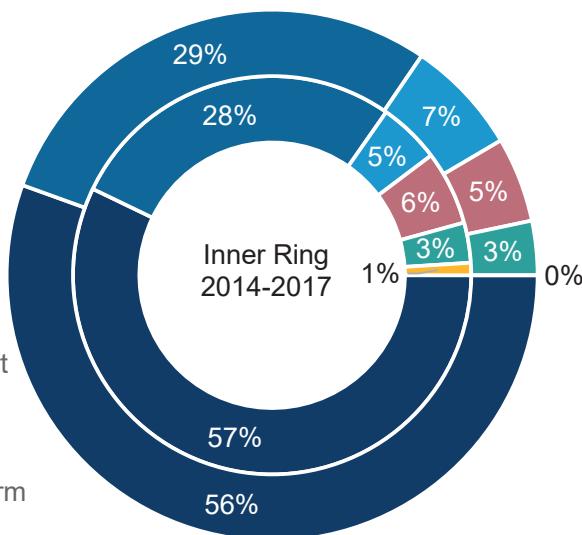


Figure 28 Mechanism of Injury – high level, Seriously Injured, 2014-2017 v 2018-2021<sup>16 17</sup>

	2018	2019	2020	2021
Seriously Injured n(atr)	347	353	307	368
Accident	93%	89%	93%	91%
Accident Transport <sup>18</sup> n(atr)	56%	52%	57%	57%
Accident Falls n(atr)	31%	32%	30%	27%
Accident Other n(atr)	6%	5%	6%	7%
Assault	3%	8%	4%	5.7%
Intentional Self Harm	3%	3%	4%	3.2%
Legal Intervention	-	-	-	-

Table 24 Mechanism of Injury, Seriously Injured, by calendar year

<sup>16</sup> ATR Annual Report 2015/16, 2016/17, 2017/18

<sup>17</sup> ATR Annual Report 2018/19 2019/20

<sup>18</sup> Sub-groups of Accident; Transport Falls Other

## Mechanism of Injury – Transport, Seriously Injured



Car and motorcycles continue to be the majority of transport accidents (~64%) Although there has been a 4.5% increase in cyclist as a mechanism of injury. Overall, the proportion distribution has not significantly changed between the two reporting periods.

2014 - 2017

33%



Car

32%



Motorcycle

13%



Cyclist

10%



Pedestrian

2018 - 2021

32%

32%

17%

11%

Figure 29 Top four (4) Transport Mechanisms of injury, Seriously Injured, 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured $n(atr)$	347	353	307	368
Transport Accident (below calc $\frac{n}{(n(transport))}$ )	194	182	176	212
- Car Occupant	33.3%	32.4%	27.9%	31%
- Motorcyclist	30.8%	26.4%	31.3%	39%
- Pedal Cyclist	15.9%	17.6%	20.1%	16%
- Pedestrian	10.3%	15.4%	13.4%	6.1%
- Other Land Transport Accidents	4.6%	4.4%	3.9%	6.1%
- Occupant of Heavy Transport	1.0%	1.1%	0.6%	0.5%
- Water Transport	2.6%	2.7%	2.2%	0.9%
- Occupant of Ute or van	0.5%	-	0.6%	-
- Air and Space	1.0%	-	-	0.5%

Table 25 Mechanism of Injury - Transport, Seriously Injured, by calendar year





## Mechanism of Injury – Falls, Seriously Injured

Falls is the second highest accident group at ~29% of all mechanisms. Falls from the same level account for the largest sub-group at 25% of all falls.

	2018	2019	2020	2021
Seriously Injured n(atr)	347	353	307	368
Falls (all) (below calc $\frac{n}{(n(falls\ all))}$ )	109	113	93	100
Falls (all)/ Seriously Injured	31%	32%	30%	27%
Same Level (W01.N, W18.N)	16%	25%	27%	30%
One Level to another (W17.N)	17%	10%	12%	21%
Stairs Steps (W10.N)	16%	14%	13%	9%
Falls from Ladder/Scaffold <sup>19</sup>	12%	12%	14%	12%
Fall from or through Roof/ Balcony/ Building <sup>20</sup>	16%	12%	9%	19%
Above mechanisms account for x% of all falls	76%	73%	74%	91%
Powered pedal cycle/ scooter/ skateboard <sup>21</sup>	4%	3%	9%	6%

Table 26 Mechanism of Injury -Falls, Seriously Injured, by calendar year

<sup>19</sup> W11 Fall on and from ladder & W12 Fall on and from scaffolding

<sup>20</sup> W13.N: (W13.0) Balcony or veranda, (W13.3 & W13.4) From or through Roof, (W13.8 & W13.9) Other building or structure

<sup>21</sup> These cases may be included in the above categories – added due to the increase prevalence of these devices

# Quality Indicators



## Time from Injury to definitive care (QTDC), Seriously Injured

Measure the timeliness of transfer to definitive care and evaluate compliance with transfer protocols. The median time between the two reporting periods is similar having only a 9 min difference.

When we look at transfer from scene only (next page), the average time is the same between the two reporting periods at 2 hours 13 minutes and the median time having an 11 min differential of approximately 1 hour and 20 min.

Mean and/or median length of time spent from Injury Date time to arrival at definitive care. See Appendix 1 Quality Indicator 1 Time from injury to definitive care.

### Time from Injury (all cases)

	2014 -2017	2018-2021
Seriously Injured n(atr)	1165	1375
Included (valid data)	96.7%	98.4%
Median Time (min)	89	98
Average Time (min)	408	316

Table 27 Time from Injury to definitive care, Seriously Injured, 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured n(atr)	347	353	307	368
Included (valid data)	98.6%	98.0%	97.4%	99.5%
Median Time (min)	99	101	96	94
Average Time (min)	365	378	275	248

Table 28 Time from Injury to definitive care, Seriously Injured, by calendar year.



Figure 30 Westpac Rescue Helicopter at GCUH helipad (courtesy Matthew Scott)

#### Time from Injury where transport is direct from Scene

	2014 -2017	2018-2021
Seriously Injured <i>n(atr)</i>	1165	1375
Included (valid data)	74.5%	81.2%
Median Time (min)	77	88
Average Time (min)	133	133
Australian Median (min) (ATR)	87 <sup>22</sup>	88.5 <sup>23</sup>

Table 29 Time from Injury to definitive care (scene), Seriously Injured, 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured <i>n(atr)</i>	347	353	307	368
Included (valid data)	77.8%	77.9%	81.4%	87.5%
Median Time (min)	88	88	85	90
Average Time (min)	148	148	116	121

Table 30 Time from Injury to definitive care (scene), Seriously Injured, by calendar year.

<sup>22</sup> ATR Annual Report 2015/16, 2016/17, 2017/18 (84min 90min and 87min respectively)

<sup>23</sup> ATR Annual Report 2018/19 2019/20 (88min and 89 min respectively)



## Pre-Hospital Transport Time (RACS/QTDC), Seriously Injured

This indicator is to enable understanding of the timeliness of pre-hospital encounters. The two reporting periods did not show a significant difference in median or average times.

Mean and/or median time elapsing between time of injury and episodes of care prior to arrival at the first receiving hospital. See Appendix 1 Quality Indicator 2 Pre-hospital transport time to first hospital.

	2014 -2017	2018-2021
Seriously Injured n(atr)	1165	1375
Included (valid data)	938 (80.5%)	1232 (89.6%)
Median Time (min)	55	63
Average Time (min)	74	75

Table 31 Pre-hospital Transport Time, Seriously Injured, 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured n(atr)	347	353	307	368
Included (valid data)	304 (87.6%)	310 (87.8%)	273 (88.9%)	345 (93.8%)
Median Time (min)	60	62	62	66
Average Time (min)	72	71	82	77

Table 32 Pre-Hospital Transport Time, Seriously Injured, by calendar year .

## Trauma Activations (RACS/QTDC), Seriously Injured



Determine the accuracy of trauma team activation. Trauma team activation ensures appropriate clinical response in ED for severely injured patients. Between the two reporting periods there was a significant decrease in the proportion of cases not getting a trauma activation from 31% to 24%.

