

# OVERVIEW - THE ROYAL CHILDREN'S HOSPITAL TRAUMA REGISTRY

## INTRODUCTION

- The RCH Trauma Registry was commenced in 1999 as part of the measures introduced in response to the Victorian State Government's 1999 Review of Trauma and Emergency Services (RoTES) report.
- The current registry contains (as of late 2011) over 22,000 records of acute-phase trauma admissions to the Royal Children's Hospital. Over 1,400 of these patients meet one or more of Victoria's major trauma criteria (see below).
- Since July 2000 the registry has aimed to capture all such trauma admissions meeting registry criteria – presently at a rate of around 2,000 admissions per year. Trauma admissions include any patient who has been 'admitted' to the Emergency Department with a stay of greater than 4 hours (generally, for observation or a procedure under sedation). Patients who are only seen in the Emergency Department for less than 4 hours are still included on the registry if they die, or if there has been a trauma team page (callout).
- Inclusion criteria for the registry are:
  - Blunt, penetrating or burn trauma;
  - Drowning, hanging or electrocution trauma;
  - Accidental ingestion or inhalation of medication, toxic substance or foreign body;
  - Envenomation.
- The following patients are excluded:
  - Presentations for 're-management' of previously treated trauma (ie, trauma which has received treatment which would usually be regarded as definitive for the injuries sustained);
  - Presentations for management of secondary complications of trauma;
  - Intentional ingestions of harmful substances;
  - Foreign bodies lodged in orifices other than the airway or upper digestive tract (ie, with no mechanical tissue disruption).
- Data fields collected on trauma admissions include:
  - Demographics;
  - Comorbidities;
  - Injury event information;
  - Transport and pre-hospital information;
  - Where applicable, referring hospital information;
  - RCH arrival and initial management information;
  - Operations performed under general anaesthesia;
  - Outcome information, including discharge destination, length of stay and Abbreviated Injury Scale (AIS) coding.

## MAJOR AND SIGNIFICANT INJURIES

- Blunt, penetrating and burn trauma admissions are classified as major or non-major according to whether a patient meets one or more RoTES criteria for major trauma:
  - Injury Severity Score (ISS) of greater than 12 (see below for more information);
  - Intensive Care stay greater than 24 hours, including mechanical ventilation;
  - 'Urgent' (within 48 hours) surgery for intra-cranial, intra-abdominal or intra-thoracic injury, or for fixation of pelvic or spinal fractures;
  - Death after injury.
- It is estimated that the RCH sees more than 80% of the pediatric major trauma load in the state of Victoria, either by direct admission or transfer from another hospital.
- Patients who drown or suffer an asphyxiation injury (eg hanging) who meet the second or fourth criteria (death or ICU > 24 hours) are also regarded as major trauma patients.

## ENTRY POINT

- There are 3 points of entry to RCH for patients being admitted - Emergency, Intensive Care and Direct Admit to wards (bypassing both of the other points). Only a few hospitals have multiple entry points. Intensive Care admissions are more likely to have serious injuries than Emergency or Direct Admit patients, but any of these sites can still receive patients with severe injuries. Admissions not presenting to the Emergency department have become less common since 2004, and presently occur only for PETS (Paediatric Emergency Transport Service) retrievals of intubated patients.

## INJURY SEVERITY SCORE (ISS)

- The ISS provides a measure of the severity of the overall injury pattern from a single injury episode (trauma). An ISS of greater than 12 is taken to indicate a 'major' trauma, but an ISS of greater than 9 (ie, 10 or more) still indicates a significant injury. Note, however that the scale used is not a ratio scale (ie, a patient with an ISS of 10 is not 'twice as bad' as a patient with an ISS of 5; mortality incidence, for example, increases exponentially with increasing ISS).
- The ISS is calculated by taking the sum of the squares of the AIS (Abbreviated Injury Scores) codes for the most severe injury in each of the 3 most severely injured ISS body areas.

- An AIS code is a seven digit number specifying the body region, specific structure, type of injury, severity of injury, and threat to life on a scale of 1 (minor) to 6 (unsurvivable - such as brain stem transection or total liver avulsion). The last of the 7 digits is the severity of injury used in ISS calculation. There are 1,341 codes in the 1998 version of the AIS, which was used until mid-2010; as of July 2010 the 2008 AIS update, containing 1,999 codes, will be used. Adoption of the 2008 AIS also resulted in a lower ISS threshold of >12 being adopted for major trauma definition in Victoria; using the earlier 1998 AIS version (which tended to assign higher severities) a higher ISS threshold of >15 was used.

- For ISS calculation the body is divided into 6 regions:
  - Head and Neck
  - Face
  - Chest (thorax)
  - Abdominal and Pelvic Contents
  - Extremities and Bony Pelvis
  - External
- Again, only the most severe injury in each region will be counted, up to a maximum of three regions. So if a patient has (for example):
  - Small intracranial bleed to left parietal lobe of brain  
→ *Head injury with AIS level 4*
  - Depressed left parietal skull fracture  
→ *Head injury (different) with AIS level 3*
  - Left rib fracture with pneumothorax  
→ *Thorax injury with AIS level 3*
  - Closed undisplaced fracture left elbow  
→ *Extremities injury with AIS level 2*
  - Graze to left forearm  
→ *External (superficial) injury with AIS level 1*

the patient's ISS would be 29:

- $4^2 = 16$  from MOST SEVERE head injury
  - $3^2 = 9$  from thorax injury
  - $2^2 = 4$  from extremities injury
- Total = **29**

- Note that in this instance, the three most severe injuries were not used (the skull fracture which wasn't used is a more severe injury than the elbow fracture which was used); nor was an injury taken from all of the injury areas involved (the external graze was ignored). An alternate scoring system, the New Injury Severity Score (NISS) has also been developed; this uses the three most severe injuries irrespective of body region. So, in the above instance the patient would have an ISS of 29, but a NISS of 34 ( $= 4^2 + 3^2 + 3^2$ ).

- Occasionally, a level '9' injury may be coded. These generally result from poor information regarding a patient's injury or injuries. If such patients have sustained other injuries, an ISS may be calculated based on the other injuries only; a level '9' injury is not used in the calculation of an ISS.