Recognition and Management of Suspected Sepsis in Paediatrics Guideline

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Contents

Section			Page
Document summary sheet			2
1	Overview		8
2	Scope & Associated Documents		8
3	Background		8
4	What is new in this version?		8
5	Guideline		9
	5.1	Introduction	9
	5.2	Early recognition & screen for severe sepsis	9
	5.3	Paediatric Sepsis 6 tool & pathway	10
	5.4	Patient information	14
	5.5	PICU Guideline – Sepsis initial management pathway	15
6	Roles and responsibilities		16
7	Monitoring document effectiveness		16
8	Abbreviations and definitions		16
9	References		17
10	Document Control Information		18
11	Equality Impact Assessment (EqIA) tool		20
12	Appendices		-

Document Summary Sheet
[Guideline for Recognition & Management of Suspected Sepsis in Paediatrics, reference number & version]

For patients under 5 years of age

Paediatric Sepsis Screening & Action Tool
Under 5 years

Northern Care Alliance NHS Group — THE UK SEPSIS TRUST

To be applied to all children who have a suspected infection or have clinical observations outside normal limits

Patient details (affix label):
Name
Hospital number
NHS number
Date of birth

Staff member completing form:
Date (DD/MM/YY): Time
Name (print):
Designation:
Signature:

Is an end of life pathway in place? Yes ☐ Is escalation clinically inappropriate? Yes ☐ Initials ☐ Discontinue pathway

1. Does the child look sick? (No / Yes)
or is parent / carer very worried?
or is EWS red / PAT-POPS >1?

All N → Low risk of sepsis. If concerned, reassess within 6h. Use standard protocols, review if deteriorates. Tick ☐

Any Y ↓

2. Could this be an infection? (No / Yes)
- Yes, but source unclear at present
- Pneumonia/ likely chest source
- Meningitis/ encephalitis
- Urinary Tract Infection
- Abdominal pain, drawing legs up, or distension
- Acquired bacteraemia (e.g. Group B Strep)
- Other (specify: ....)

N → Y ↓

3. Is one or more Red Flag present? (No / Yes, Tick)
- Unresponsive to social cues / difficult to rouse
- Looks very ill to health professional
- Weak, high pitched or continuous cry
- Grunting respiration or apnoeic episodes
- SpO_2 < 90%/ new need for oxygen
- Severe tachypnoea (see table)
- Severe tachycardia (see table)/ bradycardia < 60
- No wet nappies/ not passed urine in last 18 h
- Non-blanching rash or mottled/ ashen/ cyanotic
- Temperature < 36°C
- If under 3 months, temperature > 38°C

N → 4; Y ↓

Red Flag Sepsis!!
Start Sepsis 6 pathway NOW

4. Any Amber Flag criteria? (No / Yes, Tick)
- Abnormal response to social cues/ not smiling
- Reduced activity/ very sleepy/ abnormal behaviour
- Moderate tachypnoea (see table)
- SpO_2 <91% OR nasal flaring
- Moderate tachycardia (see table)
- Capillary refill ≥3 seconds
- Reduced urine output (< 1ml/kg/h if catheterised)
- Pale or flushed
- Leg pain or cold extremities
- Immunocompromised

N ↑ (to Low risk of sepsis); Y ↓

Send bloods if 2 criteria, consider if 1 — lactate, blood cultures, FBC, U&Es, CRP, Coag (Time complete / Initials)
Immediate call to Paed/EM ST3+ — Must review with results with 1 hour (Time complete / Initials)

Is lactate >2? (tick) YES ☐ NO ☐

YES → Red Flag Sepsis; NO ↓

Clinician to make antimicrobial prescribing decision within 3h (Time complete / Initials)
If senior clinician happy, may discharge with appropriate safety netting (Discharged? / Initials)

Chart for box 3 and 4

Age	Tachypnoea		Tachycardia	
	Severe	Moderate	Severe	Moderate
< 1 y	≥ 60	50-59	≥ 160	150-159
1-2 y	≥ 50	40-49	≥ 150	140-149
3-4 y	≥ 40	35-39	≥ 140	130-139

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Once completed please file in the patient's notes.

Paediatric Sepsis Six Pathway
Under 5 years old
To be applied to children with suspected or confirmed Red Flag Sepsis

Inform Consultant Paediatrician and NWTS
Consider transfer to a paediatric centre with PICU.
State patient has Red Flag Sepsis

Time zero	Consultant/ paed unit informed? (tick)	Initials

1. Give high flow oxygen

Time complete: ____ Initials: ____

2. Obtain IV/IO access, take bloods

Blood cultures, blood glucose, lactate, FBC, U&Es coag, CRP
Lumbar puncture if clinically indicated

Time complete: ____ Initials: ____

3. Give IV/IO antibiotics

According to Trust protocol- basic guideline below
Consider allergies prior to administration

Time complete: ____ Initials: ____

4. Consider IV/IO fluids

if lactate >4 mmol/l or >40 ml/kg given call NWTS

Time complete: ____ Initials: ____

5. Ensure paediatric ST3+ attends or equivalent

Time complete: ____ Initials: ____

6. Consider inotropic support

if normal physiology is not restored after 20 ml/kg consider PICU. Dopamine or adrenaline agents of choice, may be given by peripheral cannula or IO

