INFECTION IN FIRST 72 HOURS OF LIFE

Based on **NICE CG149 Antibiotics for early onset neonatal infection** Updated December 2016, **NICE Early onset neonatal infection pathway** updated March 2019 and **NICE NG195 Neonatal infection: antibiotics for prevention and treatment** April 2021

RISK FACTORS FOR INFECTION

Red flag risk factor

- Suspected or confirmed infection in another baby in the case of a multiple pregnancy

Other risk factors

- Invasive Group B streptococcal infection in a previous baby
- Maternal Group B streptococcal colonisation, bacteriuria or infection in the current pregnancy
- Preterm birth (<37 weeks) following spontaneous labour
- Confirmed rupture of membranes for >18 hr before a preterm birth
- Confirmed pre-labour rupture of membranes at term for >24 h before onset of labour
- Intrapartum fever >38°C if there is confirmed or suspected bacterial infection
- Clinical diagnosis of chorioamnionitis

CLINICAL INDICATORS SUGGESTIVE OF INFECTION

Red flag clinical indicators

- Apnoea
- Need for cardiopulmonary resuscitation
- Seizures
- Need for mechanical ventilation
- Signs of shock

Other clinical indicators

- Altered behaviour or responsiveness
- Altered muscle tone (e.g. floppiness)
- Feeding difficulties (e.g. feed refusal)
- Feed intolerance including abdominal distension, vomiting, excessive gastric aspirates
- Abnormal heart rate (bradycardia or tachycardia)
- Signs of respiratory distress (including grunting, recession, tachypnoea)
- Hypoxia (e.g. central cyanosis or reduced oxygen level)
- Jaundice in first 24 hr of life
- Signs of neonatal encephalopathy
- PPHN
- Temperature <36°C or >38°C, not explained by environmental factors
- Unexplained excessive bleeding, thrombocytopenia or abnormal coagulation
- Hypo/hyperglycaemia
- Metabolic acidosis (BE ≥10)

Red flag signs and clinical indicators suggestive of neonatal infection

- Suspected or confirmed infection in another baby in the case of a multiple pregnancy
- Apnoea
- Seizures
- Need for cardiopulmonary resuscitation
- Signs of shock
- Need for mechanical ventilation

ACTIONS

- Any red flags or no red flags but ≥2 risk factors **or** clinical indicators
  - perform investigations, including blood cultures, and start antibiotics
- No red flag or clinical indicators but 1 risk factor, **or** no red flag or risk factors but 1 clinical indicator
  - use clinical judgement and consider withholding antibiotics
  - monitor baby for clinical indicators of possible infection, including vital signs
  - monitor for at least 12 hr from birth (at 1 hr, 2 hr and then 2-hrly for 10 hr)
- If further clinical concerns, perform investigations including blood cultures and start antibiotics
- Whenever decision made to give antibiotics, start as soon as possible and always within 1 hr of decision

KAISER PERMANENTE SEPSIS RISK CALCULATOR (KP-SRC)

- Online tool used to determine whether a baby is at risk of early onset neonatal infection and whether antibiotic treatment is indicated. NICE has endorsed this as an alternative to the framework above for babies born at ≥34 weeks provided that it is used as part of a prospective audit
- In this guideline the KP-SRC is applied to well babies who meet the NICE criteria for treatment with antibiotics for possible early onset neonatal infection to determine whether they should receive antibiotics
- If baby meets the criteria for antibiotic treatment refer to the **Kaiser Permanente sepsis risk calculator** guideline and apply KP-SRC online tool
- If KP-SRC recommends withholding antibiotics continue to follow the **Kaiser Permanente sepsis risk calculator** guideline
- Continue with this guideline, following the advice below if:
  - KP-SRC recommends antibiotic treatment **or**
  - baby does not meet the KP-SRC inclusion criteria **or**
  - online tool is not available **or**
  - local trust has chosen not to adopt KP-SRC

INVESTIGATIONS BEFORE STARTING ANTIBIOTICS

- Blood culture (in all)
- Measure CRP at presentation and 18–24 hr after
- If strong clinical suspicion of infection or signs of meningitis, perform lumbar puncture (LP), if thought safe to do
  - if performing LP will delay antibiotics, give antibiotics first
- Do not carry out routine urine MC&S
- Take skin swabs only if clinical signs of localised infection
- If purulent eye discharge (may indicate serious infection e.g. chlamydia or gonococcus):
  - collect eye swabs for urgent MC&S and swabs in viral transport media for viral PCR, especially if looking for chlamydia or gonococcus (see **Conjunctivitis** guideline)
  - start systemic antibiotics while awaiting results
- If signs of umbilical infection, including purulent discharge or periumbilical cellulitis, perform blood culture, take swab for MC&S and start flucloxacillin and gentamicin IV
  - if microbiology results indicate infection not due to Gram-negative infection stop gentamicin