Percentage of patients with ISS>12 who had a trauma team activated at the time of presentation to ED. Refer to Appendix 1 Quality Indicator 3 Trauma activation for patients with ISS>12.

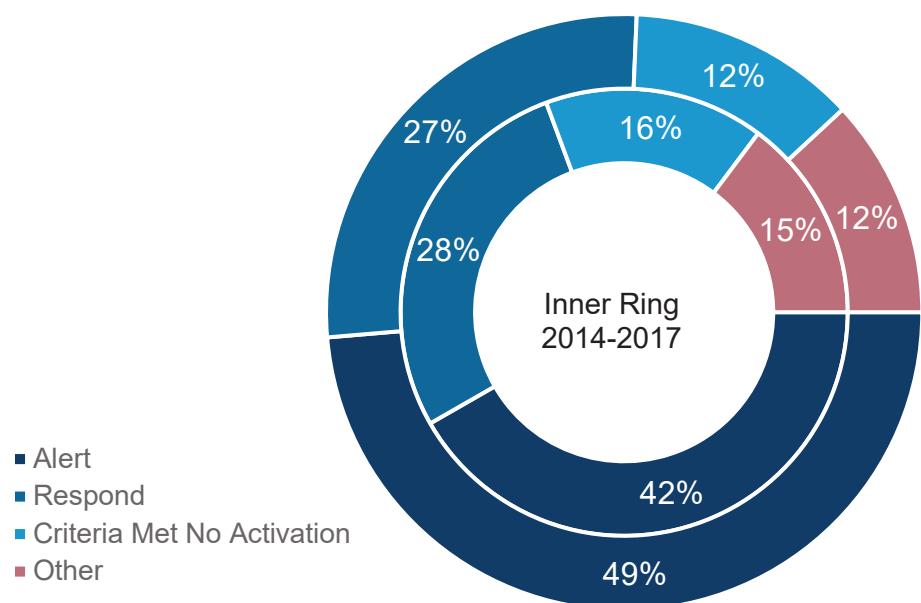


Figure 31 Trauma Activations, Seriously Injured, 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured n(atr)	347	353	307	368
Alert	52%	46%	48%	49%
Respond	30%	25%	27%	26%
Alert or Respond	82%	71%	75%	75%
Criteria Met No Activation	10%	18%	13%	9%
Other	8%	11%	12%	16%

Table 33 Trauma Activations, Seriously Injured, by calendar year



## Time to CT (GCS<13) (RACS/QTDC), Seriously Injured



Measure the timeliness of CT (Computerised Tomography aka 'Cat. Scan') investigation of a patient with a suspected brain injury. The CT scan was, on average, under one hour with no significant difference between reported periods. The median time also had no significant difference.

Mean and/or median time between arrival at the reporting hospital and the first head CT performed at that hospital. See *Appendix 1 Quality Indicator 4 Time to CT scan if GCS<13*.

	2014 -2017	2018-2021
Seriously Injured <i>n(atr)</i>	1165	1375
Included cases	203 (17.4%)	251 (18.3%)
Excluded (CT performed prior to arrival)	15 (6.9%)	15 (5.6%)
Average time to CT (min)	46	45
Median time to CT (min)	32	38
Australian Median (min) (ATR)	-	44 to 47 <sup>24</sup>

Table 34 Time to CT GCS<13, Seriously Injured, 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured <i>n(atr)</i>	347	353	307	368
Included cases	57	69	48	77
Average time to CT (min)	26	54	54	45
Median time to CT (min) (RACS/QTDC)	23	42	44	39

Table 35 Time to CT GCS<13, Seriously Injured, by calendar year.

<sup>24</sup> ATR Annual Report 2018/19 2019/20





## Hospital Length of Stay (QTDC), Seriously Injured

Measure the timeliness of discharge from acute definitive care and/or evaluate compliance with transfer protocols.

Mean and/or median length of time spent from hospital admission date/time to hospital discharge date/time for acute care. *See Appendix 1 Quality Indicator 5 Hospital acute length of stay ISS>12.*

	2014 -2017	2018-2021
Seriously Injured <i>n(atr)</i>	1165	1375
Included cases	1110 (95.3%)	1357 (98.7%)
Median	8 days 9hrs	7 days 11hrs
Australian Median (ATR)	7 days <sup>25</sup>	7 days <sup>26</sup>
Average	15 days 23hrs	10 days 19hrs

Table 36 Hospital Length of Stay, Seriously Injured, 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured <i>n(atr)</i>	347	353	307	368
Included cases	337 (97.1%)	348 (98.6%)	304 (99.0%)	368 (100%)
Median (days-hrs)	7d-15h	6d-13h	7d-2h	7d-12h
Average (days-hrs)	11d-19h	10d-9h	10d-13h	10d-10h

Table 37 Hospital Length of Stay, Seriously Injured, by calendar year).

<sup>25</sup> ATR Annual Report 2015/16, 2016/17, 2017/18 (all reports state 7 days)

<sup>26</sup> ATR Annual Report 2018/19 2019/20 (all reports state 7 days)



## Hospital Discharge Disposition (RACS/QTDC), Seriously Injured

There is no significant change in the ratio of discharge dispositions between the two reporting periods with consistently higher discharge home rates when compared to Australia New Zealand Trauma Registry.

See Appendix 1 Quality Indicator 6 Discharge destination.

Australia Wide comparison			
ATR Annual Reports	2015/16 2016/17 2017/18	2018/19 2019/20	
Home	62%	65%	

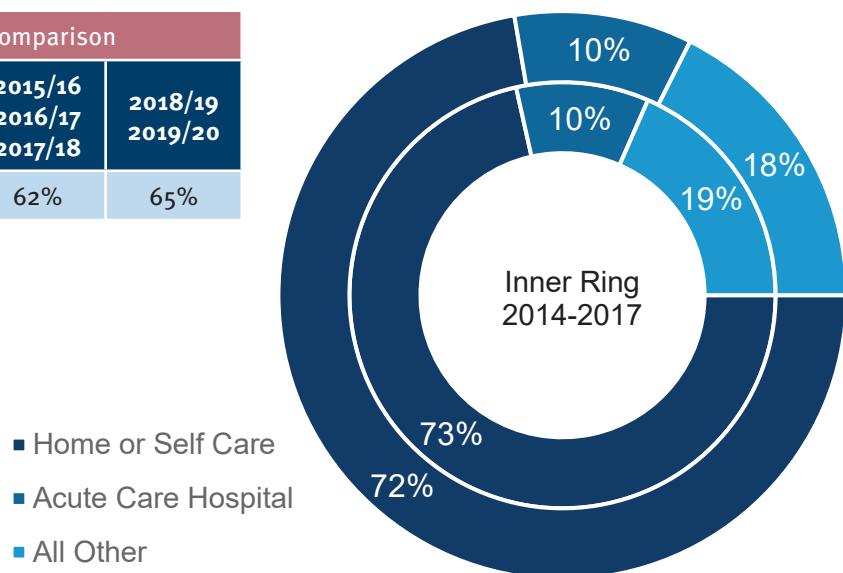


Figure 32 Hospital Discharge Disposition, Seriously Injured, 2014-2017 v 2018-2021 <sup>27 28</sup>

	2018	2019	2020	2021
Seriously Injured n(atr)	347	353	307	368
Home or Self Care	75%	71%	69%	73%
Acute Care Hospital	7%	9%	16%	9%
Sub-Acute Care <sup>29</sup> (current hospital admission)	9%	7%	9%	11%
Rehabilitation (not current hospital admission)	3%	6%	2%	2%
Other <sup>30</sup>	6%	8%	4%	5%

Table 38 Hospital Discharge Disposition, Seriously Injured, by calendar year

<sup>27</sup> ATR Annual Report 2015/16 (no data), 2016/17 (62%), 2017/18(62%)

<sup>28</sup> ATR Annual Report 2018/19 (65%) 2019/20 (64.2%)

<sup>29</sup> Sub-Acute Care collected from 2018 onwards

<sup>30</sup> Includes: Unable to Complete Treatment, Correctional Facility or in Law Enforcement Custody, Skilled Nursing Facility, Other, or not yet discharged.





