

Clinical Guideline

INFANTS AT RISK OF EARLY NEONATAL INFECTIONS (ANTIBIOTICS FOR EARLY ONSET NEONATAL INFECTION)

SETTING	Women's and Children's Division, St Michael's Hospital, Central Delivery Suite
FOR STAFF	Midwives and Neonatologists
PATIENTS	All new born babies at St Michael's Hospital

GUIDANCE

Early onset neonatal bacterial infection (infection with onset usually within 72 hours of birth) is a significant cause of mortality and morbidity in new born babies. It is well recognised that there can be unnecessary delays in the recognition and treatment of sick babies. In addition, concern about the possibility of early onset infection is common. This concern is an important influence on the care given to pregnant women and new born babies. There is wide variation in how risk of early-onset infection is managed in healthy babies.

This updated guideline is an extrapolation of the NICE guideline: Antibiotics for early onset neonatal infection published in August 2012. It links to other local and national guidelines such as the empirical antibiotic guideline for neonates, Group B Streptococcal infection care in pregnancy and labour guideline and the Bacterial meningitis and meningococcal septicaemia (NICE) guideline.

Using the guideline

This guideline is based around two tables, one for risk factors, one for clinical indicators and a flow diagram.

Following this there is advice on the investigations that should be completed, the management and duration of antibiotics and the management of meningitis.

It is first necessary to assess the risk factors (based on mainly maternal/perinatal factors), then assess the clinical indicators of the baby. These will then allow the flow diagram to direct the practitioner to the correct course of treatment.

All babies at risk of infection should get

- 1 set of Neonatal Observations (NOBS) within 1 hour of delivery
- Another set of NOBS by 2 hours of age
- 2 hourly observations for 12 hours
- 4 hourly observations to 24 hours

Determine the need for antibiotic treatment in the baby

Use Table 1 to identify risk factors for early onset neonatal infection and Table 2 to identify clinical indicators of early onset infection.
 Use Tables 1 and 2 to identify red flags (risk factors and clinical indicators that should prompt a high level of concern regarding neonatal infection).

If there are any risk factors for early onset infections (Table 1.) or if any clinical indicators of possible early-onset infection (Table 2.) perform a careful clinical assessment without delay. Review the maternal and neonatal history and carry out a physical examination of the baby including an assessment of vital signs.