Time complete: ____ Initials: ____

If after delivering Sepsis 6, the child still has:
- Reduced consciousness
- Severe tachycardia or tachypnoea
- Lactate >2 mmol/l after 1 hour

Or is clearly critically ill at any time
Then call Consultant Paediatrician immediately

Antimicrobial guideline for sepsis

Neonates: cefotaxime and amoxicillin
(<2 weeks old add aciclovir if rash, hepatitis or ?HSV)
1-3 months: ceftriaxone and amoxicillin
>3 months: ceftriaxone
add Gentamicin if requiring inotropes or suspected UTI / resistant organism / line infection

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Once completed please file in the patient's notes.

For patients aged 5 – 11 years of age

Northern Care Alliance NHS Group

Paediatric Sepsis Screening and Action Tool

Aged 5-11 years

To be applied to all children who have suspected infection or have clinical observations outside normal limits

THE UK SEPSIS TRUST

Is an end of life pathway in place? Yes ☐ Is escalation clinically inappropriate? Yes ☐ Initials ☐ Discontinue pathway

Patient details (affix label):
Name
Hospital number
NHS number
Date of birth

Staff member completing form:
Date (DD/MM/YY): Time
Name (print):
Designation:
Signature:

1. Does the child look sick? (No / Yes)
or is the parent / carer very worried?
or is EWS red / PAT-POPS >1?

All N → Low risk of sepsis. If concerned, reassess within 6h. Use standard protocols, review if deteriorates (Tick)

Any Y ↓

2. Could this be an infection? (No / Yes)
- Yes, but source unclear at present
- Pneumonia/ likely chest source
- Meningitis/ encephalitis
- Urinary Tract Infection
- Abdominal pain or distension
- Other (specify: ....)

N → 4

Y ↓

3. Is one or more Red Flag present? (No / Yes Tick)
- Objective change in behaviour or mental state
- Doesn't wake if roused or won't stay awake
- Looks very ill to health professional
- SpO_2 < 90%/ new need for oxygen
- Severe tachypnoea (see chart)
- Severe tachycardia (see chart)
- Bradycardia (< 60 per minute)
- Not passed urine in last 18 h
- Non-blanching rash / mottled/ ashen/ blue
- Temperature < 36°C

N → 4

Y ↓

Red Flag Sepsis!!
Start Sepsis 6 pathway NOW

4. Any Amber Flag criteria? (No / Yes Tick)
- Behaving abnormally/ not wanting to play
- Significantly decreased activity/ parental concern
- Moderate tachypnoea (see chart)
- SpO_2 < 92% on air
- Moderate tachycardia (see chart)
- Cap refill time ≥3 seconds
- Reduced urine output (< 1ml/kg/h if catheterised)
- Leg pain or cold extremities
- Immunocompromised

N ↑ (to low risk)

Y ↓

	Time complete	Initials
Send bloods if 2 criteria, consider if 1 — lactate, blood cultures, FBC, U&Es, CRP, Coag		
Immediate call to Paed/EM ST3+ — Must review with results within 1 hour		

↓

Is lactate >2? (tick) YES ☐ NO ☐

YES → Red Flag Sepsis (Y)

NO ↓

	Time complete	Initials
Clinician to make antimicrobial prescribing decision within 3h		
	Discharged?	**Initials**
If senior clinician happy, may discharge with appropriate safety netting		

Chart for box 3 and 4

Age	Tachypnoea		Tachycardia	
	Severe	Moderate	Severe	Moderate
5 y	≥ 29	27-28	≥ 130	120-129
6-7 y	≥ 27	24-26	≥ 120	110-119
8-11 y	≥ 25	22-24	≥ 115	105-114

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Once completed please file in the patient's notes.

Paediatric Sepsis Six Pathway

5-11 years old

To be applied to children with suspected or confirmed Red Flag Sepsis

Inform Consultant Paediatrician and NWTS
Consider transfer to paediatric centre with PICU
State patient has Red Flag Sepsis

Time zero	Consultant/ paed unit informed? (tick)	Initials

Step	Time complete	Initials	
1. Give high flow oxygen			
2. Obtain IV/IO access, take bloods Blood cultures, blood glucose, lactate, FBC, U&Es coag, CRP Lumbar puncture if clinically indicated			
3. Give IV/IO antibiotics According to Trust protocol- basic guideline below Consider allergies prior to administration			
4. Consider IV/IO fluids if lactate >4 mmol/l or >40 ml/kg given call NWTS			
5. Ensure Paediatric ST3+ attends or equivalent			
6. Consider inotropic support if normal physiology is not restored after 20 ml/kg consider PICU. Dopamine or adrenaline agents of choice, may be given by peripheral cannula or IO			

If after delivering Sepsis 6, the child still has:
- Reduced consciousness
- Severe tachycardia or tachypnoea
- Lactate >2 mmol/l after 1 hour

or is clearly critically ill at any time
Then call Consultant Paediatrician immediately

Antibiotic guideline for sepsis

ceftriaxone 80 mg/kg
once a day with a maximum dose of 4 g daily

add Gentamicin if requiring inotropes or suspected UTI / resistant organism / line infection

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Once completed please file in the patient's notes.