## In Hospital Mortality (RACS/QTDC), Seriously Injured

Increase in cases that were directly related to self-harm hanging and accidental drownings from 23 in 2014-2017 to 54 in 2018-2021. Not all sites within the Australia New Zealand Trauma Registry (ATR) report these incidents and as such unadjusted mortality excludes these cases. From 2022, these cases are formally excluded from the ATR.

See Appendix 1 Quality Indicator 7 Case fatality rate.

	2014 - 2017	2018 - 2021
Seriously Injured <i>n(atr)</i>	1165	1375
Raw observed mortality	9.4%	11.0%
Mortality (excluding Hangings/Drowning <sup>31)</sup>	7.4%	9.0%
Mortality (>4hr Total LOS) <sup>32</sup>	5.9%	5.7%
Mortality Australia (ATR)	10.17% <sup>33</sup>	10.05% <sup>34</sup>

Table 39 In hospital mortality, Seriously Injured, 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured <i>n(atr)</i>	347	353	307	368
Raw observed mortality	9.0%	11.7%	11.1%	11.3%
Mortality (excluding Hangings/Drowning)	6.1%	7.7%	7.8%	5.9%
Mortality (>4hr Total LOS)	6.1%	6.6%	6.2%	5.1%

Table 40 In hospital mortality, Seriously Injured, by calendar year.

<sup>31</sup> Drownings includes ICD10 codes: (W67), (W68), (W69), (W74) (V92.7) (V92.8) (Y21.1)

Hanging includes ICD10 codes (X70)

<sup>32</sup> Mortality (>4hr TLOS (total length of stay) = ED arrival to hospital discharge) also excludes hanging and drownings

<sup>33</sup> ATR Annual Report 2015/16, 2016/17, 2017/18 (10%, 10.6% and 9.9% respectively)

<sup>34</sup> ATR Annual Report 2018/19 2019/20 (9.8% and 10.3% respectively)



## Mortality by Location in Hospital

	2014 - 2017	2018 - 2021
Seriously Injured $n(atr)$	1165	1375
Mortality $n$	106	151
Emergency Dept $\frac{n}{n(atr)}$	23 (21.7%)	21 (13.9%)
Operating Room $\frac{n}{n(atr)}$	4 (3.8%)	3 (2.0%)
ICU $\frac{n}{n(atr)}$	67 (63.2%)	102 (67.5%)
Ward $\frac{n}{n(atr)}$	12 (11.3%)	25 (16.6%)

Table 41 Mortality by Location, Seriously Injured, 2014-2017 v 2018-2021 (raw)

	2014 - 2017	2018 - 2021
Seriously Injured $n(atr)$	1165	1375
Mortality $n(excl\ h/d)$	90	124
Emergency Dept $\frac{n}{n(atr)}$	20 (22.0%)	15 (12.1%)
Operating Room $\frac{n}{n(atr)}$	4 (4.4%)	3 (2.4%)
ICU $\frac{n}{n(atr)}$	54 (60.4%)	81 (62.9%)
Ward $\frac{n}{n(atr)}$	12 (13.2%)	25 (20.2%)
Mortality in Emergency Department Australia (ATR)	15.4% <sup>35</sup>	14.15% <sup>36</sup>

Table 42 Mortality by Location, Seriously Injured, 2014-2017 v 2018-2021 (excluding hanging and drownings)

<sup>35</sup> ATR Annual Report 2015/16, 2016/17, 2017/18 (15.8%, 14.2% and 16.2% respectively)

<sup>36</sup> ATR Annual Report 2018/19 2019/20 (13.8% and 14.5% respectively)





## Mortality by Mechanism of Injury (high level)

Transport, as a mechanism of injury, has a higher proportion of mortality when compared to the Australia New Zealand Trauma Registry. Although, falls have increased significantly as a proportion of seriously injured between reporting periods.

	2014 -2017	2018-2021
Seriously Injured <i>n(atr)</i>	1165	1375
Accident	75.8%	73.6%
Accident Transport <sup>37</sup> / <i>n(atr)</i>	46.2%	37.2%
Accident Falls / <i>n(atr)</i>	30.8%	46.3%
Assault	5.5%	6.6%
Intentional Self Harm	7.7%	3.3%
Transport Related Mortality Australia (ATR)	25% <sup>38</sup>	30% <sup>39</sup>

Table 43 Mortality by Mechanism of Injury, Seriously Injured, 2014-2017 v 2018-2021 (excluding hanging and drownings)

<sup>37</sup> Sub-groups of Accident; Transport Falls Other

<sup>38</sup> ATR Annual Report 2015/16, 2016/17, 2017/18 (each year reported 25%)

<sup>39</sup> ATR Annual Report 2018/19 2019/20 (31% and 29%)



## Mortality by ISS range

Injury Severity Score (ISS) is related to mortality rates and the below table shows a significant proportional mortality decrease by 7% in the Critically injured. The overall median ISS remains similar between reporting periods.

	2014 -2017	2018-2021
Seriously Injured $n(atr)$	1165	1375
ISS 13-15 Serious $\frac{n}{n(atr)}$	1.6%	2.1%
ISS 16-24 Severe $\frac{n}{n(atr)}$	3.2%	5.5%
ISS 25-40 Grievous $\frac{n}{n(atr)}$	20.3%	24.3%
ISS 41-75 Critical $\frac{n}{n(atr)}$	39.3%	31.9%

Table 44 Mortality by ISS Group, Seriously Injured, 2014-2017 v 2018-2021 (raw)

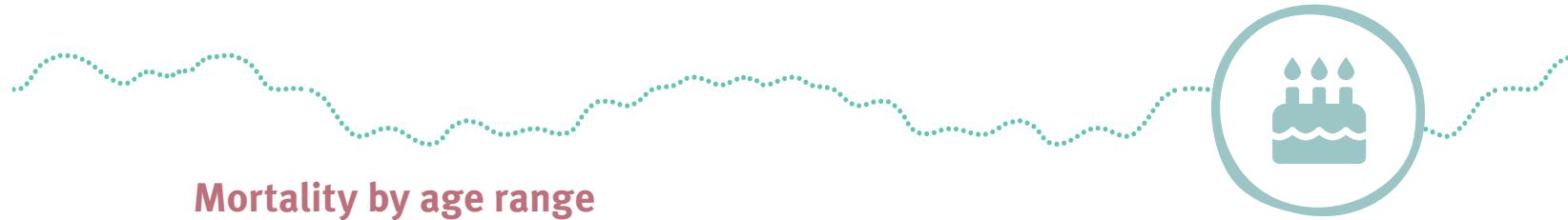
	2014 -2017	2018-2021
Median ISS	18	17
Seriously Injured $n(atr)$	1165	1375
ISS 13-15 Serious $\frac{n}{(n(atr)-hd)}$	1.6%	2.1%
ISS 16-24 Severe $\frac{n}{(n(atr)-hd)}$	3.2%	5.5%
ISS 25-40 Grievous $\frac{n}{(n(atr)-hd)}$	17.2%	19.3%
ISS 41-75 Critical $\frac{n}{(n(atr)-hd)}$	35.1%	32.6%
Median ISS Australia (ATR)	26 <sup>40</sup>	- <sup>41</sup>

Table 45 Mortality by ISS Group, Seriously Injured, 2014-2017 v 2018-2021 (excluding hanging and drownings)

<sup>40</sup> ATR Annual Report 2015/16, 2016/17, 2017/18 (each year reported ISS=26)

<sup>41</sup> ATR Annual Report 2018/19 2019/20 (no data)





## Mortality by age range

Mortality has increased in the under 16 age group when reviewing the raw mortality rate. Although, when excluding hangings and drownings this rate has not significantly increased.

The mortality rate of 75yrs + when compared to the ATR is significantly lower (~10%).

