INITIAL TRAUMA MANAGEMENT OF AN INJURED CHILD IN ED - CHW

PRACTICE GUIDELINE ©

DOCUMENT SUMMARY/KEY POINTS

Key principles of Trauma in ED:

- An organised multidisciplinary approach to rapidly assess, resuscitate, and manage the child with serious injury.
- The Children's Hospital at Westmead (CHW) has a two-tier trauma system to inform staff about the expected or actual arrival of a child with potentially serious injuries.
- The trauma team is coordinated by the Trauma Team Leader. The Primary Survey identifies immediate or impending life threats. Secondary Survey identifies serious but non-life-threatening injuries
- Timely documentation of initial Emergency Department (ED) management by the multidisciplinary team is required to optimise patient safety, handover and continuity of care

This document will cover the following topics related to the initial management of an injured child in CHW ED:

- Trauma Call Criteria
- Activation of Trauma Calls
- Trauma Attend
- Trauma Consult
- Trauma Team Roles and Responsibilities
- Trauma Assessment
- Blood Orders
- Medical Imaging
- Documentation
- Disposition
- Other Trauma Activation Criteria and Relevant Links

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

Approved by:	SCHN policy, Procedure and Guideline Committee	
Date Effective:	1st March 2024	**Review Period:** 3 years
Team Leader:	Staff Specialist	**Area/Dept:** Emergency Department

CHANGE SUMMARY

- N/A – new CHW guideline.
- 21/02/24 Minor review: minor wording correction.

READ ACKNOWLEDGEMENT

- CHW ED Clinical Staff and CHW Trauma Team Members are to read and acknowledge having read this guideline.

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This Guideline may be varied, withdrawn or replaced at any time.
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1 Introduction

The key principles of Trauma in ED include:

- An organised multidisciplinary approach aims to rapidly resuscitate, assess, and manage the child with serious injury.
- The trauma team is coordinated by the Trauma Team Leader.
- Primary Survey identifies immediate or impending life threats.
- Secondary Survey identifies serious but non-life-threatening injuries.
- Timely documentation of initial ED management by the multidisciplinary team is required to optimise patient safety, handover and continuity of care.

2 Trauma Call Criteria

Children with injuries may present to the Emergency Department (ED):

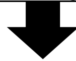
- By ambulance - sometimes bypassing other hospitals with the aim of transporting the child to a Paediatric Major Trauma service
- Transferred from other hospitals
- Brought in by parents or patient carers

CHW has a two-tier trauma call system to inform staff about the expected or actual arrival of a child with potentially serious injuries to enable early detection and appropriate management. In consultation with ED Medical and Nursing team leaders, a **TRAUMA ATTEND** or **TRAUMA CONSULT** is activated when the child fulfils the criteria

CHW EMERGENCY DEPARTMENT TRAUMA CALL CRITERIA

MECHANISM

MVA/ MBA – passenger or pedestrian or cyclist	Significant blunt/ penetrating/ major crush injury	Fall > 3 metres or twice the child's height
Explosion/Electric burns/Burns*	Animal(e.g. Horse) related injury	Immersion*



TRAUMA ATTEND			TRAUMA CONSULT
	INJURIES		
Penetrating Injury	**Head/neck/ torso/pelvis**		
Airway risk/ CSF leak/ fracture	**Head / Neck**	Orofacial injury/orbital injury	
Spinal cord injury/ fracture	**Spine**	Mild tenderness	
Haemo- Pneumothorax /flail segment/ crush injury	**Chest**	Bruise &/or abrasions	
Distended rigid tender/ macroscopic haematuria/ positive pre-hospital E-Fast	**Abdomen**	Bruise &/or abrasions	
Deformity / blood at meatus	**Pelvis**		
>2 long bones fracture Vascular injury / limb amputation/crush injury	**Limb**	Isolated long bone fracture or deformity	
Suspected inhalational burns or >20% BSA	**Burns***	< 20% BSA	
	SIGNS & SYMPTOMS		
Intubated/At risk/hoarse/ Red zone BTF	**Airway/ Breathing**		
Weakness/paraesthesia	**C-spine**		
Cold/pale/clammy/ Unexplained tachycardia/ Red zone BTF/ Traumatic cardiac arrest	**Circulation**		
<V on AVPU or GCS<13	**Disability**		
Open or closed fracture with neurovascular compromise	**Long bones**		
	TREATMENTS		
Support/ Assisted Ventilation	**Airway/ Breathing**		
Volume support - Blood products	**Circulation**		
Mannitol/ Hypertonic saline	**Disability**		
Call 2222 TRAUMA ATTEND IN ED			**Call 2222 TRAUMA CONSULT IN ED**

*Associated with a traumatic mechanism

Change from "CONSULT" to "ATTEND" at any stage if required.
"TRAUMA ATTEND" should be activated when an ED Consultant or Fellow is not available to rapidly assess and manage children with trauma related injuries in the Emergency Department

Figure 1: CHW Emergency Department Trauma Call Criteria

This Guideline may be varied, withdrawn or replaced at any time.

