Clinical Practice Guidelines:
Trauma/Traumatic haemorrhagic shock

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Purpose	To ensure a consistent appproach to the management of a patient with a traumatic brain injury.
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Health care setting	Pre-hospital assessment and treatment.
Population	Applies to all ages unless stated otherwise.
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Traumatic haemorrhagic shock

September, 2024

Haemorrhage is the primary cause of preventable mortality in people with traumatic injuries. It is estimated to be responsible for 40% of all deaths related to trauma.[1] Substantial ongoing bleeding remains a critical and potentially fatal complication of severe trauma.

Initial treatment of these patients must prioritise rapid haemorrhage control achieved through the application of direct pressure bandages, tourniquets, wound packing, splinting, and/or pelvic binders.[2] This is followed by the maintenance of normothermia in addition to avoidance of both acidosis and coagulopathy.[3,4] Additionally pharmacological adjuncts and blood products that aim to inhibit fibrinolysis, replace clotting factors, and restore circulatory volume should then be considered.

The circulating blood volume varies between individuals depending on their weight and gender. In clinical practice, the following estimated can be used:

- Adult male: 75 mL/kg
- Adult female: 65 mL/kg
- Paediatric: 80 mL/kg

Clinical features

- The clinical features of haemorrhagic shock vary depending on the amount of blood loss.

SIGNS AND SYMPTOMS OF HAEMORRHAGE

Parameter	Minor	Mild	Moderate	Severe
Approximate blood loss	< 15%	15–30%	31–40%	> 40%
Heart rate	↔	↔/↑	↑	↑/↑↑
Blood pressure	↔	↔	↔/↓	↓
Pulse pressure	↔	↓	↓	↓
Respiratory rate	↔	↔	↔/↑	↑
Urine output	↔	↔	↓	↓↓
Glasgow Coma Scale score	↔	↔	↓	↓
Need for blood products	Monitor	Possible	Yes	Massive Transfusion Protocol

* Base excess is the quantity of base (HCO_2–, in mEq/L) that is above or below the normal range in the body. A negative number is called a base deficit and indicates metabolic acidosis.

LEGEND:

↔	↑	↓	↑↑	↓↓
no change	increase	decrease	significant increase	significant decrease

Risk assessment

- Blood loss in the out-of-hospital setting is inherently difficult to gauge and is often underestimated.
- Hypotension in trauma patients may not be secondary to haemorrhage – consider other causes (e.g., obstructive shock, tension pneumothorax, cardiac tamponade, spinal cord injuries, or toxins.

Additional information

- Prior to definitive care, the out-of-hospital fluid resuscitation goal for most patients with traumatic haemorrhagic shock is the maintenance of a palpable radial pulse. Alternatively, in patients suffering an associated traumatic brain injury and a potential for raised intercranial pressure, the target becomes supporting a systolic blood pressure of 100–120 mmHg.
- It's well-recognised that a significant cohort of traumatically injured patients develop clotting dysfunction. Whilst the exact pathophysiological mechanism of trauma-induced coagulopathy (TIC) is not fully understood,[6] it is likely to be influenced by genetic factors, injury burden, hypoperfusion, and resuscitative measures.[7]
- Hypofibrinogenemia is one of the earliest manifestations of coagulation dysfunction and is associated with increased mortality and an increased requirement of blood transfusions.[4,8]
- Low fibrinogen is associated with reduced clot strength and poor outcomes in trauma patients.[9] Hypofibrinogenemia in the prehospital setting and on emergency department arrival has been associated with both increased mortality and increased blood transfusions.[4,10]
- Identifying trauma patients who require blood products and have low plasma fibrinogen concentrations allows for the administration of human fibrinogen substitution therapy.

CPG: Clinician safety
CPG: Standard cares

STEPP
Supporting the Translation of Evidence into Paramedic Practice

- **Haemorrhage control**
- **Maintain normothermia**

Consider:

- **Oxygen**
- **IV/IO access**
- **Sodium chloride 0.9%**
- **Tranexamic acid**
- **PRBC (1 unit to 2.2 mmol calcium gluconate)**
- **ELP (1 unit to 2.2 mmol calcium gluconate)**
- **Human fibrinogen**

Note: *Clinicians must only perform procedures for which they have received specific training and authorisation by the QAS.*

Associated traumatic brain injury?

N → **Treatment target = palpable radial pulse**

Y → **Treatment target = SBP 100–120 mmHg**

Transport to hospital
Pre-notify as appropriate