Use the following framework to direct antibiotic management decisions

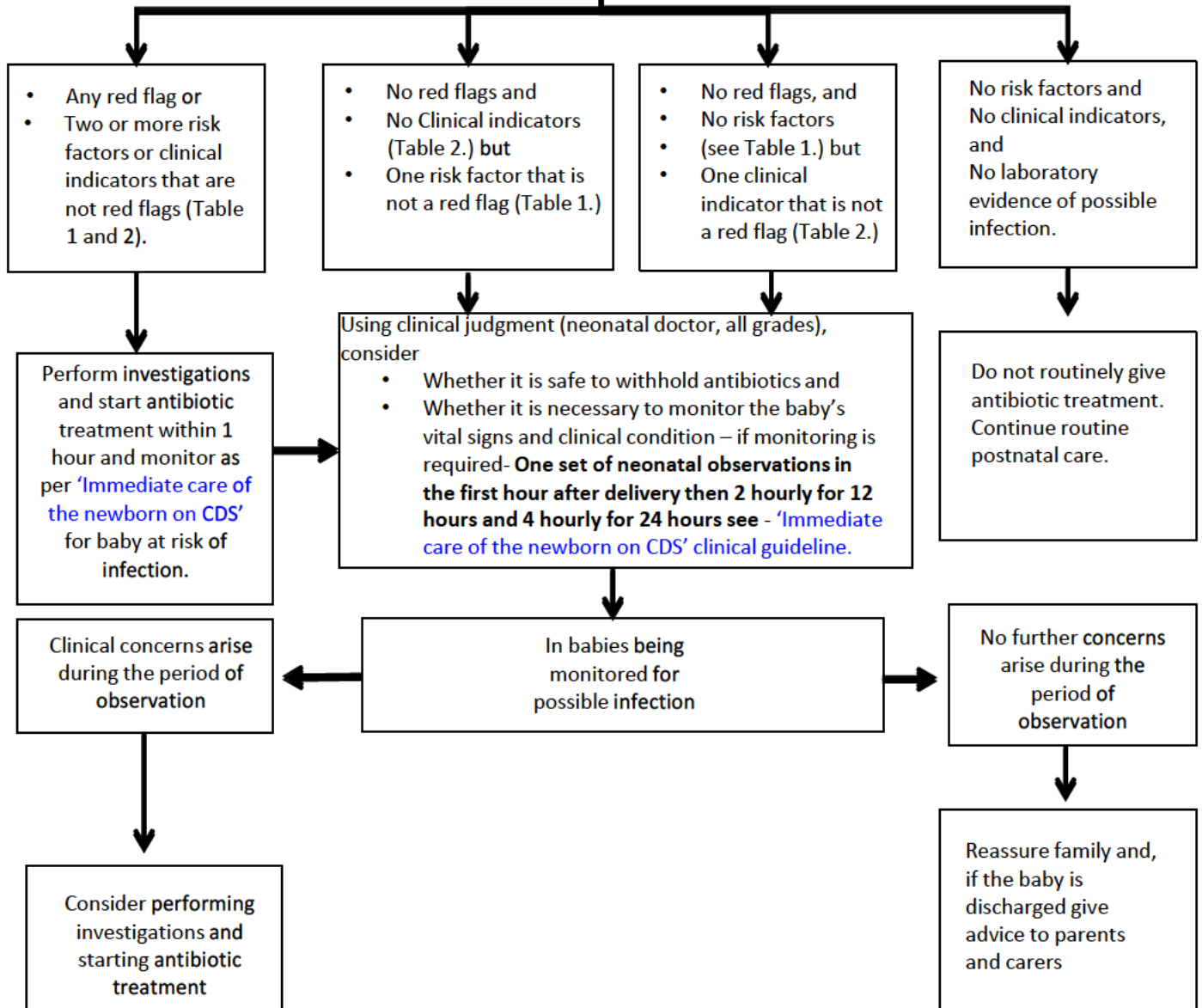


Table 1. Risk factors for early-onset neonatal infection, including red flags

Risk Factor

Text in red = red flag 🚩 (high level of concern regarding neonatal infection)

🚩 Parenteral antibiotic treatment given to the woman for confirmed or suspected invasive bacterial infection (such as septicaemia) at any time during labour, or in the 24-hour periods before and after birth [This does not refer to antibiotic prophylaxis]

🚩 Suggested or confirmed infection in another baby in the case of multiple pregnancy

Invasive group B *Streptococcal* infection in previous baby

Preterm birth following spontaneous labour (before 37 weeks)

Maternal group B *Streptococcal* colonisation, bacteriuria or infection in the current pregnancy

Prelabour rupture of membranes (>24 hours)

Suspected or confirmed rupture of membranes for more than 18 hours in a preterm birth

Intrapartum fever > 38^o C
 (see 'Pyrexia in labour' in Labour Care guideline)

Table 2. Clinical indicators of possible-early-onset neonatal infection (observations and events in the baby), including red flags.**Clinical indicator****Text in red = red flag** 🚩 (high level of concern regarding neonatal infection)

🚩 Signs of respiratory distress starting 4 hours after birth

🚩 Seizures

🚩 Need for mechanical ventilation in a term baby

🚩 Signs of shock

Altered behaviour or responsiveness

Altered muscle tone (e.g. floppiness)

Feeding difficulties (e.g. refusal)

Feed intolerance including vomiting, excessive gastric aspirates and abdominal distension

Abnormal heart rate (bradycardia or tachycardia)

Signs of respiratory distress

Hypoxia (e.g. central cyanosis or reduced oxygen saturation level)

Jaundice within 24 hours of birth

Apnoea

Signs of neonatal encephalopathy

Need for cardio-pulmonary resuscitation

Need for mechanical ventilation in preterm baby

Persistent fetal circulation (persistent pulmonary hypertension)

Temperature abnormality (lower than 36°C or higher than 38°C) unexplained by environmental factors.

Unexplained excessive bleed, thrombocytopenia or abnormal coagulation (INR >2.0)

Oliguria persisting beyond 24 hours of birth

Altered glucose homeostasis (hyper- or hypoglycaemia)

Metabolic acidosis (base deficit of 10mmol/l or greater)

Local signs of infection (e.g. affecting skin or eye)

Investigations before starting antibiotic treatment

- In infants with risk factors for infection or clinical indicators of possible infection, perform a blood culture before administering the first dose
- Measure the C-reactive protein at presentation when starting antibiotic treatment.
- Perform a lumbar puncture to obtain a cerebrospinal fluid sample before starting and it is safe to do so and
 - There is strong clinical suspicion of infection or
 - There are clinical symptoms or signs of suggested meningitis
 - If performing a lumbar puncture would unduly delay starting antibiotics, perform it as soon as possible after starting antibiotics.
- Do not Routinely perform urine culture or microscopy as part of the investigation for early onset neonatal infection
- Do not perform skin swab microscopy or culture as part of the investigation for early-onset neonatal infection in the absence of clinical signs or localised infection.

Management of antibiotic treatment for suspected for early-onset neonatal infection

If a baby needs antibiotic treatment it should be given as soon as possible within 1 hour of the decision to treat
 Use intravenous Benzylpenicillin and Gentamicin as the first choice regime for empirical treatment of suspected infection unless microbiological surveillance data revealing bacterial resistance patterns indicating a different antibiotic.

Refer to Empirical Antibiotic Guideline for Neonates for specifics of treatment.

In babies given antibiotics because of risk factors for infection or clinical indicators for infection, measure the C-reactive protein concentration 18 – 24 hours after presentation

Consider doing a lumbar puncture to obtain cerebrospinal fluid in a baby who did not have a lumbar puncture at presentation who is receiving antibiotics, if it is safe to do so and the baby:

- Has a C-reactive protein concentration greater than 10 mg/litre
- Has a positive blood culture
- Does not respond satisfactorily to antibiotic treatment.

