Don't Forget The Bubbles

MAJOR TRAUMA - INJURIES BY ASSAULT

Facilitators Guide

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Topic: **Major Trauma - Injuries by Assault**
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Duration: **up to 2 hours**
Facilitator level: **ST4+**
Learners level: **Foundation doctors, ANPs, core and middle grade level paediatric/ED trainees**

OUTLINE

- Pre-reading
- Basics (10 Minutes)
- Main session: (2 x 15 minute) case discussions covering the key points and evidence
- Advanced session: (2 x 20 minutes) case discussions covering grey areas, diagnostic dilemmas, advanced management and escalation
- Sim scenario (30-60 mins)
- Quiz (10 mins)
- Infographic sharing (5 mins): 5 take-home learning points

PRE-READING FOR LEARNERS

Clinical Practice Guidelines : Trauma - primary survey

Major trauma: assessment and initial management | Guidance | NICE

Major paediatric trauma radiology guidance | The Royal College of Radiologists

BACKGROUND

In the UK, the prevalence of paediatric injuries caused by assault is alarming, with data from the Office for National Statistics indicating a rise in violent crime involving children in recent years. According to the latest figures (2022), there were approximately 6,000 recorded offences where a child was a victim of violence, including physical assault, sexual abuse, and homicide. Trauma is the most significant contributor to childhood mortality, with the mechanism changing with maturity and social development.

In younger children, the predominant mechanism of inflicted injury is by shaking or beating, and most commonly, the abuser is a family member or caregiver. With increasing age, children and young people are more at risk of other mechanisms of violent crime, such as assaults with weapons, e.g. stabbing. Additionally, perpetrators start coming from outside the family unit.

The paediatric trauma patient differs from adults in anatomy, physiology, cognition and psychology. When involved in the same kind of trauma as adults, children may suffer quite different injuries because of these differences.

The management of paediatric trauma requires prompt and systematic assessment through a <C>ABCDE (catastrophic haemorrhage, airway with spinal protection, breathing, circulation, disability and exposure/environment) primary survey approach. This should include early identification of life-threatening injuries, targeted fluid resuscitation using blood products, pain management, then eventual safeguarding and psychological support. Given the unique variation in children's presentation and injuries based on age and development, clinicians must tailor their approach to meet the needs of paediatric patients.
Early intervention and multidisciplinary management are key to minimising the long-term consequences of trauma in children.

BASIC CASE 1: KICK TO THE HEAD

Ali, a 12-year-old male, is pre-alerted by ambulance to ED. He was walking home from school an hour ago when his phone was stolen. When he tried to protest, he was pushed down and kicked in the head.

The pre-alert from the ambulance states his GCS is 12 (E3V4M5), moving all 4 limbs with an obvious large haematoma to the back of his head. There are no signs of any other injury and he is haemodynamically stable.

How would you prepare for the patient's arrival to ED?

What would be the approach to assessing this patient on arrival?

Which investigations would you consider?

Is any other immediate pharmacological treatment indicated while awaiting further investigation?

CASE 1 DISCUSSION

Preparation for Trauma Patient Arrival

The period before a trauma patient's arrival is a key opportunity to prepare yourself, your team and your equipment.

Ideally, the ambulance will call before the patient arrives to provide a handover or ATMIST (age, time, mechanism, injuries, signs, treatment). This information allows clinicians to consider the patient›s condition, anticipated interventions, and required resources.

Some specific considerations could be:

- **Team**
  - Who will be the trauma team leader?
  - Team brief and assign roles, e.g. primary survey, airway, scribe, IV access, drugs.
  - Do I need a trauma team activation? (All hospitals will have different makeups of trauma teams and possibly different levels of activation)
  - Do I need any additional expertise outside of who would typically be in the trauma team? E.g. burns, neurosurgery, interventional radiology.

