Clinical Guideline

SEPSIS AND SUSPECTED SEPSIS - MANAGEMENT GUIDELINE AND CARE PATHWAY FOR THE CHILDREN’S EMERGENCY DEPARTMENT

SETTING
Children’s Emergency Department (CED) Bristol Royal Hospital for Children (BRHC)

FOR STAFF
All health professionals staff seeing children and young people presenting to the CED with suspected or confirmed sepsis

PATIENTS
All children and young people who present to the CED with suspected or confirmed sepsis.

GUIDANCE

GENERAL POINTS FOR CONSIDERATION:

• In unwell children and young people presenting to the Children’s Emergency Department (CED) always think ‘could this be sepsis?’ if they present with signs or symptoms that indicate infection, even if they do not have a high temperature.
• Be aware that children and young people with sepsis may have non-specific, non-localising presentations (for example, feeling very unwell / reduced activity).
• Pay particular attention to concerns expressed by the young person and family/carer.
• Take particular care in the assessment of children and young people where they or their parent/carer are unable to give a good history (for example families with English as a second language or families with communication difficulties). Consider using a translation service (“TheBigWord” phone in the department) to help get a clear history if needed.

RISK FACTORS:
The following groups of children and young people are more vulnerable to sepsis:

• Children < 1 year old
• Children and young people who have had recent (within the last 6 weeks) trauma or surgery or invasive procedures
• Children with impaired immunity due to chronic illness or drugs (such as steroids, chemotherapy or immunosuppressants) – for children and young people with suspected febrile neutropenia please see separate guideline
• Children and young people with indwelling lines / catheters / any breach of skin integrity (such as a burn, blister, cut or skin infection)
• Infants born to mothers who are positive for group B streptococcus during pregnancy or are febrile / unwell during delivery
• Young women who are pregnant or have been pregnant within the past 6 weeks

ASSESSMENT:

o Assess children and young people with suspected infection to identify:
  • Likely source of infection
  • Risk factors (see above)
  • Indicators of clinical concern such as abnormalities of behaviour, circulation or respiration.
  o Stratify risk of severe illness and death from sepsis using assessment algorithm
  o If sepsis not suspected and there is no clinical cause for concern or risk factors then use clinical judgement to treat the person, using NICE guidance relevant to their diagnosis when available.
ACTION TO TAKE IF A CHILD PRESENTS WITH SUSPECTED OR CONFIRMED SEPSIS:

**Triage:**

- If the automatic Medway sepsis screen at triage flags a child / young person as being at risk of sepsis.
- If there is an infant < 3 months with a fever or history of fever.
- If the triage nurse is concerned that the child may be septic (for example, 2 sepsis criteria present even if screen not triggered on Medway or there is no fever but child looks unwell.

Discuss with the nurse in charge, who should review the child and document findings.

If the nurse in charge agrees with concerns (and/or fever < 3 months old):

- A copy of the “Suspected Sepsis / Septic Shock Care Pathway” should be placed in the CAS card
- The child should be triaged at least as a P2 (or P1 if signs of shock)
- The notes should be given to a senior member of the medical team (ST4 or above) who should review the child and complete the “Suspected Sepsis / Septic Shock Care Pathway”.

**Following Triage:**

If any health professional seeing the child / young person is concerned that the child / young person is unwell and at risk of sepsis then they should use and complete the “Suspected Sepsis / Septic Shock Care Pathway”, escalating to a senior member of the team as appropriate.

**DIVERGENCE FROM NICE GUIDANCE:**

- This guidance is based on the updated NICE guidance on sepsis [NG51] from July 2016.
- The algorithm and care pathway have been adapted in an attempt to give an implementable approach to identifying septic children in the Emergency Department without placing all children with an isolated elevated heart or respiratory rate (due to screaming / agitation / fear for example) in the high risk category.
• It also introduces the concept of correction of heart rate for fever (2 studies\textsuperscript{2,3}), and allows clinical discretion regarding giving fluids if the lactate is between 2 – 4 mmol/L. This decision was based on fact that the NICE guideline development group (NGDG) considered that the current evidence was not strong enough to justify determining a particular lactate threshold on a rule-in / rule-out basis for sepsis (based on the low quality of the evidence available).