Regularly assess the clinical condition and results of investigations in babies receiving antibiotics. Consider whether to change the antibiotic regimen taking account of:

- The baby's clinical condition (e.g. no improvement)
- The results of microbiological investigations
- Expert microbiological advice taking into account surveillance data

If there is microbiological evidence of Gram-negative infection bacterial sepsis add another agent to the Benzylpenicillin and Gentamicin that is active against Gram-negative bacteria (e.g. Cefotaxime) If Gram negative is confirmed then stop Benzylpenicillin.

Duration of antibiotic treatment

The usual duration of antibiotic treatment for babies with a positive blood culture:

- 10 days for GBS (without meningitis)
- 14 days for Listeria bacteraemia without meningitis
- 14 days for Gram negative sepsis without meningitis
- 21 days for Meningitis (any bacterium)

In babies given antibiotics because of risk factors or clinical indicators of possible infection consider stopping antibiotic after 48 hours if

- The blood culture is negative
- The initial clinical suspicion was not strong
- The baby's clinical condition is reassuring with no clinical indicators of possible infection and
- The trend of CRP concentration is reassuring

In culture negative infants with a strong suspicion of sepsis continue antibiotics for **5-7 days** (consultant decision) or if severe clinical signs (e.g. hypotension, DIC) - **2 weeks**

Consider continuing antibiotic treatment for more than 7 days if:

- The baby has not yet fully recovered
- This is advisable based on the pathogen identified on blood culture (seek expert microbiological advice)

If continuing antibiotics for longer than 24 hours despite negative blood culture, review the baby every 24 hours. On each occasion, using clinical judgment, consider whether it is appropriate to stop antibiotic treatment, taking account of:

- The level of initial clinical suspicion of infection
- The baby's clinical progress and current condition and the
- Trend of CRP concentration

Antibiotic management for suspected or confirmed meningitis in babies on the neonatal unit

Consider doing a lumbar puncture to obtain cerebrospinal fluid in a baby who did not have a lumbar puncture at presentation who is receiving antibiotics, if it is safe to do so and the baby:

- Has a C-reactive protein concentration greater than 10 mg/litre
- Has a positive blood culture
- Does not respond satisfactorily to antibiotic treatment.
- In neonates at least 20 cells/microlitre in CSF microscopy is considered abnormal ²*
- Lumbar puncture results should be interpreted with caution.

If meningitis is suspected but the causative pathogen is unknown (e.g. the CSF gram stain sample is uninformative), treat with Cefotaxime and Amoxicillin §

If meningitis is shown to be due a Gram negative infection wither by CSF Gram stain or culture, stop Amoxicillin and treat with Cefotaxime alone

If meningitis is shown by CSF fluid Gram stain to be a Gram-positive infection continue treatment with I.V. Amoxicillin and Cefotaxime while awaiting the CSF culture

If the CSF culture is positive for GBS consider changing the antibiotic treatment as per the neonatal empirical guidelines i.e.

- Benzylpenicillin (dose as per guideline)
- Gentamicin (dose as per guideline)

If the blood culture or CSF culture is positive of Listeria consider stopping Cefotaxime and treating with Amoxicillin and Gentamicin.

If the CSF culture identifies a Gram-positive bacterium other than GBS or Listeria then seek expert microbiological advice.

*

- Lumbar punctures may be traumatic (35 -46% by some reports ³).
- CSF results can be affected by antibiotics (maternal or neonatal).
- The interpretation of traumatic taps by the 500:1 rule or other ratios is unreliable.
- Normal results in a neonate
 - Neutrophils $0 \times 10^6/l$, Lymphocytes $< 20 \times 10^6/l$, Protein $< 1g/l$, Glucose (CSF: blood ratio) > 0.6

§

- If the LP is uninformative or traumatic AND there is clinical concern AND CRP > 10 mg/l or increasing concern consider treating for 21 days. Regular review of clinical situation (including inflammatory parameters) and duration of antibiotics is advised.

References

NICE: Antibiotics for early onset neonatal infection. August 2012.

NICE: Antibiotics for early onset neonatal infection
<http://www.nice.org.uk/nicemedia/live/13867/60629/60629.pdf>

NICE: Bacterial meningitis and meningococcal septicaemia June 2010.
<http://www.nice.org.uk/nicemedia/live/13027/49437/49437.pdf>

Greenberg R.G., Smith P.B., Cotton C.M. et al. Traumatic lumbar punctures in neonates: Test performance of cerebrospinal fluid white blood cell count. *Ped Infect Dis J.* December; 2008 27(12): 1047 – 1051.

RELATED DOCUMENTS

Associated guidelines

Empirical antibiotics guideline for neonates
<http://nww.avon.nhs.uk/dms/download.aspx?did=15009>

Group B Streptococcus (GBS) infection care in pregnancy and labour
<http://nww.avon.nhs.uk/dms/download.aspx?did=2819>

Immediate care of the new born on CDS

SAFETY

There are no unusual or unexpected safety concerns (to staff or patients)

QUERIES

Contact [REDACTED] or [REDACTED] Practice Development Midwife ex 25164

Or bleep on call senior neonatologist to answer a query.