For patients aged 12 – 16 years

Paediatric Sepsis Screening & Action Tool

12-16 years old

To be applied to all children who have suspected infection or have clinical observations outside normal limits

Patient details (affix label):
Name
Hospital number
NHS number
Date of birth

Staff member completing form:
Date (DD/MM/YY): Time
Name (print):
Designation:
Signature:

Important:
Is an end of life pathway in place? Yes ☐ Is escalation clinically inappropriate? Yes ☐ Initials ☐ Discontinue pathway

1. Does the child look sick? (No Tick / Yes Tick)
or is the parent / carer very worried?
or is EWS red / PAT-POPS >1?

All N → **Low risk of sepsis** (Tick)
Use standard protocols, consider discharge (approved by senior decision maker) with safety netting

Any ↓ Y

2. Could this be an infection? (No / Yes Tick)
- Yes, but source unclear at present
- Pneumonia
- Urinary Tract Infection
- Abdominal pain or distension
- Cellulitis/ septic arthritis/ infected wound
- Device-related infection
- Meningitis
- Other (specify: ....)

N → **4. Any Amber Flag criteria?** (No / Yes Tick) — N ↑ to Low risk of sepsis
- Relatives concerned about mental status
- Acute deterioration in functional ability
- Immunocompromised
- Trauma/ surgery/ procedure in last 6 weeks
- Respiratory rate 21-24
- Systolic B.P 91-100 mmHg
- Heart rate 91-130 OR new dysrhythmia
- Not passed urine in last 12 hours
- Temperature < 36°C
- Clinical signs of wound, device or skin infection

↓ Y

3. Is one or more Red Flag present? (No / Yes Tick)
- Responds only to voice or pain / unresponsive
- Acute confusional state
- Systolic BP <90 mmHg
- Heart rate > 130 per minute
- Respiratory rate ≥ 25 per minute
- SpO_2 < 90% / new need for oxygen
- Non-blanching rash, mottled/ ashen/ cyanotic
- Not passed urine in last 18 h/ UO <0.5 ml/kg/hr

N → (Amber flag) Y ↓

Send bloods if 2 criteria, consider if 1 — lactate, blood cultures, FBC, U&Es, CRP, Coag (Time complete / Initials)
Ensure urgent senior review
Must review with results within 1 hour

Is lactate >2 ? YES ☐ NO ☐

NO ↓
Clinician to make antimicrobial prescribing decision within 3h
If senior clinician happy, may discharge with appropriate safety netting

YES → Y ↓

↓ Y

Red Flag Sepsis!! Start Sepsis 6 pathway NOW (see overleaf)

This is time critical, immediate action is required.

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Once completed please file in the patient's notes.

Paediatric Sepsis Six Pathway
12-16 years old

To be applied to children with suspected or confirmed Red Flag Sepsis

Inform Consultant Paediatrician and NWTS
Consider transfer to paediatric centre with PICU
State patient has Red Flag Sepsis

Step	Time complete / Initials	
1. Give high flow oxygen	Time complete: Initials:	
2. Obtain IV/IO access, take bloods Blood cultures, blood glucose, lactate, FBC, U&Es, coag, CRP. Lumbar puncture if clinically indicated	Time complete: Initials:	
3. Give IV antibiotics According to Trust protocol Consider allergies prior to administration	Time complete: Initials:	
4. Consider IV/IO fluids If lactate >4 mmol/l or >40 ml/kg given call NWTS	Time complete: Initials:	
5. Ensure Paediatric ST3+ attends or equivalent	Time complete: Initials:	
6. Consider inotropic support if normal physiology is not restored after 20 ml/kg consider PICU. Dopamine or adrenaline are agents of choice, may be given by peripheral cannula or IO	Time complete: Initials:	

If after delivering Sepsis 6, child still has:
- Reduced consciousness
- Severe tachycardia or tachypnoea
- Lactate >2 mmol/l after 1 hour

or is clearly critically ill at any time
Then call Consultant Paediatrician immediately

Antibiotic guideline for sepsis

ceftriaxone 80 mg/kg
once a day with a maximum dose of 4 g daily

add Gentamicin if requiring inotropes or
suspected UTI / resistant organism / line infection

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Once completed please file in the patient's notes.

1. Overview (What is this guideline about?)

The key purpose of this guideline is to promote the awareness of sepsis in children, to reduce the delay in the recognition of sepsis, and to initiate prompt and effective treatment.

It will result in escalation of concern to an appropriate clinician in a timely fashion.

The charts and algorithms at the front are provided to guide the management of the child and are age related

If you have any concerns about the content of this document please contact the author or advise the Document Control Administrator.

2. Scope (Where will this document be used?)

For medical and nursing staff in paediatric observation and assessment department and emergency departments.