• In order to ensure consistency with NICE clinical guideline CG160 “Feverish illness in children: Assessment and initial management in children younger than 5 years”, infants who are 1 month to 3 months old with a fever of 38°C who look well and have no other features of sepsis can be investigated and treated according to the Fever in Children < 3 months age: Management in Emergency Department guideline.

Table A

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<th>REFERENCES</th>
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<table>
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<tr>
<th>RELATED DOCUMENTS</th>
<th>PICU management of septic shock</th>
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<td>Fever in Children &lt; 3months age: Management in Emergency Department</td>
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<th>AUTHORISING BODY</th>
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| QUERIES | Dr Will Christian, Consultant in Paediatric Emergency Medicine Children’s Emergency Department, extension 28666. |
ASSESSMENT ALGORITHM FOR CHILDREN WITH SUSPECTED SEPSIS

High risk criteria
- Appears ill to a healthcare professional
- Behaviour:
  - No response to social cues
  - Does not wake, or if roused does not stay awake
  - Weak high - pitched or continuous cry
- Grunting
- Apnoea (in the context of suspected sepsis)
- Oxygen saturation of less than 90% in air or increased oxygen requirement over baseline with no obvious respiratory cause
- Mottled or ashen appearance
- Systolic blood pressure < 5th centile for age (see table)
- Cyanosis of skin, lips or tongue
- Non - blanching rash of skin
- Temperature:
  - Less than 36°C
  - Aged < 1 month – 38c or more (axilla)
  - Aged 1 to 3 months – 38c or more ( tympanic or axilla) and unwell (for the management of infants aged 1 to 3 months with a fever of 38c or more who appear well, please refer to BRHC guideline ‘FEVER IN INFANTS UNDER 3 MONTHS OF AGE’)
- Anuria
- 2 or more moderate risk criteria

1. Start Suspected Sepsis / Septic shock Pathway (Assessment - page 1)

2. Arrange immediate review by senior clinical decision maker (paediatric or emergency care ST4 or above or equivalent) who should assess the child for the possibility of sepsis / septic shock and document their findings. If sepsis is not considered likely, other diagnoses should be sought (such as respiratory problems or gastroenteritis or petechial rash of mechanical cause), the appropriate guideline should be followed and treatment directed appropriately.

3. If sepsis is considered a possibility or there is a delay in senior review proceed directly to page 2 of the care pathway:
   - Take bloods (see pathway for details)
   - Give IV fluids according to clinical state / vital signs / lactate
   - Give IV antibiotics without delay, and at least within one hour
   - Discuss with consultant

Moderate Risk Criteria
- Behaviour:
  - Not responding normally to social cues
  - No smiles
  - Wakes only with prolonged stimulation
  - Decreased activity
  - Parent or carer concern that child is behaving differently from usual
- Heart rate (corrected for fever):
  - Aged under 1 year: 160 beats per minute (bpm) or more
  - Aged 1-2 years: 150 bpm or more
  - Aged 3-4 years: 140 bpm or more
  - Aged 5 years: 130 bpm or more
  - Aged 6-7 years: 120 bpm or more
  - Aged 8-11 years: 115 bpm or more
  - Over 12 years: 100 bpm or more
  - Heart rate less than 60 bpm at any age
- Respiratory rate:
  - Aged under 1 year: 60 respirations per minute (rpm) or more
  - Aged 1-2 years: 50 rpm or more
  - Aged 3-4 years: 40 rpm or more
  - Aged 5 years: 35 rpm or more
  - Aged 6-7 years: 27 rpm or more
  - Aged 8-11 years: 25 rpm or more
  - Over 12 years: 25 rpm or more
- Poor peripheral / renal perfusion:
  - Capillary Refill Time of > 3 seconds
  - Cold hands or feet
- Temperature:
  - Aged 3-6 months: 39c or more
- Leg pain

1. Moderate Risk Criterion

Arrange urgent senior (ST4+) clinician review and check capillary blood gas. Higher lactates are associated with increased risk of sepsis.