3 Activation of Trauma Calls

Activation of **TRAUMA ATTEND** or **TRAUMA CONSULTS** are made by ringing **2222**.

Calls can be upgraded or downgraded at any stage.

The following individuals are notified of **TRAUMA ATTEND** and **TRAUMA CONSULTS via PAGER/SMS:**

*TRAUMA ATTEND/ CONSULT
Anaesthetic Registrar
Orthopaedic SRMO
Radiology
Domestic Manager
Burns Registrar (Surgical)
Social Worker - Trauma
Chaplain - Trauma
Duty Anaesthetist
Blood Bank
AHNM
Patient Flow Manager
Surgical Team 1 Staff Specialist
Surgical Registrar
Trauma CNC
PICU Team Leader
PICU Outreach – NP/JMO
PICU POD 2 Registrar
ED Admitting Officer - Consultant
Emergency Department Resus Nurse
Emergency Department Nurse Manager
Emergency Department NUM
Emergency Department Fellow
Emergency Department CNE/ NE
Security
Public Relations
Senior on Site
CSSU

Figure 2: Trauma Call Pager Notifications

*This list is frequently revised

4 Trauma Attend

- A **TRAUMA ATTEND** informs Trauma Team members of the presence or expected arrival of a patient with significant trauma as determined by anatomic injuries or altered physiology, who requires coordinated Trauma Team care.
- Between the hours of 2400-0800 where there is no ED Consultant or Fellow on site all **TRAUMA CONSULTS should be upgraded to TRAUMA ATTEND.**
- Trauma Attend team members are expected to attend ED **immediately for a pre-arrival briefing** and assist with managing the injured child. Their role in the patient's management is guided by the Trauma Team Leader (Emergency Consultant/Fellow).
- In the event that a team member is unable to attend in person, they must arrange for someone to inform the ED Admitting Officer (52454) or arrange for an alternative delegate.
- If urgent subspecialty surgical or radiology involvement is required, the appropriate team should be contacted as soon as practical.
- Other calls requiring immediate attendance which may be activated at the discretion of the Trauma Team Leader include:
  - **TRAUMA ATTEND: CODE BRAIN**
  - **TRAUMA CODE CRIMSON**
  - **MASSIVE TRANSFUSION PROTOCOL**

5 Trauma Consult

- If the Emergency Consultant/Fellow is available and the patient fulfils the criteria for a **TRAUMA CONSULT** (Figure 1), then the **TRAUMA CONSULT** is activated by dialling **2222**.
- Initial assessment, management and disposition planning of the patient will be done by the clinicians in the Emergency Department
- For **TRAUMA CONSULTS**, the Surgical Registrar should check in with the Admitting officer (98452454) **within 30 minutes** and will be informed if attendance or likely admission under Trauma is required. An admission will necessitate a review and management plan by the Surgical registrar.
- Inter-hospital transfers within 24 hours of injury who are stable should have a **TRAUMA CONSULT** and attendance by the Surgical registrar for review.
- **TRAUMA CONSULTS** are upgraded to a **TRAUMA ATTEND** when:
  - Patient presents overnight when no ED Consultant/Fellow is on site
  - An expected patient meets the **TRAUMA ATTEND** criteria on arrival
  - Patient deteriorates while being observed in ED
  - At the discretion of the Emergency Consultant/Fellow
- If a subspecialty team consultation is required, they must be contacted individually.

6 Trauma Team Roles and Responsibilities

6.1 All team members

A multidisciplinary approach is imperative to the successful resuscitation and management of patients with trauma. Team members from ED, Surgery, Anaesthetics, PICU, and Allied health work together under the coordination of the Trauma Team Leader.

- Following activation of a **TRAUMA ATTEND or CONSULT** by ED, the trauma team assembles at the allocated resuscitation bed space.
- All team members must identify themselves to the Trauma team leader and scribe nurse.
- For pre-arrival notifications, the Trauma Team Leader conducts a team huddle to share assessment and management priorities.
- All team members to don appropriate PPE, airway team to consider airborne precautions.
- All team members to place a trauma team label on that indicates their role.