- **Equipment**
  - This could include a trauma mattress, transfer equipment, ventilator, haemorrhage control, and thoracotomy/thoracostomy kit (ensure size appropriate for expected child).
  - WET FLAG or have an emergency drug calculator for the expected age of patient.
  - Consider drawing up or having ready specific drugs likely to need, e.g. TXA, sedation, paralysis, analgesia.
  - Do I have emergency blood available in the ED? Do I need to activate the major haemorrhage protocol? Do I need to alert the blood bank?

- **Environment**
  - Where is the most appropriate space to receive this patient? Almost always going to be resus or high dependency area.
  - Can I make more physical space in resus to accommodate the team?
  - Do theatres or CT need to be alerted?
  - Ensure the remainder of the department remains safe while this is ongoing.

Trauma Primary Survey

The initial approach to assessing any trauma patient would be via a primary survey (<C>ABCDE approach), including specific modifications to the paediatric patient.

- **C: Catastrophic Haemorrhage**
  - Haemorrhage control measures e.g. direct pressure, haemostatic gauze.
- **A: Airway with C-spine Protection**
  - Ensure patency and assess for signs of obstruction. Manage obstruction with manoeuvres, adjuncts or intubation if needed.
  - Maintain cervical spinal precautions via manual in-line stabilisation or blocks.
- **B: Breathing**
  - Assess oxygen saturation, respiratory rate, and effort compared to normal age values. Auscultate, percuss and palpate chest.
  - Administer O2 if necessary.
- **C: Circulation**
  - Check heart rate, blood pressure, capillary refill, and peripheral perfusion.
  - Establish IV access for potential fluid resuscitation.
- **D: Disability (Neurological Assessment)**
  - Assess GCS and pupils for size and reactivity.
  - In the context of a child with a head injury- what was the best GCS/ GCS on arrival of the crew?
- **E: Exposure and Environmental Control:**
  - Fully expose to check for other life-threatening injuries while maintaining normothermia.

Investigations

These will be situation dependent however, most patients will require bloods including:

- FBC
- Clotting
- U&Es
- G&S and cross-match
- Blood gas
- Specific situations may warrant others, e.g. CK in crush injury, amylase/LFTs in abdominal injury, myocardial injury check troponin.

Then, imaging can be considered depending on the mechanism and area of injury.

NICE has specific guidelines for the imaging of head and c-spine in trauma. This case meets the threshold for CT head within 1 hour, and given the mechanism and inability to clear the cervical spine due to the patient's GCS guidance would suggest imaging this.

Immediate Treatment

One immediate medication to consider is tranexamic acid (TXA). There is significant evidence in adults and developing in the paediatric population that TXA results in better outcomes if given early in patients with mild to moderate traumatic brain injury (TBI) and does not cause harm. Therefore, any patient with a TBI (GCS ≤ 12) should be given a TXA loading bolus and then infusion within 3 hours of injury. There is emerging evidence about a larger bolus of TXA for children and young people with a head injury; without the need for an infusion, check your local guidance.

Other considerations in significant TBI would be the temporary use of anti-epileptic drugs as prophylaxis to prevent early post-traumatic seizures to aid neuroprotection; the most commonly used would be levetiracetam. This is more routine in the adult population, but evidence suggests it also benefits the paediatric population.

Although not suggestive in this case, if signs of raised intracranial pressure were present, this would be managed per local guidance using mannitol or hypertonic saline with other neuroprotective measures.

BASIC CASE 2: STAB WOUND TO THE CHEST

Lee, a 14-year-old male, is brought into the ED by his friends, stating he has been in a fight. On initial assessment, you note a deep puncture wound to his right chest. You suspect he has been stabbed, put out a trauma call, move him to resus and start a primary survey.

What key pathologies would you try to identify and manage during the primary survey?

After the primary survey, you decide to complete a stab check. Why is that important, and where are the other areas on the body to check?

You feel the patient needs fluid resuscitation. How would you approach this?

Before Lee's eventual discharge, you want to assess if any measures can be put in place to reduce the risk of him becoming a victim of violent crime again; how would you approach this?

CASE 2 DISCUSSION

Primary Survey Key Pathologies

The primary survey is not a complete, exhaustive examination, it should be <5 minutes and focused on ruling out and starting to correct the below life-threatening pathologies. A useful mnemonic to remember these is ATOM-FC, we have also included some other key conditions to identify.

