

**Title CSOP    Vascular Access & Fluid Administration**

Version No: 2.5

Effective date: 16/01/2023

**APPROVALS**

	<u>Name</u>	<u>Date</u>	<u>Signature</u>
Original Document Author:	Dr Caroline Leech		
Revised Document Prepared by:	Dr Peter Lax	14 Nov 2022	
Reviewed by:	Mark Beasley - Paramedic Phil Bridle – Head of Operations		
Clinical Lead Approval:	Dr Justin Squires – Deputy Clinical Lead		
Next Review Date:	January 2025		

**HISTORY**

<b>Effective Date</b>	<b>Version No.</b>	<b>Summary of Amendment</b>
27 <sup>th</sup> Nov 2012	2.0	Modified trauma fluid resuscitation
23 <sup>rd</sup> Oct 2014	2.1	Remove need for 2 attempts at IV access prior to IO
Dec 2016	2.2	IO access for trauma in children – consideration as first line
Nov 2017	2.3	Provision of blood to scene procedure
June 2020	2.4	Reviewed
Nov 2022	2.5	Cross referenced with newer CSOPs, incorporation of ultrasound/subclavian access, clarification of the use of metaraminol.

**REFERENCES**

<b>Document Reference Number</b>	<b>Document Title</b>
1	Early fluid resuscitation in severe trauma. BMJ 2012; 345

**Title CSOP    Vascular Access & Fluid Administration**

Version No: 2.5

Effective date: 16/01/2023

2	NICE Major Trauma- Assessment and Initial Management (2016)
3	Mortality and prehospital blood pressure in patients with major traumatic brain injury: implications for the hypotension threshold. JAMA Surg. 2017;152(4):360–8

**Annexes/Appendices**

Annex/Appendix	Title
1	UHCW Trust Blood to Scene Information for Clinical Areas

**1. Purpose**

This SOP provides guidance on the approved methods of vascular access and the use of intravenous fluids for resuscitation in different patient groups

**2. Definitions/Acronyms:**

Abbreviations/Acronyms	Definitions
SOP	Standard Operating Procedure
IV	Intravenous
CSOP	Clinical Standard Operating Procedure
ACF	Antecubital Fossa
IO	Intraosseous
MRI	Magnetic Resonance Imaging
BP	Blood pressure

**3. Scope**

Early Vascular access should be gained in all trauma patients. For patients with hypovolaemic shock there is now clear evidence that a haemostatic resuscitation approach combining haemorrhage control, tranexamic acid and volume correction with blood and blood products produces survival benefits <sup>1</sup>.

**Title CSOP    Vascular Access & Fluid Administration**

Version No: 2.5

Effective date: 16/01/2023

Intravenous (IV) fluids should be used *as a last resort* in trauma patients with hypotension. IV fluids may cause hypothermia, acidosis, and risk increasing bleeding as blood pressure is restored and dilution of essential clotting factors that remain. Significant hypotension in the context of major haemorrhage should be treated with blood and blood products as a first line approach (see CSOP 34 for criteria).

Permissive hypotension therefore is now the standard of care for patients with uncontrolled bleeding and no head injury<sup>2</sup>. The period of permissive hypotension must be kept as short as possible thus the patient needs to be rapidly transported to a Major Trauma Centre for surgical intervention. There is no consensus on what fluid resuscitation regime to use if a closed head injury is also present with uncontrolled bleeding, and therefore clinical judgement will be required to assess the likely underlying pathology. If it is thought that haemorrhagic shock is the dominant condition, restrictive volume resuscitation should be continued with blood products. If it is thought that traumatic brain injury is the main condition, consider the use of vasopressors (e.g. metaraminol) or a less restrictive volume resuscitation approach to maintain cerebral perfusion (see CSOP 16).

Prior to fluid resuscitation all efforts should have been made to minimise blood loss and clot disruption. This includes:

- External haemorrhage control with direct pressure, tourniquets or haemostatic agents – see CSOP 22
- Splintage and traction of limb fractures e.g. manual traction of femur and application of Kendrick traction device
- Application of pelvic splint for mechanism of injury and any shocked patient – see CSOP 18
- Administration of initial dose of Tranexamic acid
- Careful handling and avoidance of excessive movement e. g avoiding log-rolling in polytrauma cases in favour of a 15° tilt to allow insertion of a scoop stretcher.
- Resuscitation with blood products and other fluids as required via a fluid warmer, and minimising exposure/warming the ambulance to minimise heat loss and hypothermia (see CSOP 12).

In the severely injured trauma patient with signs of shock, ensure alternative causes of shock have been excluded e. g. tension pneumothorax.



**Title CSOP    Vascular Access & Fluid Administration**

Version No: 2.5

Effective date: 16/01/2023

---

**VASCULAR ACCESS**

**Venous cannulation**

Gold standard access is at least one, ideally two 14G/16G cannula, though in shut down patients, smaller access such as an 18G or 20G may be all that is initially possible. In patients who require pre-hospital anaesthesia, two routes of access are needed to mitigate against failure of one access during the procedure (see CSOP 13). This may include a combination of IV or IO access. Ideally, IV insertion attempts should start distally in the hands or wrists, but this may not be possible in severely compromised patients. In patients who are peripherally shut down or have unfavourable body habitus, the Butterfly iQ may be used to assist in ultrasound guided vascular access in line with CSOP 31.