	2014 -2017	2018-2021
Seriously Injured $n(atr)$	1165	1375
<16yrs $\frac{n}{n(atr)}$	3.0%	10.7%
16-39yrs $\frac{n}{n(atr)}$	6.9%	10.0%
40-65yrs $\frac{n}{n(atr)}$	9.6%	6.6%
> 65yrs $\frac{n}{n(atr)}$	16.8%	17.9%

Table 46 Mortality by Age Group, Seriously Injured, 2014-2017 v 2018-2021 (raw)

	2014 -2017	2018-2021
Seriously Injured $n(atr)$	1165	1375
<16yrs $\frac{n}{(n(atr)-hd)}$	1.5%	4.0%
16-39yrs $\frac{n}{(n(atr)-hd)}$	5.4%	7.6%
40-65yrs $\frac{n}{(n(atr)-hd)}$	8.2%	5.3%
> 65yrs $\frac{n}{(n(atr)-hd)}$	15.7%	16.7%
75yrs+ $\frac{n}{(n(atr)-hd)}$	21.0%	21.1%
Mortality Australia (ATR) 75yrs +	39% <sup>42</sup>	31% <sup>43</sup>

Table 47 Mortality by Age Group, Seriously Injured, 2014-2017 v 2018-2021 (excluding hanging and drownings)

<sup>42</sup> ATR Annual Report 2015/16, 2016/17, 2017/18 (40%, 36.1% and 41% respectively)

<sup>43</sup> ATR Annual Report 2018/19 2019/20 (23% and 39.5% respectively)



## Red Blanket (GCUH), Seriously Injured



**There is no significant change in red blanket cases between the two reporting periods; averaging approximately 10 per annum.**

Urgent 'Red Blanket' protocol is a measure to rapidly transit a severely injured and clinically compromised patient to the operating room in the shortest time possible to enact emergency life preserving surgery. This protocol was commenced at GCUH in February 2015.

This is aggregated data of the number of cases identified within the registry for 'Red Blanket' initiation and that the case met the inclusion criteria for the Australia New Zealand Trauma Registry (ATR). Note that this is not inclusive of all 'Red Blanket' cases as not all meet ATR inclusion.

	2014 -2017	2018-2021
Seriously Injured $n(atr)$	1165	1375
Red Blanket $\frac{n}{n(atr)}$	3.5% <sup>44</sup>	2.7%

Table 48 Red Blanket, Seriously Injured, 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured $n(atr)$	347	353	307	368
Red Blanket	17	7	5	8
- Red Blanket Laparotomy <sup>45</sup>	9	3	5	4
- Red Blanket Thoracotomy <sup>46</sup>	1	3		
- Red Blanket Cardiac Procedure <sup>47</sup>				1
- Red Blanket Other	9	2		3

Table 49 Red Blanket, Seriously Injured, by calendar year.

<sup>44</sup> The number of cases  $/n(atr)$  for the same period 2015-2017.

<sup>45</sup> (30373-00) Exploratory laparotomy

<sup>46</sup> (38418-00) Exploratory thoracotomy

<sup>47</sup> (38456-02) Other procedures on lung and pleura, intrathoracic approach; (38456-03) Other procedures on chest wall, mediastinum or diaphragm, intrathoracic approach; (38456-00) Other intrathoracic procedures on heart without cardiopulmonary bypass; (38456-13) Other intrathoracic procedures on atrium without cardiopulmonary bypass; (38450-00) Transthoracic drainage of pericardium





## Screen for Blood Alcohol (RACS), Seriously Injured

In Queensland, there is no mandate in undertaking blood alcohol levels within hospitals for traumatic mechanism of injury. When compared with the ATR reports, some jurisdictions report over 60%<sup>48</sup>. As such the data below is suspected to be well under-reported.

	2014 -2017	2018-2021
Seriously Injured n(atr)	1165	1375
Total BAL and Positive or Yes Based on Clinical Assessment or Patient Report	- 49	15.2%

Table 50 Blood Alcohol Screen, Seriously Injured, 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured n(atr)	347	353	307	368
BAL Tested and Positive	1.7%	1.4%	1.6%	0.5%
BAL Tested and Negative	0.6%	1.4%	1.3%	1.6%
BAL Tested	2.3%	3.1%	2.9%	2.2%
Yes, Based on Clinical Assessment or Patient Report but Not Tested	10.4%	15.1%	13.4%	16.2%
Total BAL and Positive or Yes Based on Clinical Assessment or Patient Report	12.1%	16.8%	15.0%	16.8%

Table 51 Blood Alcohol Screen, Seriously Injured, by calendar year .



<sup>48</sup> ATR Annual Report 2019/20 New Zealand 71% Victoria 64%.

<sup>49</sup> Not collected prior to 2018



## Pregnancy (GCUH), Seriously Injured

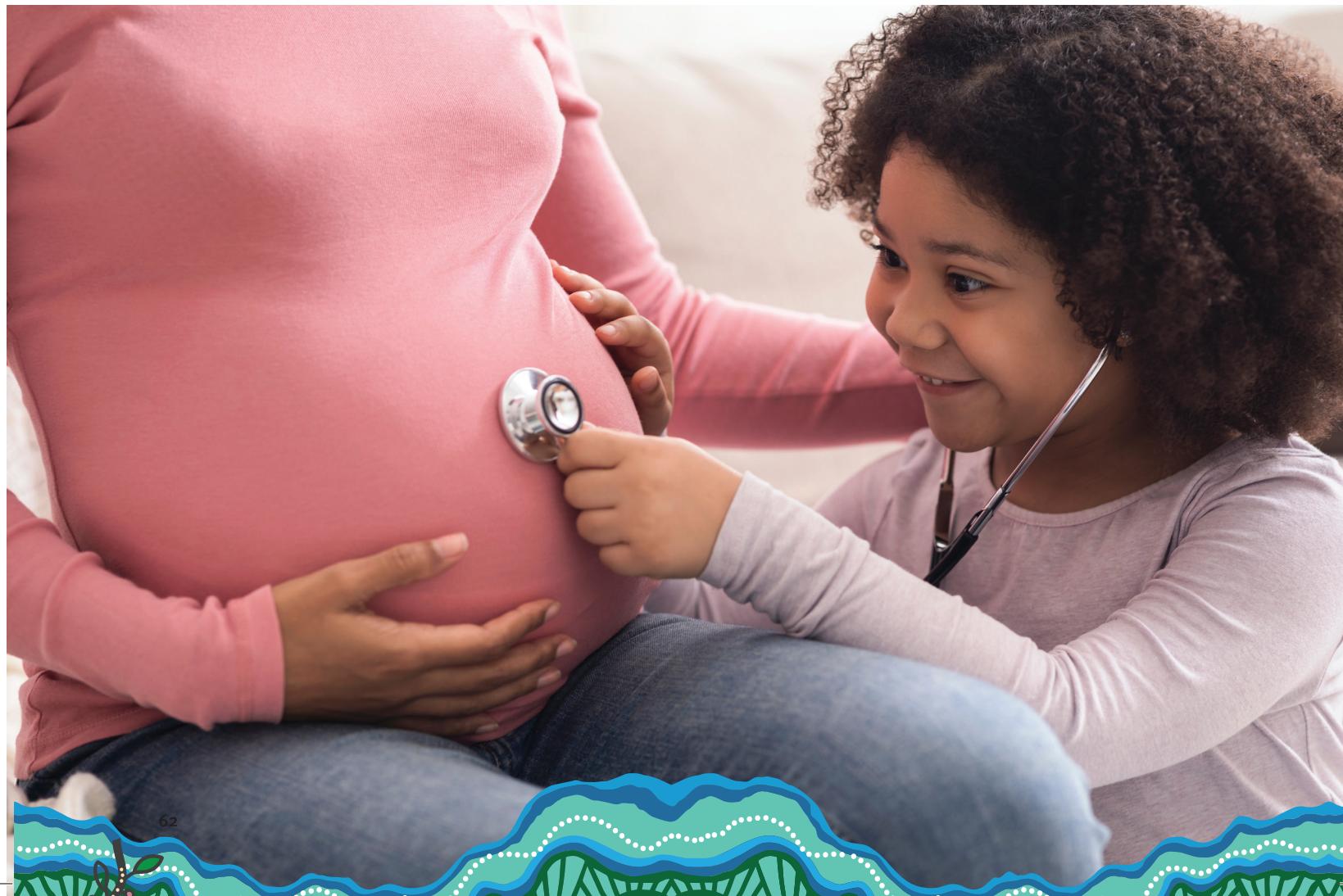
This is the first time we have reported the incidence of pregnancy for traumatic mechanism of injury. During the 2018-2021 time-period the trauma service at GCUH has had 93 trauma presentations with pregnancy, on average 23 cases per annum with significantly injured pregnant patient occurring approximately once per annum.