- **A**irway obstruction
- **T**ension pneumothorax
- **O**pen pneumothorax
- **M**assive haemothorax
- **F**lail chest
- **C**ardiac tamponade

- Catastrophic haemorrhage "Blood on the floor and 5 more."
  - In trauma patients, the primary sources of bleeding are external haemorrhage (blood on the floor), chest, abdomen, pelvis, and long bones in paediatrics brain is also included (infants with open sutures can bleed a significant amount intracranially)
- Shock
  - The most common cause in trauma is haemorrhage.
  - Other causes can be obstructive (tension pneumothorax, cardiac tamponade), cardiogenic (myocardial injury), or neurogenic (spinal cord injury).
- Decompensating head injury

Stab Check

Part of exposure in the primary survey should be the completion of a stab check. This is a focused examination of the back, axillae, groin, perineum, and buttocks, looking for further wounds that could easily be missed if not specifically looked for.

This is key because 35% of patients presenting with a stab wound have a 2nd wound. The above areas are often missed and frequently targeted by perpetrators. The patients themselves may be distracted by the obvious (and possibly less severe) wound and not be aware they have been stabbed more than once.

Fluid Resuscitation in Trauma

In trauma where the cause of shock is most likely to be haemorrhagic, fluid resuscitation should ideally be with blood products - replacing losses.

If blood products are not immediately available, boluses of balanced crystalloid (10ml/kg) can be used until blood is received. Excessive IV fluid administration should be avoided due to the risk of acidosis, coagulopathy and electrolyte disturbance - all of which evidence shows significantly increased mortality.

When blood products are available, evidence suggests using a balanced approach, transfusing a 1:1:1 FFP:platelets:pRBC ratio. These should be given as boluses of 5-10ml/kg.

In the bleeding trauma patient, fluid resuscitation aims to avoid the diamond of death (acidosis, coagulopathy, hypothermia and hypocalcaemia). The above measures can help prevent this, along with warming and administering TXA, calcium and cryoprecipitate.

To learn more about paediatric major haemorrhage, check out **https://dontforget-thebubbles.com/a-guide-to-major-haemorrhage-management-in-paediatrics/**

Safeguarding

All paediatric patients presenting with injuries related to an assault should prompt clinicians to explore their life and experience. This may be the opportunity for professionals to identify underlying social concerns or risk of further violence (e.g. drug use, criminal group/gang association, domestic abuse).

When able, and certainly before discharge, a HEADSSS assessment should be completed along with any local criminal/sexual exploitation screening processes.

Information about attendance should be shared with safeguarding professionals, including children's social care. There are also youth organisations (Red Thread, St Giles etc) specifically aimed at reaching out to young people who are victims of violent crime and exploitation; some hospitals have links with these to enable easy referral.

These organisations often work on reaching young people at a 'teachable moment.' The moment of intense crisis, when a young person is nursing a serious injury in the daunting environment of a busy hospital, can be a trigger for creating positive change in their life.

Healthcare professionals can also use this time when a young person is at their most vulnerable, potentially most open with clinicians and receptive to support

ADVANCED CASE 3: NON FATAL STRANGULATION

Ana, a 15-year-old female, self-presents to ED. She is reluctant to go into detail at triage but eventually states during an argument, her partner pinned her down by the neck.

Ana is a bit confused about what happened after that and states the next thing she remembers is that she woke up alone and that she had "wet herself." You have a cursory look at her neck and don't see any bruising.

What are the red flags to cover while assessing Ana to determine the risk profile of this injury?

Is any further investigation indicated based on the above information?

How common do you think domestic violence is in adolescent relationships, and is this injury mechanism significant?

Do you feel Ana needs any further support or follow-up on discharge?

CASE 3 DISCUSSION

Non Fatal Strangulation Assessment

This case discusses non-fatal strangulation (NFS), which is defined as obstruction of blood vessels and/or airway by external pressure to the neck (hands, ligature, chokehold), resulting in decreased O2 to the brain but not causing death. It can cause significant internal injuries, including carotid artery dissection, stroke, and acquired brain injury, but in 50% of patients, there are no external signs of injury.