Associated Documents
EDT016 Antimicrobial Paediatric Prescribing Summary
CPWC035 Guidelines for the use of Manchester Children's Early Warning System MANCHEWS
EDN004 Clinical Record Keeping Policy
EDC067 Clinical Standards Policy for Diagnostic Tests
NCAPS003(20) Incident Management Policy

3. Background (Why is this document important?)

Sepsis' is a 'clinical syndrome that results from the activation of the immune and coagulation systems in response to an infection'. The triggers can be viral or bacterial as well as fungal. It is not limited to bacterial infections, although antibiotics are a crucial early intervention pending results. Delay in the administration of antibiotics in severe sepsis increases mortality by 7.6% every hour.

Sepsis is a life-threatening condition and a medical emergency. It has been identified as a leading cause of death, and repeated studies and reports have highlighted the failure to suspect sepsis as a factor in delay in initiating treatment. Therefore, you need to know about these guidelines and use them in conjunction with clinical expertise and judgement to screen children under your care and to ensure prompt intervention and treatment as appropriate.

4. What is new in this version?

This document has been provided with a new reference number now V1, it supersedes CPWC206. The main changes from CPWC206 are

- Reference to North Manchester General Hospital removed (now part of Manchester Foundation Trust)
- Changed the wording of the antibiotic guidance to match local and GM antibiotic prescribing guidelines.

5. Guideline

5.1 Introduction

The age appropriate sepsis screening tools at the front of this document should be used to screen paediatric patients where there is suspicion of infection, where clinical observations are outside of normal limits or where sepsis is suspected.

The decision regarding subsequent actions, interventions and management is a clinical decision using the tools and algorithms in this document as a guide; not every child that triggers a review will have sepsis, and the only action required may be a repeat review or an adjustment of the parameters in that individual case. However, once the sepsis alert is triggered, all decisions will require to be documented with a plan, regardless of whether this is considered to be a child with sepsis or a child that does not have sepsis.

'Suspected sepsis' in this guideline is used to indicate patients who might have sepsis and require face to face assessment and consideration of urgent intervention. There are internationally defined terms such as, SIRS, Severe Sepsis, Septic Shock and so on (please see definitions section), however, **the key is to suspect sepsis, and one is not concerned at this stage about the other definitions. This decision is made long before laboratory results are available and therefore cannot depend on the full criteria that is often used in the consensus definitions.**

5.2 Early recognition and screen for severe sepsis

Severe sepsis is a medical emergency: early recognition and implementation of a sepsis bundle has been shown to decrease mortality from 10% to 5%.

High risk groups for sepsis and lower threshold for intervention are:

- Presence of central line or vascular access device
- Malignancy or bone marrow transplant or impaired immune function
- Neutropenia
- Neonates
- Asplenia
- Congenital heart disease
- Chronic steroid dependency
- Complex urogenital anatomy or repair
- Severe neurological impairment
- Technology dependent (such as long term ventilated patients)

Remember also to interpret signs within the clinical context, but if in doubt ask for an urgent clinical review.

Abnormal heart rate:

- Tachycardia (heart rate >2SD above normal for age) in the absence of external stimuli, drugs or painful stimuli, or otherwise unexplained elevation over 30 minutes to 4 hours
- Bradycardia (heart rate <10th centile for age) in the absence of external vagal stimulus, drugs, congenital heart disease or otherwise unexplained bradycardia for over 30 minutes

For further information on recommendations see:
https://www.nice.org.uk/guidance/ng51
http://www.survivingsepsis.org/Guidelines/Pages/default.aspx

5.3 Paediatric Sepsis 6 tool and pathway

5.3.1 Once you suspect sepsis, print out the appropriate age related chart for the child and initiate and record actions.

Each chart identifies warning flags and directs the appropriate response depending on whether there are only amber flags, or whether red flags are present.
There are 3 levels of concern:

Green	low risk, routine review (6 hours)
Amber	medium risk: review within 30 minutes, ST3 and above or advanced practitioner
Red	high risk: immediate review. ST3 and above

Remember, treatment is time critical. The clinical review determines whether the pathway is triggered.

Please note: a red flag in itself does not signify sepsis, and a review will identify this, for example a child with bronchiolitis may have a saturation of less than 90% in air and have a tachycardia but may not be sepsis. This can be documented on the chart, and further actions may not be considered necessary.

5.3.2 The sepsis 6 tool emphasises the six key elements of care in any child with sepsis which should be completed within an hour:

1. Start high flow oxygen
2. Obtain intravenous or intra-osseous access and take preliminary investigations
3. Give antibiotics intravenously or intra-osseous
4. Give intravenous fluids if indicated
5. Ensure review by senior trainee (ST3 and above) or consultant
6. Consider and initiate inotrope or vasopressor support

See 5.3.3 below for further details on the steps.

NB: It has been agreed locally in PED that review by ST3 and above is acceptable and in doubt the child must be discussed with the responsible consultant. This is a variation from NICE Guidelines which suggest ST4 and above. It has been agreed locally as ST3s will have had significant experience in emergency medicine prior to rotating through to PED. However, any child 'cleared' by an ST3 MUST be discussed with a consultant.