6.2 Trauma Team Leader

Default: ED Consultant or Fellow

Alternatives dependant on skill mix: Senior ED Registrar, Surgical Registrar or PICU Registrar

Pre-Arrival:

- Develops plan and anticipates equipment and medication that may be required
- Ensures activation of appropriate Trauma response as per Trauma Attend Criteria
- Ensures appropriate allocation of Trauma Team Roles
- Leads Team huddle to share preparation and plan

On Arrival

- Assumes responsibility for coordination of patient care
- Establishes location of handover
- Coordinates primary survey and initiates early resuscitation; prioritises investigation, management and decision on likely disposition.
- Delegates appropriate doctor to do EFAST scan where required
- Ensures timely notification of subspecialty consultation
- Ensures family are informed of progress
- Ensures drug and fluid orders are complete
- Verifies documentation complete

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6.3 Nurse Team Leader

- Allocates nursing staff to resuscitation roles
- Ensures appropriate Trauma call is activated via 2222 (on notification and once child arrives).
- Ensures patient registration details are logged in and maintained till final disposition
- Liaises with other departments (e.g. Blood bank, PICU, Theatres, Radiology)
- Liaises with Bed Manager or AHNM for staff/resources
- Supports nursing staff in specified roles

6.4 Airway Doctor

Default: Anaesthetics Doctor

Alternatives: Senior ED Registrar or PICU Registrar

- Checks and prepares appropriately sized airway equipment in collaboration with Airway Nurse
- Ensures the cervical spine is immobilised if indicated
- Assesses and manages airway and breathing
- Assesses neurological status from head of bed
- Clearly reports findings and changes to Trauma Team Leader and Scribe
- Performs or assists with intubation and ventilation according to clinical experience as requested by the Trauma Team Leader
- Determines ventilator settings and adjust according to clinical status
- Supports airway management during transport including drugs required as requested by the Trauma Team Leader
- Liaises with Anaesthetic Consultant/Operating theatre if OT is the likely disposition

6.5 Airway Nurse

Default: ED

Alternatives: PICU NP, or Anaesthetics Nurse

- Checks and prepares appropriately sized airway equipment in collaboration with Airway Doctor
- Ensures oxygen, suction, ETCO2 is functioning appropriately
- In collaboration with Circulation Nurse prepares monitoring equipment
- Ensures cervical spine is immobilised when appropriate
- Assists with intubation and airway management
- Ensures appropriate settings are selected on ventilator in collaboration with Airway Doctor
- Responsible for care of intubated and ventilated patient during transport between departments

6.6 Primary Survey Doctor

Default: ED Registrar

Alternatives: Surgical Registrar

- Conducts Primary and Secondary Survey. Communicates findings to Trauma Team Leader and Scribe.
- Conducts Extended Focused Assessment with Sonography in Trauma (**E-FAST**) if skilled and requested by the Trauma Team leader.

6.7 Circulation Doctor

Default: PICU Registrar/Nurse Practitioner

Alternatives: ED Doctor

- Prepares equipment for vascular access and blood collection
- Establishes large bore vascular access and collects blood samples
- Ensures blood samples are ordered, labelled, and sent
- Assists with haemorrhage control – applies pressure dressings, splints, sutures where appropriate
- Supports circulation nurse in prioritising medications as requested by the Trauma Team Leader

6.8 Circulation Nurse

Default: 2-3 x ED Nurses

- Prepares monitoring equipment
- With Circulation Doctor, prepares equipment for vascular access and blood sampling
- Prepares equipment for fluid bolus including fluid warmer
- Establishes medication prioritisation with Trauma Team Leader
- Prepares and labels medications. Assists with administration of fluids and medications
- Assists with cannulation and other procedures as required

6.9 Trauma Surgeon Consultant

Where possible the Trauma Consultant attends ED for **TRAUMA ATTEND**

- Liaises with Trauma Team Leader regarding appropriate radiological imaging and disposition
- Shared decision making with Trauma Team Leader, Anaesthetist and Intensivist when patients require urgent surgical intervention including activation of CODE CRIMSON.

6.10 Surgical Registrar

Surgical Registrar on-call for trauma is expected to respond in-person to all Trauma Attend pages immediately.

If unable to respond or answer, it is the responsibility of the Surgical Registrar to have someone contact the Trauma Team Leader to inform of expected delays and alternatives for surgical presence in the acute phase of assessment and resuscitation of the patient.