Clinical evidence of pregnancy or positive blood test result where patient gender = female and age between 14 and 49 years.

	2014 - 2017	2018-2021
Seriously Injured n(atr)	1165	1375
Age (14-49) Gender = F	25	151
Pregnancy	- <sup>50</sup>	2.6%

Table 52 Pregnancy, Seriously Injured, 2014-2017 v 2018-2021

<sup>50</sup> Not collected prior to 2018



## Intensive Care Length of Stay, Seriously Injured

The length of stay has increased between reporting periods, although the median LOS has remained below the ATR annual Reports. The proportion of cases required for intensive care has decreased by >5% between the reporting periods.

*The total number of hospital days spent in the Intensive Care Unit (ICU) at the definitive care hospital.*

	2014 -2017	2018-2021
Seriously Injured <i>n(atr)</i>	1165	1375
Cases requiring ICU	52.1%	45.6%
Admitted to ICU Australia (ATR)	36.7% <sup>51</sup>	39.4% <sup>52</sup>

	2014 -2017	2018-2021
Seriously Injured <i>n(atr)</i>	1165	1375
Median ICULOS (days)	1.0	2.8
Average ICULOS (days)	3.6	5.8
Median ICULOS (days) Australia (ATR)	3.9 days <sup>53</sup>	3.6 days <sup>54</sup>

Table 53 ICU LOS, Seriously Injured, 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured <i>n(atr)</i>	347	353	307	368
Cases requiring ICU	51.9%	41.6%	48.5%	41.0%
Median ICULOS (days)	3.0	3.9	2.0	2.3
Average ICULOS (days)	5.9	7.1	5.1	5.3

Table 54 ICU LOS, Seriously Injured, by calendar year

<sup>51</sup> ATR Annual Report 2015/16, 2016/17, 2017/18 (37%, 37%, and 36% respectively)

<sup>52</sup> ATR Annual Report 2018/19 2019/20 (39% and 37.7% respectively)

<sup>53</sup> ATR Annual Report 2015/16, 2016/17, 2017/18 (4 days, 4 days and 3.7 days respectively)

<sup>54</sup> ATR Annual Report 2018/19 2019/20 (3.8 days and 3.4 days respectively)



## Ventilation duration, Seriously Injured

The proportion of cases requiring ventilation has not significantly changed between reporting periods. Both the median and average ventilation periods have also not changed significantly between reporting periods.

Total number of days (whole or partial) on which mechanical ventilation was used. Exception is when the only mechanical ventilation used occurs during an Operating Room procedure. Mechanical ventilation does not include non-invasive methods of ventilatory support, such as CPAP or BiPAP. Refer to Australian Coding Standard 1006 Ventilatory Support and the Management of continuous ventilatory support ACHI codes for guidance.

	2014 -2017	2018-2021
Seriously Injured <i>n(atr)</i>	1165	1375
Cases requiring Ventilation	30.4%	27.2%
Intubation Pre-Hospital <sup>55</sup>	-	15.4% <sup>56</sup>
Median Ventilation (days)	3	4
Average Ventilation (days)	7.13	7.04

Table 55 Ventilation, Seriously Injured, 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured <i>n(atr)</i>	347	353	307	368
Cases requiring Ventilation	24.2%	27.8%	27.7%	29.1%
Intubation Pre-Hospital	4.0%	11.9%	16.6%	17.7%
Median Ventilation (days)	4	5	5	3
Average Ventilation (days)	7.16	7.6	7.11	6.39

Table 56 Ventilation, Seriously Injured, by calendar year

<sup>55</sup> Not collected prior to 2019

<sup>56</sup> Calculated number of 2019-2021 Intubations prior to arrival / number of incidents for same period





## Tertiary Survey Performed, Seriously Injured

The number of trauma presentations with tertiary assessments has increased by 128% between the two reporting periods. The proportion of tertiary assessments remain >80% with >65% performed within 24hrs of admission.

A tertiary survey was defined as completed where a time of survey was recorded. Tertiary survey within 24 hours is a specific field as it is a key performance indicator for the GCH trauma service.

	2014 -2017	2018-2021
Seriously Injured n(atr)	1165	1375
Tertiary Survey (GCH trauma presentations)	3246	4154
Tertiary for Seriously Injured	975 (83.7%)	1205 (87.6%)
Tertiary for Seriously Injured <24hr	771 (66.2%) <sup>57</sup>	928 (67.4%) <sup>58</sup>

Table 57 Tertiary Survey, Seriously Injured, 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured n(atr)	347	353	307	368
Tertiary Survey (GCH trauma presentations)	1075	965	977	970
Tertiary for Seriously Injured	312 (89.9%)	310 (87.8%)	273 (88.9%)	310 (84.2%)
Tertiary for Seriously Injured <24hr	240 (69%)	244 (69%)	212 (69%)	230 (69%)

Table 58 Tertiary Survey, Seriously Injured, by calendar year

<sup>57</sup> Increase from previous period

<sup>58</sup> As a percentage of all Seriously Injured for same period



## Emergency Discharge Disposition (RACS), Seriously Injured

Overall, there has been an increase in discharges to wards with direct ICU admissions not changing as a percentage of cases. This indicates that ICU admissions are proportional to the growth in seriously injured trauma. Of the cases which are discharged to a procedure area 2018-2021, 83% go to ICU with 15% to a ward area.

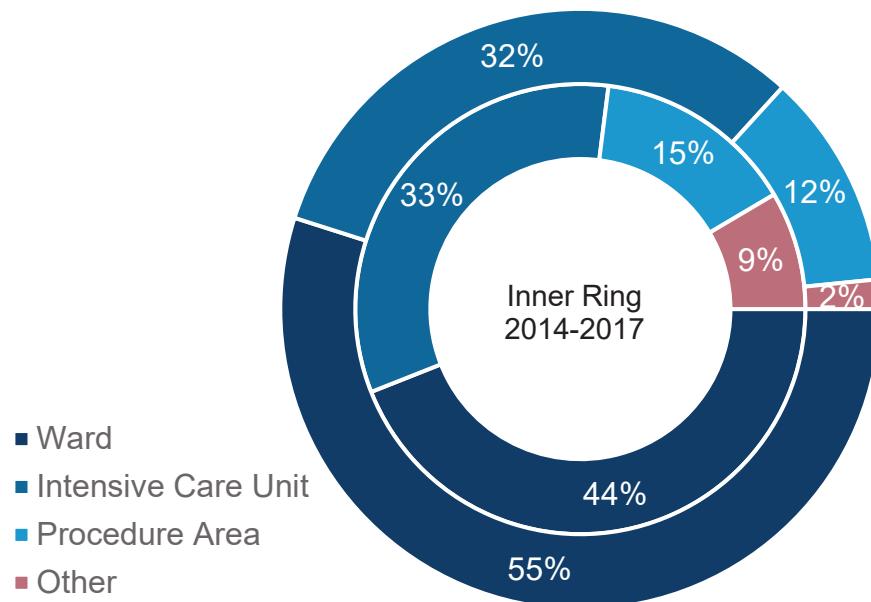


Figure 33 Emergency Discharge Disposition, Seriously Injured, 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured n(atr)	347	353	307	368
Ward	50%	58%	53%	58%
Intensive Care Unit	36%	29%	33%	31%
Procedure Area	11%	12%	13%	10%
Other	3%	1%	1%	1%

Table 59 Emergency Discharge Disposition, Seriously Injured, by calendar year




## Time in Emergency Department (RACS), Seriously Injured

The median time in emergency department for both reported periods remain below three hours and below the Australian New Zealand Trauma Registry reports.