Where possible, use an uninjured arm, which is not associated with an ipsilateral chest injury. For patients travelling by air ambulance the left arm should be preferentially selected. An extension line connected to the cannula in the right ACF may be useful if this is not possible.

Ensure the cannula and fluid line is adequately secured and will not become dislodged during transport.

In selected patients who have suspected severe hypovolaemia who would benefit from large bore IV access where peripheral vasoconstriction makes this challenging, subclavian access may be indicated if the clinician is appropriately trained and skilled (see CSOP 33).

**Intraosseous access**

If adequate intravenous access cannot be established the EZ-IO should be used to site IO access:

1. In proximal humerus
2. Proximal tibia if humerus not suitable
3. It is acceptable to use more than one IO if necessary

Where there is a potential pelvic fracture or significant abdominal injury ensure there is intravenous/ IO access above the diaphragm. For patients with a suspected pelvic fracture ensure the humeral head site is used.



## Title CSOP Vascular Access & Fluid Administration

Version No: 2.5

Effective date: 16/01/2023

For circulatory access in children with major trauma, consider intra-osseous access as first-line access if peripheral access is anticipated to be difficult<sup>2</sup>. The Distal femur site is preferred to the proximal humerus for rapid volume resuscitation in younger children (Less than 5 years old) although the need to consider pelvic and abdominal injuries may preclude this.

Analgesia or sedation with intranasal agents may be required to facilitate this if the child is not obtunded.

Contra-indications to IO access at a proposed site include:

- Inability to locate landmarks
- Fractures within that long bone or an ipsilateral more proximal bone (i.e. tibial insertion contraindicated if there is an ipsilateral femoral fracture)
- Previous orthopaedic procedures near insertion sites
- Infection at the area of insertion

EZ-IO needle are all 15G and come in three sizes:

Colour of needle	Length of needle	Size of patient
Blue	25mm	40kg+ with little overlying tissue
Yellow	45mm	40kg+ with excessive tissue e.g. muscle, fat, oedema

Insertion should follow manufacturers training. All doctors and paramedics must be signed off in IO insertion before using the equipment.

Note that IO needles must be removed within 24 hours of insertion and are not MRI compatible: this must be handed over to hospital staff.

4ml of 1% lignocaine (40mg) can be used as a flush in conscious patients after I/O insertion in accordance with the manufacturers instructions to reduce pain during IO use (maximum dose 3mg/kg, caution in children under 3 years old with estimated weight <13kg).



## Title CSOP    **Vascular Access & Fluid Administration**

Version No: 2.5

Effective date: 16/01/2023

### FLUIDS

#### Indications

##### Trauma

- Peri-arrest hypovolaemic shock when blood products have been previously used or not available
- Neurogenic shock following spinal cord injury – however consider the use of metaraminol in pure neurogenic shock.

##### Medical

- Shock due to: sepsis, anaphylaxis, poisoning etc
- Diabetic Ketoacidosis in adults – caution in rapid correction due to risk of precipitating cerebral oedema.
- Severe dehydration

#### Type of fluid

0.9% 'normal' Saline is the crystalloid fluid currently carried by the air ambulance.

#### Doses

All fluids should be given as 250mls boluses titrated to response with the following targets:

Patient group	Target
Adult medical	'Normal' BP
Paediatric medical (pre-puberty)	10ml/kg
Adult isolated head injury	SBP 120mmHg or MAP 90mmHg <sup>3</sup>
Adult polytrauma	Use clinical judgement No definitive target suggested Consider age, co-morbidities, distance/length of time to MTC
Paediatric trauma (pre-pubertal)	10ml/kg if any signs of shock
Diving Emergency	1L fluid stat.

#### Important points

The decision on when to give IV fluids is multifactorial. NICE states that in the pre-hospital setting, IV fluids should only be given if there is a loss of a radial pulse<sup>2</sup>. However, in practice, consideration should be given to other factors, including the likely source of bleeding, age of the patient and any comorbidities. Clinical decision making should be based around distance/length of



**Title CSOP    Vascular Access & Fluid Administration**

Version No: 2.5

Effective date: 16/01/2023

---

time to an MTC for delivery of blood products, and on clinical features to suggest the patient is exsanguinating i.e. conscious level, capillary refill time,  $E_tCO_2$  level, capillary refill time. Administration of fluids should be through a fluid warmer wherever possible to mitigate against the risk of hypothermia worsening bleeding.

Permissive hypotension has not been proven to benefit children or pregnant women; in these patient groups blood pressure is maintained until late in the haemorrhagic process and thus hypotension may be a pre-terminal sign.

Remember to activate the Massive Transfusion Protocol or Code Red Protocol where appropriate at the receiving hospital at the earliest opportunity.

If, due to prolonged extrication, blood is required on scene this can be requested through the regional trauma desk when operating in the West Midlands region. Procedures are in place with the West Midlands MTCs which will enable blood to be provided to scene once the request has been made. The procedure used in UHCW is shown as an example in Appendix 1. Within the East Midlands region, no such procedures are in place and liaison with the individual hospitals will be required.

Do not 'keep the drip open' with slow-running fluid as large volumes may inadvertently be administered.

**End of Document**