Approximately 20,000 victims in the UK experience strangulation each year.
The predominant demographics affected are young women and the perpetrator, an intimate partner, in this group, 3% are under 18. However, the paediatric population are also affected by perpetrators within the family, under 18's make up 24% of this group.

Often, those who present will not give a classic history of strangulation. Be aware of other terms that may be used, such as "choking"," grabbed by the neck", "throttling me", "pressure on my neck" or "I couldn't breathe." It also may not be volunteered information; consider asking explicitly about strangulation in patients presenting post-assault (physical or sexual) or if there are concerns about domestic abuse.

When assessing a patient post non fatal strangulation, red flags include:

- History - Significant pressure to the neck, loss of consciousness, amnesia of event, incontinence during the event, ligature use.
- Examination
- Airway - Voice change, stridor, dysphagia, pain swallowing, neck swelling, tenderness larynx or trachea.
- Cervical Spine - Any concerns on usual c-spine assessment (vertebral tenderness, reduced range of movement, neurological deficit).
- Breathing - Dyspnoea, subcutaneous emphysema.
- Circulation - Petechial haemorrhage, carotid tenderness/bruit.
- Disability - Altered mentation, seizure, stroke symptoms, severe headache, neurological deficit, visual symptoms.
- Exposure - Any bruising or abrasion to the neck (absence is not reassuring as 50% with underlying injury will not have any external mark).

In younger children, the history may be more difficult to elicit, but any of the signs or symptoms above could be seen. Be alert for signs of injury that can be associated with strangulation - head injury (bald patches, haematoma) and suspicious areas of bruising (in particular, ears, mouth, chest, neck). In addition, consider if there are any signs of injury with ENT, neurological or respiratory symptoms.

https://www.strangulationtraininginstitute.com/wp-content/uploads/2017/10/Baby-Hope-Signs-and-Symptoms-v10.5.2017.pdf

NFS Investigation and Medical Management

Imaging should be done within 1 hour of identifying **any** red flags above.

It is recommended that CT angiography of the neck and intracranial vessels be completed, with consideration for completing a CT chest and/or plain CT head.

There is no place for X-rays or US/carotid doppler to rule out injuries associated with this. Similarly, if the red flags above are present, observation alone is likely insufficient.

If an acute injury is ruled out with the above, it is suggested the patient should still be observed until 6 hours post-injury, as in rare cases, airway swelling can occur until this point. If discharged, it should be to a safe environment with clear safety netting to return if there are any airway or neurological symptoms.

Domestic Violence and NFS in Adolescence

Adolescents and young people are at significant risk of abuse within their intimate relationships; 25% of girls aged 13-17 and 17% of boys have experienced the use of physical force. The risk of emotional abuse/coercive control is even higher. Young people are especially vulnerable, particularly when entering their first relationships.

NFS by a known perpetrator to the victim is one of the most significant risk factors for the patient becoming a victim of homicide by that person, increasing the risk by 7.48 times. The presence of this in any assault should raise significant red flags about the risk posed by the perpetrator towards the patient.

Before discharge, the safeguarding of the patient should be considered, ensuring the patient is discharged to a safe place with appropriate risk assessment completed by children's social care. Information should be shared, ideally with the

young person's consent, with social care and any other agencies (nationwide or local) that may be able to support, e.g. independent domestic violence advocate, victim support, and sexual assault referral entre.

Since 2022, NFS has become a specific crime in its own right, separate from assault. Depending on age and capacity, discussion should be held with the patient to encourage police involvement.

NFS Long-Term Sequelae/Follow-Up

This method of assault can lead to hypoxic brain injury with even what may be perceived by the patient, perpetrator and clinician as not much pressure or force. The pressure to open a can is approximately 20 pounds per square inch (psi), to occlude the jugular veins is only 4psi and the carotids is 11 psi.