- Assists with Primary and Secondary Survey. Communicates additional findings to Trauma Team Leader and Scribe.
- Responsible for performing any of the following procedures when necessary:
  - Needle/surgical cricothyroidotomy
  - Tube thoracentesis
  - Direct pressure to the site of any external bleeding
  - IV cut down
- In arrest, treats the mechanical causes such as tension pneumothorax or pericardial tamponade.
- In consultation with Trauma Team Leader and Trauma Surgeon Consultant, helps plan investigations, management, and disposition of patient
- Afterhours, in the absence of an ED doctor experienced in trauma, the Surgical Registrar may take role as Trauma Team Leader
- Documents findings related to their role and plan for management eg: primary and secondary survey findings, procedures and investigations.

6.11 Scribe

- Prints Resus Drug Calculator according to weight
- Records time, name, and designation of Trauma Team members
- Records time of trauma call initiation, patient's arrival and handover from pre-hospital team
- Records A-G assessment, observation, fluids, drugs.
- Ensures all relevant areas of Paediatric Resuscitation Form are completed

6.12 PICU Nurse Practitioner/PICU Registrar

- Supports Airway and Circulation Nurse teams
- Assists with Ventilator settings and operation
- Liaises with PICU and assists with bed allocation where patient requires transfer to PICU
- In event of traumatic cardiac arrest, liaises with PICU consultant regarding activation of ECMO-CPR (E-CPR)

6.13 Radiographer

- Checks in with Trauma team leader regarding imaging likely required
- Performs mobile Trauma X-rays
- Liaises with team and Radiology Doctors regarding CT scan requirements

6.14 Social Worker

- Supports family during and after the resuscitation
- Assesses current situation and gathers relevant background information
- Updates Trauma Team Leader of relevant concerns or information that family has provided relevant to management of the patient

6.15 Miscellaneous

- In-hours, other clinicians may be available to support the trauma patient's care if escalation, additional resources or liaising with specialty surgical teams are required. These include ED Director, ED Nurse manager, Trauma Director, Trauma CNCs, Child life therapists, ED Nurse Practitioners and physiotherapists.

7 Trauma Assessment

The Primary Survey is done by an ED Registrar and may be assisted by the Surgical Registrar.

The purpose of the Primary Survey is to rapidly identify impending or actual life threats from injury. Priorities of management are in keeping with the CABCDE approach.

- **C** Catastrophic external haemorrhage
- **A** Airway & C-spine
- **B** Breathing & ventilation
- **C** Circulation
- **D** Disability
- **E** Exposure/Environment

The Secondary Survey is done once the patient has been resuscitated and stabilised. It involves a thorough head-to-toe examination. The aim is to identify any other significant but non-life-threatening injury.

Cervical spine immobilisation should be addressed during the primary and secondary survey. If the child arrives in a hard collar, change to appropriate soft collar as soon as practical.

The doctor who conducts the Primary and Secondary Survey should:

- Communicate their findings to the Team Leader
- Document their findings related to their role and plan for management in eMR in a timely manner

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8 Blood Orders

A VBG can be done in the ED point of care machine.

When ordering bloods on eMR there is an order set **"ED Trauma Investigations"** that includes:

- Full Blood Count
- Group and Screen
- Coagulation Studies
- Electrolytes, Urea, Creatinine (EUC)
- Liver Function Test (LFT)
- Amylase
- Lipase
- Troponin

If there is a difficult collection, prioritise VBG, Group and Screen, FBC collection.

9 Medical Imaging

The Trauma Team Leader together with the Trauma Surgeon will decide appropriate imaging.

E-FAST

- When indicated, should be done by trained/accredited clinicians
- Findings should be relayed to Trauma Team Leader and Scribe and documented in eMR in a timely manner
- Where possible it is recommended to save images/loops of scan

Plain X-rays

- Chest x-ray – assess for pneumothorax, haemothorax, rib fractures, subcutaneous or mediastinal emphysema.
- Pelvis x-ray – assess for displaced fractures or confirm adequate fracture reduction by pelvic binder
- Lateral cervical spine – assess for fracture/dislocation

CT Scans

- All contrast studies must be approved by the Radiology Doctor. The referrer is responsible for calling the Radiology Doctor who will then inform the radiographer
- Radiology Contacts for CT:
  - **In hours (0800-1700) – Radiologist on 52895**
  - **Afterhours – Radiology Fellow via Switch**