	2014 - 2017	2018-2021
Seriously Injured <i>n(atr)</i>	1165	1375
Included (valid data) <sup>59</sup>	83%	94%
Median Time (hr:min)	2:34	2:57
Average Time (hr:min)	3:10	3:26
Median Time (hr:min) Australia (ATR)	4:13 <sup>60</sup>	4:13 <sup>61</sup>

Table 60 Time in Emergency Department, Seriously Injured, 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured <i>n(atr)</i>	347	353	307	368
Included (valid data)	91%	91%	94%	99%
Median Time (hr:min)	2:57	2:53	2:53	3:05
Average Time (hr:min)	3:14	3:18	3:19	3:50

Table 61 Time from Injury to definitive care, Seriously Injured, by calendar year.

<sup>59</sup> Excluded included cases that did not get admitted via emergency department e.g. direct admit to ICU or where the field was blank.

<sup>60</sup> ATR Annual Report 2015/16, 2016/17, 2017/18 (4hr:13min, 4hr:16min, 4hr:12min respectively)

<sup>61</sup> ATR Annual Report 2018/19 2019/20 (4hr:16min and 4hr:10min respectively)



## Time in 1st Facility (if transferred) (RACS), Seriously Injured

The median time has increased by 30 min although the average time has decreased by four hours between the reporting periods.

	2014 -2017	2018-2021
Seriously Injured <i>n(atr)</i>	1165	1375
Included (valid data) <sup>62</sup>	83%	82%
Median Time (hr:min)	5:27	5:56
Average Time (hr:min)	16:20	12:02

Table 62 Time in 1st Facility, Seriously Injured, 2014-2017 v 2018-2021

	2018	2019	2020	2021
Seriously Injured <i>n(atr)</i>	347	353	307	368
Included (valid data)	81%	84%	86%	79%
Median Time (hr:min)	5:29	6:26	6:25	6:10
Average Time (hr:min)	11:26	13:25	13:11	9:07

Table 63 Time in 1st Facility, Seriously Injured, by calendar year.

<sup>62</sup> Where patient was an interhospital transfer v valid data





## Registry Auditing (RACS), Seriously Injured

The completion and accuracy of the data submitted to the ATR remains high for the reported period.

**Completeness:** how many fields have been completed against the ATR incident file version 1.51 requirements.

**Accuracy:** of the fields completed how many were nulls divided by the number of fields completed.

	2018	2019	2020	2021
Seriously Injured $n(atr)$	347	353	307	368
Completeness	98.83%	99.99%	100%	99.96%
Accuracy	99.50%	99.49%	99.45%	99.48%

Table 64 Registry Auditing, Seriously Injured, by calendar year.

	2018	2019	2020	2021
Seriously Injured $n(atr)$	347	353	307	368
ISS>12 who died (isolated head injury)	8	12	8	16
ISS>12 who died (other)	21	28	24	20
ISS >12 who were admitted to ICU (isolated head injury) - Survived	11	22	10	17
ISS >12 who were admitted to ICU (other) - Survived	142	97	117	106
ISS >12 who survived to hospital discharge without admission to ICU	148	181	137	192

Table 65 Registry Trauma Verification Auditing groups, Seriously Injured, by calendar year



# Appendices

## Data Quality Framework, Queensland Trauma Data Collection

This is the list of quality indicators from the Data Quality Framework endorsed by the Queensland Trauma Clinical Network 5 Aug 2021.

### Quality Indicator 1

Indicator	Description	Calculation	Measure
Time of Injury to Arrival at Definitive Care Hospital	Mean and/or median length of time spent from Injury Date time to arrival at definitive care.	<b>Numerator</b> Sum of the elapsed time between Injury Date time and the time of arrival at Definitive care and/or median elapsed time  <b>Denominator</b> Count of all records that have valid values in the fields of interest if calculating median.	Measure the timeliness of transfer to definitive care and evaluate compliance with transfer protocols

Qld Qualifier: Arrival to definitive care = ED Arrival Time

Filters: "Transfer From"

### Quality Indicator 2

Indicator	Description	Calculation	Measure
Pre-hospital transport time to first Hospital	Mean and/or median time elapsing between time of injury and episodes of care prior to arrival at the first receiving hospital.	<b>Numerator</b> Sum of the pre-hospital times that elapse between each encounter where the relevant field is not a default value, blank and/or median time  <b>Denominator</b> Count of all records with a valid value in the field of interest if calculating mean	Understand the timeliness of pre-hospital encounters.

Qld Qualifier: EMS Arrival at Patient v DT ED Arrival First Hospital

### Quality Indicator 3

Indicator	Description	Calculation	Measure
Trauma team activation for patients with ISS>12	Percentage of patients with ISS>12 who had a trauma team activated at the time of presentation to ED.	<p><b>Numerator</b> Sum of the pre-hospital times that elapse between each encounter where the relevant field is not a default value, blank and/or median time</p> <p><b>Denominator</b> Count of all records with a valid value in the field of interest if calculating mean</p>	<p>Determine the accuracy of trauma team activation.</p> <p>Trauma team activation ensures appropriate clinical response in ED for severely injured patients.</p>

Qld Qualifier: - Excludes direct admissions i.e. not presenting via ED

- In absence of a trauma team, this includes internal response within Emergency Department.

### Quality Indicator 4

Indicator	Description	Calculation	Measure
Time to CT scan if GCS<13	Mean and/or median time between arrival at the reporting hospital and the first head CT performed at that hospital	<p><b>Numerator</b> Sum of the times elapsed between arrival time at hospital and time of the first head CT where the relevant field is not a default time or blank</p> <p><b>Denominator</b> Count of all records with a valid value in the field of interest if calculating mean</p>	Measure the timeliness of CT investigation of a patient with a suspected brain injury.

Qld Qualifier: Where the patient:

- Did not die in the ED under the first hour from arrival; and
- Not transferred out within 2hrs of arrival; and
- CT was performed within 4hrs of arrival.

## Quality Indicator 5

Indicator	Description	Calculation	Measure
Hospital acute length of stay.	Mean and/or median length of time spent from hospital admission date/time to hospital discharge date/time for acute care.	<p><b>Numerator</b> Sum of elapsed time between hospital admission date/time and date/time of acute episode of care discharge and/or median elapsed time.</p> <p><b>Denominator</b> Count of all records that have valid values in the fields of interest if calculating median.</p>	Measure the timeliness of discharge from acute definitive care and/or evaluate compliance with transfer protocols

Qld Qualifier: Where the patient:

- Excludes cases where discharge to acute hospital occurs within 12hrs.
- Excludes cases where ISS not  $>12$
- Reference: <https://www.ihpa.gov.au/what-we-do/admitted-acute-care>

## Quality Indicator 6

Indicator	Description	Calculation	Measure
Discharge destination.	Rate at which patients are discharged to specific destinations (other than death), at conclusion of hospital admission.	<p><b>Numerator</b> Count of each record with a particular coded discharge destination value that is not death, a default value or blank.</p> <p><b>Denominator</b> Count of all records with a valid discharge destination value other than death.</p>	Quantify the outcomes of in-hospital admissions to assist resource allocation.

Qld Qualifier: Each type of destination is modelled as per ATR definitions. Variable adjusted by CSCF Trauma (pending) or RACS Trauma Verification status.