Choice of IV antibiotics

- Use benzylpenicillin and gentamicin as first choice for empirical treatment
- If microbiological evidence of Gram-negative bacterial sepsis, add a third antibiotic that is active against Gram-negative bacteria e.g. cefotaxime. If Gram-negative infection subsequently confirmed, stop benzylpenicillin

Benzylpenicillin

- 25 mg/kg 12-hrly

- If baby appears very ill, give 25 mg/kg 8-hrly

Gentamicin

- Follow local guideline or:
- 5 mg/kg
- if a second dose to be given (see below), give 36 hr after first dose
- interval may be shortened based on clinical judgement e.g. for Gram-negative infection or if baby appears very ill
- Monitoring of gentamicin – see below

INVESTIGATIONS DURING ANTIBIOTIC TREATMENT

- CRP: measure before starting antibiotics and 18–24 hr after presentation
- Consider LP if:
- positive blood culture (other than CoNS) **or**
- baby does not respond satisfactorily to antibiotics **or**
- there is a strong clinical suspicion of infection **or**
- there are clinical symptoms or signs suggestive on meningitis
- Asymptomatic babies on postnatal ward/transitional care unit with CRP ≤60 do not require routine LP, but should be reviewed by middle grade doctor

Review treatment at 36 hr

- Stop antibiotics if:
- initial clinical suspicion of infection was not strong **and**
- negative blood culture **and**
- baby is well with no clinical indicators of possible infection **and**
- levels and trends of CRP are reassuring i.e. CRP <15 mg/L on both tests

Usual duration of treatment

- If blood culture negative and baby is well with no strong clinical suspicion of infection and neither CRP >60, antibiotics can be stopped after 5 days
- If blood culture positive or strong clinical suspicion of infection or either CRP >60, treat for 7 days
- Continue treatment beyond 7 days if:
- baby is not fully recovered **or**
- this is advisable based on blood culture result and expert microbiological advice if necessary
- If any doubt about duration of treatment, discuss with consultant

Meningitis

- If meningitis suspected but Gram stain is uninformative, use amoxicillin and cefotaxime
- Review treatment decisions taking CSF results into account
- If CSF Gram stain suggests GBS, give benzylpenicillin 50 mg/kg 12-hrly and gentamicin 5 mg/kg every 36 hr
- If CSF culture confirms GBS, continue benzylpenicillin for ≥14 days and gentamicin for 5 days
- If CSF culture or Gram stain confirms Gram-negative infection, stop amoxicillin and treat with cefotaxime alone
- If blood culture or CSF culture positive for listeria, consider stopping cefotaxime and treating with amoxicillin and gentamicin
- If CSF Gram stain or culture suggests any organism other than GBS, use an antibiotic regimen based on local expert microbiological advice

Therapeutic monitoring of gentamicin

- Follow local guidelines or:
- **Trough concentrations**:
- if second dose to be given, measure before administering
- review level before giving third dose

- monitor before every third dose, or more frequently if necessary (e.g. concern about previous level or renal impairment)
- adjust dose interval aiming to achieve level of <2 mg/L
- if course lasts >3 doses, level of <1 mg/L is advisable
- if a trough level is not available, do not withhold next dose of gentamicin unless there is evidence of renal dysfunction (raised serum urea, creatinine or anuria)
- **Peak concentrations**:
- measure in selected babies e.g.:
  - with oedema
  - with macrosomia (birth weight >4.5 kg)
  - unsatisfactory response to treatment
  - proven Gram-negative infection
- Measure 1 hr after starting gentamicin infusion
- If peak <8 mg/L, increase dose

DISCHARGE FOLLOWING GROUP B STREPTOCOCCAL INFECTION

- Advise mother that if she becomes pregnant again:
- increased risk of early onset neonatal infection
- to inform her maternity team that a previous baby had GBS infection
- intrapartum antibiotics will be recommended
- Inform mother's GP in writing risk of:
- recurrence of GBS infection in this baby
- GBS infection in subsequent pregnancies
- If mother had GBS colonisation in this pregnancy but no infection in baby, this will not affect management of any further births