5.3.3 The components of management once sepsis 6 is triggered are:

Inform relevant consultant that patient has red flag status

Step 1: Ensure high flow oxygen is provided.

This is because there is relative hypovolaemia in sepsis, and therefore the amount of oxygen that is delivered to the tissues is less than the normal. Oxygen demand may also be higher. By providing supplementary oxygen, (even if saturations are normal), oxygen delivery is increased.

Step 2: Obtain IV or IO access: take blood cultures if possible prior to

administration of antibiotics, take baseline blood tests:

- Blood gas with lactate, cultures, FBC, coagulation, biochemistry profile, CRP
- If unexplained deterioration in consciousness remember to take an ammonia but do not delay treatment or other bloods for this
- If an ammonia is taken as a screening sample, it does **not** need to be sent on ice but does need to be sent urgently via a porter to reach the lab within 30 minutes of sampling. If elevated, will need repeat in ice and escalation
- Take blood cultures if other lines are inserted and there is free flow
- DO NOT DELAY ADMINISTRATION OF ANTIBIOTICS but try and take blood cultures before administration if possible.
- Consider the source of infection – does the child require an x-ray for a pneumonia or empyema, would an ultrasound be required for an abscess or wound infection? Eliminating the source of the infection helps to control sepsis. If thought to be an infected line, consult senior advice before removing as access may be difficult.

Step 3: Give antibiotics

Ensure that not only is it prescribed but you ensure that it is given. Studies show this is often not given within the hour of recommendation and in a shocked child with low blood pressure, every hour's delay increases mortality by around 7.6%.

This covers the first dose ONLY and subsequent doses must be as per Trust Antimicrobial Paediatric Prescribing Summary (EDT016) based on likely source of infection and investigations.

Check allergies. If penicillin allergy use ciprofloxacin and gentamicin as first line.

- **Non-neutropenic patients**
  All patients (both in hospital and community acquired): first line and not penicillin allergy

<table>
<tr><th>Neonate</th><th>1-3 months old</th><th>>3 months old</th></tr>
<tr><td>Cefotaxime + amoxicillin
Add aciclovir if rash or hepatitis or HSV suspected and < 2 weeks old</td><td>Cefotaxime + amoxicillin</td><td>Ceftriaxone (max 4g)</td></tr>
<tr><td colspan="3">Add gentamicin if in the following cases:
➢ Severe sepsis requiring inotropes/critical care
➢ Suspected or confirmed urinary tract infections
➢ Likely resistant organisms (such as pseudomonas)
➢ Suspected line infection (change when cultures are available if necessary to teicoplanin)
Check gentamicin levels as per Trust guideline.</td></tr>
<tr><td colspan="3">MODIFY antibiotics once clinical picture is clearer or results are available</td></tr>
<tr><td colspan="3">If antibiotics have just been discontinued then restart as per agreed plan, if no agreed plan in place, then restart ceftriaxone AND gentamicin, or cefotaxime AND gentamicin pending repeat cultures and microbiology advice.
If deterioration occurs whilst on antibiotics: seek urgent microbiology advice</td></tr>
</table>

For haematology/oncology patients please use piperacillin/tazobactam and follow their advice (Amikacin is used instead of gentamicin to ensure coverage of CPE)

- **Neutropenic patients (febrile neutropenia or suspected sepsis)**
  No allergies and not on IV methotrexate
    - Piperacillin/tazobactam (Tazocin) and amikacin

  Penicillin allergy (low risk) or on IV methotrexate
    - Meropenem and amikacin

    **do NOT use meropenem if high risk penicillin allergy – seek advice

Review antibiotics and change once focus is clearer. Consult microbiology or infectious diseases consultant within 24 hours of initiating antibiotics on this pathway and review previous results to guide definitive therapy. ALWAYS REVIEW ANTIBIOTIC AT 48 HOURS TO TRY AND RATIONALISE OR STOP IF NOT REQUIRED.

Note: these differ from current Trust guidelines and NICE guidelines but are consensus opinions based on isolates and microbiology data from RMCH.

Step 4: Give intravenous fluids

This will be required if there is hypotension or increased lactate, or evidence of decreased perfusion such as reduced central capillary refill or reduced urine output or decreased consciousness. Hypotension is a late and unreliable sign in children.

Timely fluid resuscitation helps to prevent secondary organ failures.

- Use 20mL/kg aliquots (5-10mL/kg aliquots if cardiac dysfunction) of either sodium chloride 0.9% or PlasmaLyte 148, (PlasmaLyte 148 is preferred).
- After 40mL/kg, use gelofusine for the next 20mL/kg bolus – if cardiac function is poor, may require 5-10mL/kg boluses instead of 20mL/kg bolus.
- Hepatomegaly or onset of crepitations suggest fluid overload – inotropes must be started at this stage and further fluid used with caution. Consider early intubation and early invasive monitoring in this case and inform PICU.

If a child has required more than 40ml/kg of fluid or inotropes are considered, PICU MUST be informed, if not already.