Evidence is emerging of the potential long-term neuropsychological impact (cognitive deficit, personality change, speech difficulties) of these brain injuries, and consideration should be given to whether patients need long-term neuropsychology referral for follow-up.

Additionally, this group of patients, similar to all victims of violent crime or trauma, may struggle with mental ill health post-event; they should be signposted to appropriate support resources.

ADVANCED CASE 4: GUNSHOT WOUND TO THE ABDOMEN

David is a 15-year-old male who has been pre-alerted by the ambulance with a wound to his abdomen from an unknown weapon. He was sitting in a car with friends in the park when someone reached through the window and fired.
You receive this ATMIST:

- A - 15
- T - 60 minutes ago (some delay whilst police cleared the scene)
- M -?Gunshot wound
- I - Penetrating wound to LUQ of the abdomen
- S - HR 125, BP 90/50, RR 24, Temp 35.1° C, CRT 4s, GCS 14 (combative)
- T - 500ml IV fluid bolus, IV co-amoxiclav, IV TXA, small bolus, IV ketamine for analgesia/anxiolysis

After completing a primary survey, you feel the cause of the patient's haemodynamic instability is hypovolaemia.

How have you identified hypovolaemia, and what other signs may be present from the information above?

There is a discussion about imaging required if the patient stabilises.
A colleague hopes to minimise radiation and suggests a CT abdomen would be sufficient. Do you agree?

The patient deteriorates further, resulting in a loss of cardiac output. What are your next priorities, and how do these differ from a non-traumatic cardiac arrest?

Should this patient's attendance and injuries be shared with other agencies?

CASE 4 DISCUSSION

Signs of Hypovolaemia

Children have approximately 80ml/kg of blood volume; clinical signs of shock may not occur until there has been a loss of more than 20% of circulating blood volume in pediatric trauma. Children have increased physiological reserves compared to adults and compensate by preserving normal BP in the early stages of bleeding, but it will deteriorate rapidly if not reversed early.

One of the most sensitive signs of haemorrhage is patient anxiety, then tachycardia with delayed capillary refill and eventual metabolic acidosis, hypotension and reduced GCS.

The presence of the "hateful eight" signs of haemorrhagic shock are markers for the need for transfusion: pale, clammy, "air hunger," altered mentation, tachy/bradycardia, low/falling etCO2, hypotension, venous collapse.

Imaging in Paediatric Trauma

The Royal College of Radiologists (UK) has issued new guidelines for paediatric trauma, suggesting the following but highlighting the importance of senior emergency clinician judgement. **https://www.rcr.ac.uk/media/1q2eroqj/rcr-major-paediatric-trauma-radiology-2024.pdf**

- In penetrating trauma (stab or gunshot wounds), contrast CT is the modality of choice.
- In blast injuries, CT is the modality of choice.
- The use of FAST or US scanning is not recommended.
- Given the risk of ionising radiation in children, we still aim for exposure to be as low as possible.

Gunshot wounds can cause different injury patterns based on the type of gun/bullet and area of injury. The trajectory, fragmentation and associated shockwave can make for more unpredictable injuries; for example, some bullets break apart on impact, causing projectile fragments to move in different directions, resulting in additional injuries. There should, therefore, be a lower threshold for image neighbouring anatomical regions to assess this. In this case, likely, a CT thorax, abdomen, pelvis should be completed despite only an abdominal wound.

Traumatic Cardiac Arrest

This is a high acuity, low occurrence event in the paediatric population with a high mortality rate. But it is not a futile situation with growing evidence suggesting the survival rates may be comparable to medical cardiac arrests. However, the approach to management differs.

