
Clinical Guidance

Paediatric Critical Care: Sepsis

Summary

This guideline is for staff to use when treating children with sepsis. It also gives advice on interventions, shock, resuscitation and intubation

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This clinical guideline has been produced by the South Thames Retrieval Service (STRS) at Evelina London for nurses, doctors and ambulance staff to refer to in the emergency care of critically ill children.

This guideline represents the views of STRS and was produced after careful consideration of available evidence in conjunction with clinical expertise and experience. The guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient.

Sepsis (early management)

Guideline for management of sepsis: patients may have shock +/- meningitis. Focus may be clear (purpura of meningococcal) or occult.

Initial Intervention

- Intravenous access x 2 quickly, Intraosseous if IV difficult
- Gas, sugar, B/C, FBC, clotting, U&E, CRP, X match, PCR
- **Antibiotics early (confirm allergy status):**
 - < 1month – IV cefotaxime & IV amoxicillin & aciclovir IV infusion
 - > 1month – IV ceftriaxone 80mg/kg infusion over 30 mins
 - Add IV vancomycin if indwelling line/VP shunt
 - Add IV clindamycin if features of toxic shock
 - Travel outside UK/risk of Abx resistance/allergy-consult ID
- Evaluate level of consciousness and pupils

Initial resuscitation

- Shock– tachycardia / poor pulses / obtunded / low BP
- High flow O₂. Maintain saturation >95%
 - Push 20ml/kg crystalloid² bolus and review HR / BP
 - Repeat 20ml/kg x 2 crystalloid bolus if no response

Fluid refractory shock (shock despite ≥60mls/kg)

- Start peripheral **dopamine** 10micrograms/kg/minute
- Titrate to response (max 15 micrograms /kg/min)
- Intubate and ventilate : **anticipate decompensation**
- Continue fluid resuscitation

Intubation: other indications

- Hypoxia (sats<92% despite oxygen)
- Altered level of consciousness
- Signs of raised ICP

INTUBATION

- **Early intubation for shock improves outcome³**
- Most experienced practitioner to intubate
- Induction of anaesthesia may cause cardiovascular instability : consider ketamine, avoid propofol
 - NG tube and aspirate stomach
 - Pre-oxygenate for 3 minutes
 - Ongoing volume resuscitation throughout
 - Peripheral dopamine 10micrograms/kg/min infusing
 - Cardiac arrest drugs available
- Avoid nasal intubation if coagulopathy or low platelets
- May require high PEEP if pulmonary oedema (cuffed ETT)

Gain central access (USS guidance preferable)
Infuse dopamine centrally
If dopamine >10 micrograms/kg/min then add 2nd agent

Warm shock
Wide pulse pressure

Cold shock
Narrow pulse pressure

Start **noradrenaline**
0.1 micrograms/kg/min
Titrate to response
(max 1microgram/kg/min)

Start **adrenaline**
0.1 micrograms/kg/min
Titrate to response
(max 1microgram/kg/min)

No or minimal response = catecholamine resistant shock

- Ensure inotrope dose/delivery correct
- Exclude other causes (pericardial effusion, pneumothorax, ongoing blood loss, intracranial event)
- Give hydrocortisone IV 2mg/kg bolus⁴

Low BP, warm shock
-Add adrenaline

Low BP, cold shock
-Maximise adrenaline
-consider 3rd agent

Risk factors and alerts

- Age < 12 months
- Extensive/ rapidly spreading rash⁵ (20% with meningococcal sepsis have no rash)
- Recent history of varicella (consider IV aciclovir)/ burns (consider toxic shock)
- Low platelets/ low wbc / coagulopathy: may be normal initially & rapidly change
- Persistent tachycardia despite fluid therapy
- Hypotension is late sign
- Obtundation and depressed level consciousness

Persistent tachycardia usually = under-resuscitation

Aggressive reversal of shock improves outcome

Urgent intervention & reassessment is key

Exclude cardiac cause (hepatomegaly, cardiomegaly, ECG)

Indwelling line/VP shunt=potential focus- add IV vancomycin

Features of Toxic shock- add IV clindamycin

DO NOT PERFORM LUMBAR PUNCTURE ⁶

Depressed level of consciousness (LOC)

Differential: shock, meningitis, raised ICP

- Treat seizures (phenytoin). Correct hyponatraemia and low sugar

Raised ICP: relative bradycardia, posturing/seizures, abnormal pupils -may mask shock with relative bradycardia/ hypertension

- Give osmotherapy: 3% sodium chloride 3-5 ml/kg IV
- Impending herniation: hyperventilate, give further 3 ml/kg 3% sodium chloride.

Consider steroids if <12hours since first antibiotics and clinical signs of bacterial meningitis⁷ (Dexamethasone 0.15mg/kg IV, max 10mg QDS x 4 days)

Ongoing support

- Ventilation: may need to ↑PEEP if pulmonary oedema/ poor oxygenation
- Monitor central temp, invasive BP, CVP, ABG, lactate & central venous sats
- Ongoing large volume resuscitation often required in addition to inotropes
- Consider milrinone if cold shock
- Optimise haemoglobin (maintain Hb > 100g/l; oxygen delivery) and correct clotting abnormalities
- Consider cooling if pyrexia causing compromise to 36-37°C, surface cooling or cold fluid (boluses can be cooled to 4 °C - produces rapid cooling)
- Observe urine output/electrolytes and correct abnormalities. Check CK.
 - May require urgent CVVH on arrival on unit
- Exclude other sites of infection (e.g. necrotising fasciitis)
- At risk of pressure sores-consider Huntleigh mattress on admission
- Consider immunoglobulin (IVIg) in toxic shock
- Liaise with ID if concerns regarding Abx resistance or rationalisation

Public Health

- Refer to website (see below) regarding notifiable diseases⁸ and prophylaxis
- Common notifiable diseases: invasive group A Strep, meningococcal, acute meningitis/encephalitis
- Prophylaxis if meningococcal probable:
 - Household contacts
 - Health workers exposed to resp secretions in first 24 h of treatment
 - Treat with oral ciprofloxacin (all ages and in pregnancy)
- If meningococcal, patient no longer infectious after 24 h of treatment⁹

1. Van den Berghe: Crit Care Med 2003 31, 2, 359-366, 2. Carcillo: Crit Care Med 2002;30, 6 1365-783, 3. Dellinger: Crit Care Med 2004 32 (3) 858-73. 4. Baines:Arch Dis Child:2000;83, 510-13, 5. Baines: Br J Anaesth 2003;90 1, 72-83, 6. Rennick: BMJ 1993: 306, 6883, 953-955, 7.NICE Clinical Guideline CG102, 2010.

8. <https://www.gov.uk/government/collections/notifications-of-infectious-diseases-oids>

9. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/322008/Guidance_for_management_of_meningococcal_disease_pdf.pdf