Step 5: Ensure that a senior or experienced clinician has attended

This will be an ST3 and above paediatric medical trainee, or an advanced practitioner (PICU or Emergency Medicine), ST3 and above PED trainee or consultant. Attendance should be within 30 minutes of triggering the sepsis pathway. This is to ensure that alternative diagnoses have been considered, and the treatment is appropriate.

Note: in less severe cases, where there are only amber triggers (see flow chart), the child should be reviewed or discussed with an ST3 and above, and the decision for antibiotics can be made within 3 hours, with hourly reviews in the meantime.

Step 6: If normal circulation has not been restored after 20ml/kg of fluid and the patient has triggered red flag sepsis, then inform PICU/ discuss with NWTS.

Once 40ml/kg has been given, if normal circulation has not been restored, discuss with NWTS. Transfer to critical care may be appropriate at this stage.

Resuscitation goals:
These values are target values that indicate resuscitation is successful.
Along with these physiological measures, a serial reduction of lactate by 10% every hour or normalisation of lactate is targeted.

Age group	Heart Rate	Respiratory Rate	Systolic BP	Mean BP
0-4 months	110-160	30-40	>60	≥45
4months – 2yrs	110-150	25-35	>70	≥50
2yrs – 5yrs	80-120	25-30	>85	≥60
5yrs – 12yrs	70-120	20-25	>90	≥60
Over 12 years	65-110	15-20	>100	≥65

PLEASE INVOLVE PICU IF >40ml/kg of fluid resuscitation or inotropes are required.

5.4 Patient information

Information leaflet:
https://bestpractice.bmj.com/patient-leaflets/en-gb/html/3000059/Sepsis%20in%20children

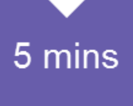
It is your responsibility to check on the intranet that this printed copy is the latest version

5.5 The PICU guideline for sepsis

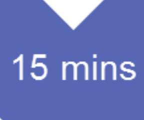
The following is included for reference:

SEPSIS: Initial Management Pathway (PICU Guideline)

- Recognise sepsis - start clock
- High flow oxygen/CPAP.
- Intravascular access (IV or IO) -blood gas with lactate, CBG if possible
- Base line bloods if possible - cultures, FBC, coagulation, biochemistry profile, CRP

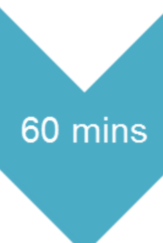


- Start Fluid resuscitation - up to 60mL/kg in 20mL/kg aliquots over 15-30 minutes. Reassess after every bolus. (Consider 5 to10mL/kg aliquots in cardiac dysfunction and reassess - if signs of failure, do not continue to give volume - start inotropes)
- Administer appropriate antibiotic (check drug allergy):
- Correct hypoglycaemia.
- Take blood cultures if possible prior to antibiotics but do NOT delay antibiotic



- If normal perfusion is not restored after 40mL/kg of fluid : INFORM CONSULTANT
- Ensure antibiotics have been given (add dexamethasone if meningitis suspected)
- Continue with fluid resuscitation, unless crepitations or hepatomegaly
- Obtain second vascular access, start dopamine peripherally (up to 10micrograms/kg/min) concentration dependant - see PICU continuous infusion policy
- If no improvement with 60mL /kg fluid : urgent review by PICU, Anaesthetics

- Patient should have antibiotics and initial fluid resuscitation of up to 60mL/kg
- If inotropes are in use and patient outside PICU move to critical care, unless in BMT
- Consider intubation to facilitate support: induction with ketamine or etomidate.
- **If perfusion has not normalised, consultant review should have taken place.**
- Insert central line and start inotropes for fluid refractory shock : dopamine and:
    - cold shock with normal BP: consider andrenaline and/or milrinone
    - cold shock with hypotension: adrenaline
    - warm shock with hypotension: noradrenaline
- Hydrocortisone 2mg/kg stat if cathecholamine resistant or adrenal insufficiency, then 6 hourly (usual max dose 100mg 6 hourly - see under section 3.7)



- Patient should be in appropriate area (Critical care, PED majors or theatre, BMT)
- If ongoing fluid resuscitation (>60mL/kg) then intubate and ventilate to protect airway and faciliate central lines
- Central and arterial lines should have been inserted.
- Insert nasogastric tube and urinary catheter, ensure xray confirmation of NG / ET tube
- Titrate inotropes to target $ScVO_2$, lactate clearance and blood pressure
- Ensure arterial gases, electrolytes, coagulation, LFT, CRP, group and save, throat swab, and appropriate cultures are taken. Ensure baseline ammonia, if decreased consciousness, has been sent.

Consider ECMO if no response to escalating inotropes or steroids

6. Roles & responsibilities

All relevant staff should:

- be aware of this guideline,
- use this guideline in conjunction with clinical expertise and judgement to implement the required sepsis screening and actions appropriate to individual clinical circumstances and patient age,
- seek senior support where required,
- document interventions and care given and planned and ensure where used that charts and tools are fully completed and filed in the patient's notes,
- report any adverse incidents or outcome as per the Trust's Incident Management Policy NCAPS003(20)
- attend training as appropriate.