If concern on clinician review then follow high risk pathway.

Low risk criteria
- Responds normally to social cues
- Content or smiles
- Stays awake or awakens quickly
- Strong normal cry or not crying
- No high risk or moderate high risk criteria met
- Normal colour

- Use clinical assessment and manage according to clinical judgement

Definition of Hypotension by Age:

Systolic Blood Pressure less than 5th centile:
- < 1 year: < 70mmHg
- 1-5 years: < 80mmHg
- 5-12 years: < 90mmHg

Notes:
1. Correct heart rate for fever according to the following algorithm – subtract 10 beats per minute for every degree over 37 degrees centigrade. Caution should be applied - if the child appears unwell – do not be reassured by a corrected normal heart rate
Suspected Sepsis / Septic shock Care Pathway – Assessment (PAGE 1)

Staff member completing form:
Date:..........................................................
Name:..........................................................
Signature:....................................................
Designation:..................................................

Patient Details (affix label):
Trust Number:..................................................
NHS Number:..................................................
Surname:.....................................................
Forename:....................................................
Gender:.............................................. DoB:..........................

1. Is there high level clinical concern?  YES NO
   OR Are 1 or more High Risk Criteria present?  YES NO
   OR Are 2 or more Moderate Risk Criteria present?  YES NO

2. a) Review by senior decision maker (ST4+)
   Time Reviewed
   Yes    No

   b) IS SEPSIS SUSPECTED?  YES to any of the above

3. Start Sepsis Treatment Pathway (page 2 - overleaf)
   Time of decision to start pathway:

ENSURE ANTIBIOTICS GIVEN WITHIN 1 HOUR

Consider other diagnoses, document and manage appropriately - Consider other investigations to help guide diagnosis

If no definitive underlying condition identified, repeat structured assessment at least hourly and ensure review by senior decision maker within 3 hours

If further concerns or high / moderate risk criteria develop then request review by senior decision maker and if sepsis suspected then start sepsis treatment pathway

If no further concerns then leave pathway; treat underlying condition. If safe for discharge, provide safety net advice written and verbal as appropriate.

HIGH RISK CRITERIA
- Appears ill to a healthcare professional
- Behaviour:­
  - No response to social clues
  - Does not wake, or if roused does not stay awake
  - Weak high pitched or continuous cry
- Grunting
- Apnoea
- Oxygen saturation of less than 90% in air or increased oxygen requirement over baseline with no obvious respiratory cause; (NB sepsis can co-exist with respiratory illnesses such as bronchiolitis and asthma– always consider the possibility of sepsis in these groups)
- Mottled or ashen appearance
- Systolic blood pressure <5th centile for age (see table)
- Cyanosis of skin, lips or tongue
- Non-blanching rash of skin
- Temperature
  - Less than 36°C
  - Aged under 3 months 38°C or more
- Anuria
- 2 or more moderate risk criteria

MODERATE RISK CRITERIA
- Behaviour:
  - Not responding normally to social cues
  - No smiles
  - Wakes only with prolonged stimulation
  - Decreased activity
  - Parent or carer concern that child is behaving differently from usual
- Heart rate (corrected for fever):
  - Aged under 1 year: 160 beats per minute (bpm) or more
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  - Aged 3-4 years: 40 rpm or more
  - Aged 5 years:
  - Aged 6-7 years: 27 rpm or more
  - Aged 8-11 years: 25 rpm or more
  - Over 12 years: 25 rpm or more
- Poor peripheral/renal perfusion:
  - Capillary Refill Time of >3 seconds
  - Reduced urine output
  - Pale/flushed/pallor of skin, lips or tongue
  - Cold hands or feet
- Temperature
  - Aged 3-6 months: 39°C or more
- Leg Pain