In traumatic cardiac arrest the priority is also the correction of the common reversible causes (hypoxia, hypovolaemia, tension pneumothorax and cardiac tamponade), but to achieve this a bundle of interventions should be prioritised alongside and if needed, take priority over CPR:

- Haemorrhage control (external haemorrhage control measures, pelvic binder, long limb splints, etc.)
- Adequate oxygenation and ventilation
- Bilateral thoracostomies
- Rapid volume replacement (ideally warmed blood products)

For further information about the differing approaches to traumatic cardiac arrest, have a look at **https://dontforgetthebubbles.com/chest-compressions-in-traumatic-cardiac-arrest/.**

If there is no return of spontaneous circulation with the initial above measures, resuscitative thoracotomy should be considered if expertise and equipment are available in the following scenarios:

- Penetrating injury and CPR <15 minutes
- Blunt injury (excluding isolated catastrophic head injury) and CPR <10 minutes

Information Sharing Knife and Gunshot Wounds

The police should be informed of any presentations of patients with gunshot wounds or violent knife wounds, ideally with patient consent, to allow the police to assess the risk and protect the public.

If the patient refuses consent or cannot give it (i.e. because they are unconscious), you can still disclose information if you believe disclosure is justified in the public interest. Breaking confidentiality should not be taken lightly; the consultant in charge or other seniors should be consulted.

As this situation involves a young person, child protection and safeguarding procedures should also be followed - sharing information with social services and screening for further risk of harm and exploitation.

SIMULATION NAME: Paediatric Stabbing/Tension Pneumothorax

PATIENT DETAILS:

Name: David Abraham
Age: 14
ID No.: L1002000
Weight: est weight 50kg

SIMULATION TIMINGS:

Pre-brief: 2 minutes
Scenario: 13 minutes
Debrief: 15 minutes
OSAD: n/a

LEARNING OBJECTIVES:

Demonstrate trauma primary survey and identification life threatening pathology
Work as an effective multidisciplinary trauma team
Demonstrate management of stab wounds including pneumothorax

SYNOPSIS:

14-year-old male was brought by ambulance after a suspected stabbing with a 3cm laceration to the right chest/axilla.
Haemodynamically stable but intermittently non-compliant on arrival.
Deteriorated post A-E with signs of tension pneumothorax. If not resolved will arrest, if addressed will improve.

PATIENT HISTORY

14-year-old David was out with friends, limited history from him but as per police there was an altercation and he was found with a wound to his chest, suspected stabbing. Not much EBL at scene.

Family and Social History:
Unknown

Current Medications:
Nil regular
NKDA

EXPECTED ACTIONS:

1. Set up resus, allocate roles, WETFLAG, drugs, blood bank
2. Take paramedic handover
3. A-E
4. Access, bloods
5. Stab check
6. TXA, consider fluid bolus
7. Consider CT imaging
8. *Deteriorate
9. Reassess
10. Recognise tension pneumothorax and correct
11. +/- MHP/blood
12. Start set up for thoracostomy
13. Reassess

DOCUMENTS, EQUIPMENT AND SET UP REQUIREMENT:

Sim mannikin
Stab wounds moulage
Bloodstained bandages
Sim cannula
Drugs – Blood, TXA, ketamine, morphine, co-amoxiclav, rocuronium, fluids, tetanus
Scoop
Chest manakin to decompress
Cannula/syringe to decompress
Thoracostomy equipment

1.
2.
3.

CANDIDATE BRIEFING:

An alert call has just been received with the following ATMIST.

Handover: David, NF&W, NKDA, out with friends tonight not willing to tell us what happened but police called to altercation found him. No knife seen.
Scooped and ran. 1 stab wound to chest, not sucking, good A/E, seal on.
Obs/treatment remained static from ATMIST. Mum on her way.

A – 14 year old
T – 40 mins ago
M – Stabbing
I – Right chest
S – HR 115, RR 32, BP 110/65, Sats 99% 15L
T – O2, 500ml crystalloid, chest seal