- The on-call Radiology Doctor travels from home for all contrast scans after hours. Time taken for their arrival should be considered when transferring a patient to CT.
- The preliminary report for after-hours contrast scans is documented in eMR by the Radiology Doctor. The formal report by Consultant Radiologist is produced in-hours.
- Everlight Radiology remotely reports the following:
    - CT head non contrast
    - CT Cervical Spine
    - CT Facial bones
- Everlight Radiology reporting times:
    - 2300 – 0800 on weekdays
    - 24 hours on Saturday/Sunday/Public Holidays
- Everlight Radiology hardcopy CT reports are faxed to ED

eMR Orders for Imaging in Trauma

When ordering imaging on eMR there is an **"ED Trauma Investigations"** order set that includes

- Xray Chest
- Xray Pelvis
- Xray Spine Examination: Cervical
- CT Head
- CT Spine Examination: Cervical
- CT Abdomen and Pelvis
- CT Chest to Pelvis

If there is high suspicion of **spinal injury**, it is useful to include this in clinical history as spine views can be reconstructed from CT Chest to Pelvis.

If a CT angiogram is required, a separate order is needed.

Scanning Intubated Patients

- When scanning an intubated patient, long ventilator tubing is required to ensure adequate length for the patient to enter into machine to achieve CT down to pelvis.
- Alternatively, if an Anaesthetic Doctor is present, the patient may be placed on the Anaesthetic machine in CT for the duration of the scan.

10 Documentation

- Scribe should document resuscitation on hardcopy *Paediatric Resuscitation Chart*
- All trauma patients require a documented management plan in their eMR before they leave ED to optimize patient safety, handover and continuity of care.
- The trauma and subspecialty teams attending to the patient are required to document their plans after seeing the patient in a timely manner.
- Trauma Team Leader or delegate should document the resuscitation in eMR.
- The Primary and Secondary Survey should be documented by the clinician who completes the assessment.

11 Disposition

Depending on the nature of injuries and haemodynamic stability, the patient may be transferred from ED to:

- Urgent OT
- CT Scan
- Interventional radiology suite
- Ward
- PICU
- Discharged to home

Patients remain under the care of ED until handover is complete.

In rare instances, patients require expedited urgent transfer to Operating Theatres and may bypass or spend minimal time in the Emergency Department. **This, including activating other Trauma Codes must be discussed as per relevant policy and coordinated amongst:**

- ED Trauma Team Leader
- Trauma Surgeon Consultant
- Consultant Anaesthetist
- Operating Theatres

11.1 Trauma Patient Admission

Refer to **CHW Trauma Patient Admission Guideline**:
http://webapps.schn.health.nsw.gov.au/epolicy/policy/5764

12 Other Trauma Activation Criteria and Relevant Links

12.1 Trauma Attend: Code Brain

- Activated when a patient with an acute traumatic head injury requires neuro-imaging and possible emergency life-saving surgery.
- Is activated as soon as a moderate or severe head injury is considered *highly likely* in an otherwise stable patient. This may be PRIOR to patient arrival in the ED.
- Can only be activated by the Emergency Consultant/Fellow.
- Can only be overturned by the Emergency Consultant/Fellow.

For more details please refer to **Trauma Attend: Code Brain- CHW Guideline**: http://webapps.schn.health.nsw.gov.au/epolicy/policy/5201

12.2 Trauma Attend: Code Crimson

- Activated when a patient with a potential acute life-threatening haemorrhage is requiring transfer to theatre for possible immediate life-saving surgery
- To be activated within 10 minutes of the Primary Trauma Survey
- In some instances Code Crimson is activated pre-hospital by retrieval services
- Can **only** be activated by the *Surgical Registrar/Consultant* and/or the *ED Fellow/Consultant*
- Can **only** be overturned by the Consultant Surgeon on-call

For more details please refer to **Trauma: Code Crimson- CHW Procedure**: http://webapps.schn.health.nsw.gov.au/epolicy/policy/5918

12.3 Massive Transfusion Protocol (MTP) - Paediatric

Massive transfusion is defined as the transfusion (or anticipation of transfusion) of

- One or more blood volumes within 24 hours, OR
- 50% of blood volume within 4 hours, OR
- 40mL blood/kg

Activate MTP by ringing BLOOD BANK ext. 52284 or pager 6832

For more details please refer to **Massive Transfusion Protocol (MTP) – Paediatric Procedure**: http://webapps.schn.health.nsw.gov.au/epolicy/policy/5458

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