## Quality Indicator 7

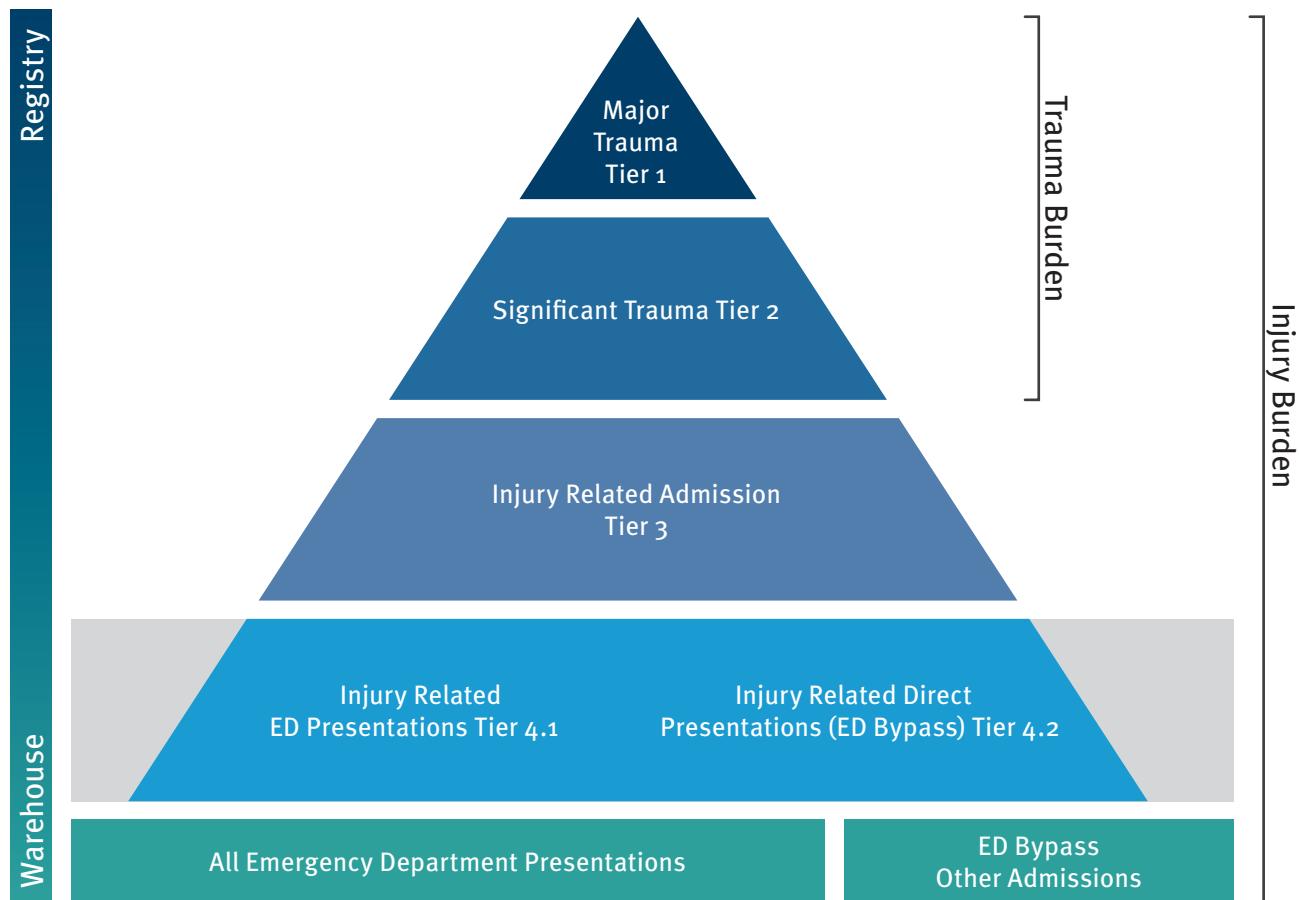
Indicator	Description	Calculation	Measure
Case fatality rate.	Rate of in-hospital deaths that occur, either in the emergency department or after patient admission, inpatients admitted following injury for acute length of stay.	<p><b>Numerator</b> Count of all records where discharge destination is death.</p> <p><b>Denominator</b> Count of all records with ISS <math>&gt;12</math> in the database for the reporting period.</p>	Understand burden of death from injury in patients that are alive on presentation to hospital.

Qld Qualifier: Denominator includes any case meeting ATR inclusion Criteria. Variable adjusted by CSCF Trauma (pending) or RACS Trauma Verification status.

## Queensland Trauma Burden Definition

**Trauma Burden includes Tier 1 Major Trauma and Tier 2 Significant Trauma Injury.**

The definition for Major Trauma in Australia and New Zealand is admitted Patients who subsequently die after injury, or who sustain major trauma (defined as an Injury Severity Score greater than 12).



## In Queensland to achieve this the following four tier definition:

### Tier 1. Major Trauma

### Australia and New Zealand Trauma Definition

**Inclusion:** Admitted Patients who subsequently die after injury, or who sustain major trauma (defined as an Injury Severity Score greater than 12) are included.

**Exclusions:** 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 ; Older adults ( $\geq 65$  years of age) 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).

### Tier 2. Significant Trauma

Patients that meet Tier 3 Admissions with any the following criteria:

- Acute Hospital Admission with Length of stay  $>72$ hr
- Requiring mechanical ventilation.
- Admission to intensive care or critical care unit for more than 24 hours
- Transferred to or received from another facility for further care
- Intracranial, intrathoracic or intraabdominal surgical procedure, fixation of pelvic or spinal fractures, or requiring any interventional radiological procedure
- Injury Severity Score ISS $>9$  (where available)

### Tier 3. Injury Related Admission

Admissions with all the following criteria:

- Acute Hospital Admission with Length of stay  $>24$ hrs AND
- Hospital discharge diagnosis due to traumatic injury as per agreed ICD-10-AM Code List or ED Presentations with ICD10/SNOMED Equivalent (previously known as the QHRS 10-3 Trauma Data Extract); AND
- Hospital external cause code of V01-X59 Accidents; X60-X84 Intentional Self Harm; X85-Y09 Assault; Y10-Y34 Event of undetermined intent; Y35-Y36 Legal intervention and operations of war; Y85-Y86 Sequelae of Transport Accidents; Y87.1-Y87.2 Sequelae of assault or events of undetermined intent; Y89 Sequelae of other external causes; Y96 Work-related condition.

### Tier 4. Injury Related Presentations

All presentations to an Emergency Department which meet the following criteria:

- EDIS: Any case with an ED diagnosis of an injury or external cause code from the following range:
  - ▶ ICD-10-AM codes from Chapter 19 (Range: Soo-T75 or T79), Chapter 20 (V, W, X, Y codes), Z codes which refer to accidents (Z04.1, Z04.2, Z04.3).
- FIRSTNET: Any cases with SNOMED codes which map to EDIS list of ICD-10-AM codes described above OR Any case for which any of the following are true:
  - ▶ An ieMR trauma form is completed
  - ▶ The ED tracking dashboard indicates a model of care pathway of trauma
  - ▶ A trauma specialty is assigned to manage the case
  - ▶ Trauma activation criteria selected from the ED triage form
  - ▶ Presentation direct result of injury- YES selected within the triage form
  - ▶ Trauma alert or trauma respond DTA complete within view of ieMR.

Trauma Burden

Injury Burden



# Abbreviations

AAAM	Association for the Advancement of Automotive Medicine.
ATR	Australia New Zealand Trauma Registry
ATSI	Aboriginal or Torres Strait Islander peoples are indigenous ethnic groups of Australia.
AIS	Abbreviated Injury Scale 2005 (Updated 2008) as issued by the AAAM.
CDC	Centers for Diseases Control
CNC	Clinical Nurse Consultant
FTE	Full Time Equivalent (76 hours of employment)
GCUH	Gold Coast University Hospital
GCHHS	Gold Coast Hospital and Health Service
ICD-10-AM	International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification. International for the period in this report the version utilised is the 8th Edition (which commenced use throughout Australia in 1 July 2013).
ICU	Intensive Care Unit
IHT	Inter Hospital Transfer
ISS	Injury Severity Score utilising qualified Abbreviated Injury Scale (AIS) coders <a href="https://www.aaam.org/abbreviated-injury-scale-ais/">https://www.aaam.org/abbreviated-injury-scale-ais/</a> . <b>Coding Note:</b> From February 2014-August 2016 all trauma service admissions were coded. From September 2016 patients with a length of stay from hospital admission >12hours were coded. Injury Severity Score is calculated automatically via the software to ensure integrity and consistency in the methodology is applied.
ITIM (NSW)	Institute of Trauma and Injury Management (New South Wales)
LOS	Length of Stay
MOC	Model of Care
NP	Nurse Practitioner
ORMIS	Operating Room Management Information System.
RACS	Royal Australasian College of Surgeons
RN	Registered Nurse
TRIS	Trauma Registry Information System (Gold Coast University Hospital Trauma Registry)