SCENARIO PROGRESSION

Parameters	Presentation	Deterioration	Deterioration 2	Resolution
SpO2	99% on 15L	85% on 15L	70% 15L	96% 15L
RR	32	50	65	36
Chest Sounds	Left clear, N expansion Right basal creps, N exp	Left clear, N expansion Right no A/E, ↓ expansion	Left clear, N exp. R no A/E, no exp.	Left clear, N expansion Right better A/E/exp
HR, Rhythm, Pulse	125, sinus	160, sinus	160, sinus No palpable pulse	130, sinus
BP	110/65	82/65	42/30	100/60
CRT	4	4	6	4
Temperature	36.2	36.2	35.6	36.2
Pupils	PEARL 4mm	PEARL 4mm	PEARL 4mm	PEARL 4mm
Eye-opening	Normal	Voice	Unresponsive	Normal
AVPU	A	Anxious	Unresponsive	A
Skin	Pale	Sweaty	Pale, Sweat, Mottle	Pale
Pain	Mild-mod	Mild-mod	Unresponsive	Mild-mod
Parent remark	Get off me, I'm fine	I'm going to die	Unresponsive	What have you done
Other	Trachea mid, N resonance Mild WOB	Trachea to left, hyperresonance right Mod WOB	Distended neck veins	Trachea midline, hyperresonance Mild WOB

PROMPTS AND CUES:

Do we need to fully expose him?

He's gone all sweaty and clammy.

Do we need to call for help?

DISCUSSIONS:

What pathologies are we looking for in primary survey?
How would you manage the non compliant pt?
What were your thoughts when the patient deteriorated?
Where do we commonly miss stab wounds?
How was communication – closed loop?
What is next for this patient?

QUIZ QUESTIONS

Question 1.

In moderate to severe traumatic brain injury, TXA has proven to reduce mortality and morbidity.
What GCS would the administration be recommended for?

A: GCS <15

B: GCS ≤14

C: GCS ≤12

D: GCS ≤8

E: GCS 3

Question 2.

At what threshold of blood loss do children begin to show signs of haemorrhagic shock?

A: 5% blood volume

B: 10% blood volume

C: 20% blood volume

D: 25% blood volume

E: 40% blood volume

Question 3.

Which of the following features is not a red flag when assessing a patient presenting with non fatal strangulation?

A: Oral petechial haemorrhages

B: Dysphagia

C: Amnesia

D: Painful but full range of movement of the neck

E: Bruising on the neck

Question 4.

Which is not a key aspect of fluid resuscitation in trauma?

A: Balanced blood product transfusion 3 pRBC:2 FFP:1 Platelets

B: Calcium replacement

C: Avoid hypothermia

D: Avoid acidosis

E: Replace cryoprecipitate to target normal fibrinogen

Question 5.

If a patient presents with a stab wound, they have a 35% chance of having a 2nd stab wound on examination. The key areas to examine for these additional wounds as part of a stab check are the buttocks, perineum, groin, and axilla.

Question 6.

In paediatric traumatic cardiac arrest, when would a resuscitative thoracotomy be considered?

A: Stab wound to the chest, CPR for 35 minutes

B: Isolated significant head injury with blown right pupil, CPR for 10 minutes

C: RTC causing polytrauma, CPR for 20 minutes

D: Stab wound to the abdomen, CPR for 10 minutes

E: Fall from building causing polytrauma, CPR for 15 minutes

Take Home Points - Major Trauma

1 **CHECKLISTS**
A trauma checklist can help the team ensurereadiness and anticipate potential needs and complications.

2 **PRIMARY SURVEY**
Follow the >C<ABCDE approach to quickly identify and address life-threatening conditions.

3 **FLUID RESUSCITATION**
Fluid resuscitation in pediatric trauma ideally involves boluses of blood products in a balanced ratio of packed red blood cells, plasma, and platelets. Emphasis is placed on addressing the cause of haemorrhage, preventing hypothermia, acidosis, hypocalcaemia, and coagulopathy—the "diamond of death"—to optimise outcomes.

4 **CARDIAC ARREST**
Paediatric traumatic cardiac arrest requires rapid implementation of a group of interventions to correct potential causes, e.g. thoracostomies, aggressive fluid resuscitation and haemorrhage control, sometimes taking priority over CPR.

5 **THINK HOLISTICALLY**
In all paediatric patients presenting with injuries related to assault, this should prompt professionals to provide trauma informed care and display curiosity about the young person's life and experience. It should also trigger child protection and safeguarding processes.

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