Allied health professionals should be aware of the guideline and the relevant parts to their practice. If you encounter any difficulties in following this guideline, you must escalate this to your line manager)

7. Monitoring document effectiveness

- **Key standards:** MANCHEWS scores on admission will be recorded in casenotes for 100% children admitted to the children's ward
- **Method(s)*:** clinical audit
- **Team responsible for monitoring:** ward manager.
- **Frequency of monitoring:** quarterly
- **Process for reviewing results and ensuring improvements in performance:** audit will be shared with the teams involved and reported up through the care organisation governance committee'.

8. Abbreviations and definitions

°C	degrees Celsius
BMT	bed management team
BP	blood pressure
CBG	capillary blood gas
CPAP	Continuous Positive Airway Pressure
CPE	Carbapenemase-producing Enterobacteriaceae
CRP	c-reactive protein
ECMO	extracorporeal membrane oxygenation
EM	emergency medicine
ET	endotracheal
EWS	early warning score
FBC	full blood count
g	gram
h	hour
HSV	herpes simplex virus
IO	intraosseous infusion

It is your responsibility to check on the intranet that this printed copy is the latest version

IV	intravenous
Kg	kilogram
LFT	liver function tests
MANCHEWS	Manchester children's early warning system
min	minute(s)
ml	millitre
mmHg	millimetres of mercury
mmol	millimole
NCA	Northern Care Alliance
NG	nasogastric
NICE	National Institute of Health and Care Excellence
NWTS	North West & North Wales Paediatric Transport Services
PED	paediatric emergency department
PICU	paediatric intensive care unit
RMCH	Royal Manchester Children's Hospital
$ScVO_2$	Central venous oxygen saturation
SD	standard deviation(s)
SpO_2	oxygen saturation via pulse oximetry
ST	specialist trainee
U&Es	urea & electrolytes
UO	urine output
UTI	urinary tract infection
y	year
yrs	years

Definitions

- **Infection:**
  Suspected or proven infection or a clinical syndrome associated with a high probability of infection

- **Sepsis:**
  SIRS resulting from or occurring in the presence of proven infection

- **Septic shock:**
  Evidence of cardiovascular dysfunction that remains after initial fluid resuscitation of at least 40mL/kg within an hour

- **Severe sepsis:**
  Sepsis and evidence of organ dysfunction

- **SIRS (Systemic Inflammatory Response Syndrome):**
  This is the inflammatory response that characterises the start of a dysregulated response to infection but can also be present following severe trauma.

9. References

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Acknowledgements

This guideline has been adapted from the Royal Manchester Children's Hospital Guideline: Recognition and management of sepsis. Originated By: (1) JM Samuel, (2) G Subramanian, (3) E Balmer, (4) D Mattison, K Potier (5), S Hughes (6), D Sanyal (7), P McMaster (8) F Buckley (9), K Alexander (10) Designation: Consultants: Paediatric Intensivists (1&2), paediatricians (3&4), emergency medicine (5), immunologist (6), microbiologist (7), infectious diseases (8), PICU sister (9), antimicrobial pharmacist (10).

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10. Document Control Information

<table>
<tr><td colspan="4">Part 1
Must be fully completed by the Author prior to submission for approval</td></tr>
<tr><td>Name of lead author:</td><td colspan="3">Michael Perkins</td></tr>
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<tr><td>Name/s of person or group</td><td>State which COs/ corporate services/ staff groups the person or group represents</td><td>Date</td><td>Response: FU/ FNU / NR</td></tr>
<tr><td>Paediatric consultants, senior nurse</td><td>OCO</td><td>Jan 2022</td><td>NR</td></tr>
<tr><td>Paediatric directorate</td><td>OCO</td><td>8 Feb 2022</td><td>FU</td></tr>
<tr><td colspan="4">EqIA sign off: See Appendix 11</td></tr>
<tr><td colspan="2">Name: (Insert named lead from EDI team</td><td colspan="2">Date:</td></tr>
<tr><td colspan="2">J McMahon</td><td colspan="2">07/02/2022</td></tr>
<tr><td colspan="4">Communication plan: State below how the practice in this document will be rolled out across the organisation and embedded in practice. A communication plan be requested for review by the approving committee – if applicable, add details her of the owner</td></tr>
<tr><td colspan="4">This guideline will be available via the Document Management System. An E-learning package for management of sepsis and use of Sepsis 6 pathway will be made available. Sepsis packs will also be available in all clinical areas</td></tr>
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Submit to Document Control/Policy Support for publication</td></tr>
<tr><td>Approval date:</td><td colspan="2">Method of document approval</td></tr>
<tr><td>09/02/2022</td><td>Formal Committee decision
Yes</td><td>Chairperson’s approval
No</td></tr>
<tr><td>Name of Approving Committee</td><td colspan="2">Women and children’s divisional assurance board</td></tr>
<tr><td>Chairperson Name/Role</td><td colspan="2">S Mehigan, Director of Midwifery + Divisional Director of Nursing</td></tr>
<tr><td>Amendments approval: Name of approver, version number and date. <u>Do not amend above details</u></td><td colspan="2"></td></tr>
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<tr><td colspan="2">Part 3
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<tr><td>Keywords & phrases:</td><td>Paediatric; Sepsis; infection; deterioration; MANCHEWS, EWS, trigger, children</td></tr>
<tr><td>Document review arrangements</td><td>Review will occur by the author, or a nominated person, within five years or earlier should a change in legislation, best practice or other change in circumstance dictate.</td></tr>
<tr><td>Special requests</td><td>Indicate whether upon publication you require specific groups to be informed such as nursing or medical? This will be in addition to the policy author.</td></tr>
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11. Equality Impact Assessment (EqIA) tool