# Glossary

AIS	Abbreviated Injury Scale (AIS) Coding is only performed by staff who have successfully completed AAAM approved AIS© 2005-08 and injury scaling: uses and techniques. This informs the international Injury Severity Score and other recognised scoring systems.
Calendar Year	January 1st to December 31st in the same year. This aligns with traditional trauma service reporting internationally and the trauma service inception. <b>Calendar Year 2014:</b> Noting that the Trauma Service at GCUH commenced in Feb 2014 as such for this calendar year as such Jan 2014 is not included in this report.
Financial Year	1st July to 30 June, in line with national standard of financial year. This is in line with Australian hospital funding arrangements and ATR national reporting requirements. <a href="https://www.accd.net.au/lcd10.aspx?page=3">https://www.accd.net.au/lcd10.aspx?page=3</a>
ISS>12 ATR	This is the standard for the Australia New Zealand Trauma Registry (ATR) based on the Binational Minimum Dataset v1.50 (2016). Using a standardised inclusion and exclusion Criteria: <b>Inclusions:</b> All patients of any age admitted to hospital with either: <ul style="list-style-type: none"><li>• Injury Severity Score (ISS) &gt;12 (based on AIS 2005 Update 2008) or</li><li>• Death following injury</li></ul> <b>Exclusions:</b> <ul style="list-style-type: none"><li>• Patients with delayed admissions greater than seven days after injury</li><li>• Poisoning or drug ingestion that do not cause injury</li><li>• Foreign bodies that do not cause injury</li><li>• Injuries secondary to medical procedures</li><li>• Isolated neck of femur fracture</li><li>• Pathology directly resulting in isolated injury</li><li>• Elderly (<math>\geq 65</math> years of age) 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).</li></ul>
ISS≤12	Patients coded with an ISS≤12. From February 2014- August 2016 all trauma service admissions were coded. From September 2016 patients with a length of stay from hospital admission >12 hours were coded.
ISS >15:	This is an international standard for Major Injured patients as defined by the American College of Surgeons and European trauma registries.
Hospital Admission:	Where the patient was formally admitted to the hospital. This is excludes Emergency Department presentation.
Intensive care unit	(Urquhart et al.): Patients who required intensive care due to their injuries (admission to ICU)
MAIS ≤1	AIS grade 1 (MAIS = 1) they were not severely injured. These cases were excluded from further analysis. <sup>63</sup>
MAIS 2	The worst injury was of AIS grade 2.
MAIS 3+	The worst injury was of AIS grade 3 or more (MAIS 3+) which recently was defined as seriously injuries by the EU when looking for an internationally agreed definition for road traffic research. 1

<sup>63</sup> 2016 Sektion NIS of DGU / AUC & Lefering R., et al 2016.

Major Trauma VSTORM:	All trauma patients with injury as their principle diagnosis with one or more of the following criteria. <ul style="list-style-type: none"> <li>• Death after injury</li> <li>• ISS&gt;12</li> <li>• Admission to an ICU&gt;24hours requiring mechanical ventilation</li> <li>• Urgent surgery for intracranial, intrathoracic or intraabdominal or fixation of pelvic or spinal fracture.</li> </ul>															
Observed Mortality	Patients primarily admitted to the facility, excluding transferred in and transferred out early (within 48hours of admission) (TR-DGU, 2017)															
Seasons	Southern Hemisphere seasons: <ul style="list-style-type: none"> <li>• Summer: December, January, February.</li> <li>• Autumn: March, April, May</li> <li>• Winter: June, July August</li> <li>• Spring: September, October, November</li> </ul>															
Red Blanket	Urgent ‘Red Blanket’ protocol is a measure to rapidly transit a severely injured and clinically compromised patient to the operating room in the shortest time possible to enact emergency life preserving surgery.															
Severely injured (Paffrath et al)	<p>Injury severity (ISS&gt;15) is combined with physiological consequences as done with the new ‘polytrauma’ definition (Paffrath et al., 2014)</p> <p><b>Inclusion:</b></p> <ul style="list-style-type: none"> <li>• Primary admission to the hospital (no transfers in).</li> <li>• No transfers out within 48 hours.</li> <li>• Injury Severity Score (ISS) &gt;15</li> </ul> <p><b>Risk Factors Definition (as used in this report) *</b></p> <table> <tbody> <tr> <td>• High Age</td> <td>Age</td> <td>≥70years</td> </tr> <tr> <td>• Acidosis</td> <td>Base Excess</td> <td>&lt;-6</td> </tr> <tr> <td>• Consciousness</td> <td>GCS</td> <td>3-8 (Pre-hospital)</td> </tr> <tr> <td>• Hypotension</td> <td>SBP</td> <td>≤90mmHg (Pre-Hospital or On Arrival)</td> </tr> <tr> <td>• Coagulopathy</td> <td>INR</td> <td>≥1.4</td> </tr> </tbody> </table> <p>*For Inclusion only one of these risk factors needed to be present.</p>	• High Age	Age	≥70years	• Acidosis	Base Excess	<-6	• Consciousness	GCS	3-8 (Pre-hospital)	• Hypotension	SBP	≤90mmHg (Pre-Hospital or On Arrival)	• Coagulopathy	INR	≥1.4
• High Age	Age	≥70years														
• Acidosis	Base Excess	<-6														
• Consciousness	GCS	3-8 (Pre-hospital)														
• Hypotension	SBP	≤90mmHg (Pre-Hospital or On Arrival)														
• Coagulopathy	INR	≥1.4														
Polytrauma	<p>According to the new “Berlin Definition” two body regions need to be severely affected (MAIS 3+ in each), and one or more physiological problems are present (Pape et al., 2014).</p> <p><b>Inclusion:</b></p> <ul style="list-style-type: none"> <li>• Injury Severity Score (ISS) &gt;15 <ul style="list-style-type: none"> <li>“...The definition implies the following parameters: two injuries that are greater or equal to 3 on the AIS and one or more additional diagnoses (pathologic condition), that is, hypotension (systolic blood pressure &lt; 90 mm Hg,), unconsciousness (GCS score ≤ 8), acidosis (base deficit ≤ 6.0), coagulopathy (PTT≥ 40 seconds or INR ≥ 1.4), and age (≥ 70 years).” (Pape et al., 2014, pp. 785-786).</li> </ul> </li> </ul>															
Quarter	<p>The division of a year into three monthly segments.</p> <p>Q1: Jan Feb Mar. Q2: Apr May Jun. Q3: Jul Aug Sep. Q4: Oct Nov Dec.</p>															

Northern NSW Local Health District (NNSWLHD)	Includes, Casino & District Memorial Hospital, Lismore Base Hospital, Maclean District Hospital, Murwillumbah District Hospital, Kyogle Multi-Purpose Service, Nimbin Multi-Purpose Service, Byron Central Hospital, Ballina District Hospital and The Tweed Hospital.
Mid North Coast Local Health District (MNCLHD)	Includes, Coffs Harbour Base Hospital
New South Wales (Other)	Includes Liverpool Hospital, Royal Rehabilitation Hospital, Nepean Hospital, Bankstown/Lidcombe Hospital, Inverell District Hospital.
Queensland Gold Coast Private	Includes, Pindara Private Hospital, John Flynn Private Hospital Gold Coast Private Hospital (formerly Allamanda Private Hospital).
Gold Coast Public Hospital	Gold Coast Hospital and Health Service including Gold Coast University Hospital, Robina Hospital.
Queensland (Metro South HHS)	Includes, Logan Hospital, Princess Alexandra Hospital.
Queensland (Metro North HHS)	Includes, Redland Hospital, Royal Brisbane & Women's Hospital.
Queensland Other	Includes, Lady Cilento Children's Hospital, Mackay Base Hospital, Mater Adult Hospital, Nambour Hospital.

AIS Severity Code <sup>64</sup>	Description
N(6).1	Minor
N(6).2	Moderate
N(6).3	Serious
N(6).4	Severe
N(6).5	Critical
N(6).6	Maximal (currently untreatable)

Table 66, AIS Severity Code Description

<sup>64</sup> Abbreviated Injury Scale (2005©) Update 2008, Association for the Advancement of Automotive Medicine



## References

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