Hypotension by Age
Systolic Blood Pressure less than 5th centile:
<1 year: <70mmHg
1-5 years <80mmHg
5-12 years: <90mmHg
Suspected Sepsis / Septic shock Care Pathway – Treatment (PAGE 2)

**IMMEDIATE ACTIONS:**
- Ensure senior medical (CED consultant in hours) and nursing staff aware
- Move to resuscitation area unless directed otherwise by senior medical staff

**ACTION**—(remember that these processes should normally happen in parallel) ***ACTIONS 1 to 6 SHOULD TAKE PLACE WITHIN 1 HOUR***

1. Give high flow O2 if signs of septic shock (unless contraindicated). Support A & B

2. Obtain IV/IO access:
   - 2 lines if shocked. **Take bloods:** Minimum set - blood gas, blood cultures, blood glucose, lactate, FBC, U&Es, clotting. If using IO, flush with 0.9% sodium chloride using a 10ml syringe before use → NO FLUSH = NO FLOW.
     - If lactate ≥4 mmol/L discuss with CED consultant and PICU (consider “2222” rapid review call).
     - If lactate 2-4mmol/L – inform consultant and consider giving a fluid bolus unless clinically not indicated (see point 4).
     - May hold fluids if haemodynamically stable and lactate < 2mmol/L unless clinical state dictates otherwise (see point 4)

3. Further Investigations:
   - Consider further investigations to locate source of infection (if no signs of septic shock).
   - Do not perform LP if signs of raised ICP, shock, abnormal coagulation / DIC, abnormal neurology or respiratory insufficiency.

4. Consider IV/IO fluids for septic shock. If fluids not required give antibiotics immediately.
   - If haemodynamically unstable give 20mls/kg (neonates: 10-20mls/kg) of plasmalyte (may also consider 4.5% HAS for septic shock) and reassess. Beware fluid overload (examine for hepatomegaly, creps, gallop). If hypotensive put out a “2222” medical emergency call (unless directed otherwise by CED consultant).

5. Give IV/IO antibiotics according to Trust guidelines. **ANTIBIOTICS MUST BE GIVEN WITHIN 1 HOUR** of diagnosis of sepsis / suspected sepsis.
   - Consider allergies prior to administration and prescribe accordingly.

6. Treat any metabolic derangement:
   - A) Hypoglycaemia (≤3mmol/l) – give 2ml/kg 10% dextrose IV and re-assess
   - B) Hypocalcaemia (ionised Ca <1mmol/L on blood gas); Give Calcium Gluconate 10% 0.5ml/kg IV (max 4.5mmols) over 20mins

**FURTHER ACTIONS—ONLY TO BE COMPLETED IF ONGOING SIGNS OF SHOCK AND/OR METABOLIC DERANGEMENT**

- Reassess - if no improvement after 1st bolus give a 2nd bolus of 20mls/kg fluid notify CED consultant and contact PICU for review.
- Reassess—if no improvement after a 2nd bolus put out “2222” medical emergency (“resus”) call and give 3rd bolus of 20mls/kg whilst considering inotropic support and need for intubation. Reassess and treat any metabolic derangement.

- Consider inotropic support If normal physiology is not restored after ≥40ml/kg fluid (20ml/kg in neonates). Dilute (peripheral) adrenaline recommended first line inotrope; consider Noradrenaline for “warm shock” with peripheral vasodilatation. D/W PICU re other agents. Obtain central access if possible (can use IO as central line); see PICU drug sheet for doses

- Consider intubation and ventilation if needing > 40mls/kg fluid
  - i) Put out “2222” medical emergency (“resus”) call if not already done so
  - ii) High risk of collapse on induction if unstable/low BP—use RSI checklist, ensure inotropes and fluids available
  - iii) Suggested Induction Drugs IV:
    - 1) Ketamine 1 to 2mg/kg plus/minus Fentanyl 1 to 2microgram/kg
    - 2) Rocuronium 600 micrograms / kg