- The below tool must be completed at the start of any new or existing policy, procedure, or guideline development or review. **N.B.** For ease, all documents will be referred to as 'Policy*'. The EqIA should be used to inform the design of the new policy and reviewed right up until the policy is approved and not completed simply as an audit of the final Policy itself.
- All sections of the tool will expand as required.
- EqIAs must be sent for review prior to the policy* being sent to committee for approval. Any changes made at committee after an EqIA has been sign off must result in the EqIA being updated to reflect these changes. Policies will not be published without a completed and quality reviewed EqIA.

Help and guidance available:

- Click here for the Policy*EqIA Tips for Completion QRG
- Email the Group EDI Team: eqia@pat.nhs.uk for advice or training information.
- Submission of policy* documents requiring EqIA sign off to: eqia@pat.nhs.uk. Allowing an initial four week turnaround.
- Where there is a statutory or significant risk, requests to expedite the review process can be made by exception to the Group Equality & Inclusion Programme Manager tara.hewitt@pat.nhs.uk

1. Possible Negative Impacts

Protected Characteristic	Possible Impact	Action/Mitigation
Age	Excludes certain age groups	Applicable to only under 18
Disability	Communication in cases of autism, mental health, visual, hearing or speech impediment	Virtual or supportive communication aids Compliance with Trust advocacy service
Ethnicity	Language and communication difficulties	Use of interpreter service
Gender	N/A	
Marriage/Civil Partnership	N/A	
Pregnancy/Maternity	N/A	
Religion & Belief	N/A	
Sexual Orientation	N/A	
Trans	Nothing within this guideline would discriminate.	Patients/staff that are Trans - we will ensure they are treated with respect and needs are met.
Other Under Served Communities (Including Carers, Low Income, Veterans)	Communication/reassurance	Carers involved in all communication.

2. Possible Opportunity for Positive Impacts

Protected Characteristic	Possible Impact	Action/Mitigation
Age	Paediatric population only	None required
Disability	As above	
Ethnicity	As above	Use of translation policy
Gender		
Marriage/Civil Partnership		
Pregnancy/Maternity		
Religion & Belief		
Sexual Orientation		
Trans		
Other Under Served Communities (Including Carers, Low Income, Veterans)		

3. Combined Action Plan

Action (List all actions & mitigation below)	Due Date	Lead (Name & Job Role)	From Negative or Positive Impact?
Use of interpreter service and compliance with Trust mandatory training and guideline on equality and diversity	Whenever necessary	S Mehigan Director of midwifery & Divisional Director of Nursing	Negative
Virtual or supportive communication aids Compliance with Trust advocacy service	Whenever necessary		Negative
Use of advocacy service when required/ Carers involved in all communication	Whenever necessary		Negative
Patients/staff that are Trans - we will ensure they are treated with respect and needs are met	Whenever necessary		Negative

4. Information Consulted and Evidence Base *(Including any consultation)*

Protected Characteristic	Name of Source	Summary of Areas Covered	Web link/contact info
Age	Trust Equality and diversity guideline	communication	Trust Equality and diversity guideline
Disability	Trust Equality and diversity guideline	communication	Trust Equality and diversity guideline
Ethnicity	Trust Equality and diversity guideline Interpretation & Translation Policy	communication	Trust Equality and diversity guideline Interpretation and Translation Policy
Gender	NA		
Marriage/Civil Partnership	NA		
Pregnancy/Maternity	NA		
Religion & Belief	NA		
Sexual Orientation	NA		
Trans	NA		
Other Under Served Communities (Including Carers, Low Income, Veterans)	NA		

5. EqIA Update Log

(Detail any changes made to EqIA as policy has developed and any additional impacts included)

Date of Update	Author of Update	Change Made
09/12/2021	M Perkins	Full review

6. Have all of the negative impacts you have considered been fully mitigated or resolved? *(If the answer is no please explain how these don't constitute a breach of the Equality Act 2010 or the Human Rights Act 1998)* Yes - *Impact has been mitigated as described above in section 1*

7. Please explain how you have considered the duties under the accessible information standard if your document relates to patients?
Policy only relevant for paediatric population. Communication and language barriers mitigated through compliance with Equality and Diversity training and guideline and use of interpreter and advocacy service.
The policy will be available to staff in different formats, including large print, enlarged on computer screen and/or on different colour paper. This would also include all Appendices

8. Equality Impact Assessment completed and signed off? *(Insert named lead from EDI Team below). Please also add this information within Section 11.*

Name: [signature] **Date: 07/02/2022**