INFECTION

PREVENTION

- **Strict hand washing or alcohol hand rubs:**
- to the elbow with particular attention between digits
- on entering the unit and between each patient
- Unless absolutely essential, avoid entering incubators or touching any part of cots
- Meticulous regimen for changing drips and three way taps

DIAGNOSIS

Symptoms

- Difficult especially in babies of low birth weight
- These can be vague and non-specific
- The following are suggestive of an infection:
- poor colour
- lethargy/inactivity
- hypotonia
- irritability
- poor suck
- vomiting
- abdominal distension
- high or **low** body temperature
- jaundice
- cyanotic attacks
- tachypnoea

Nursing staff may describe babies with a mixture of these signs and symptoms as having 'gone off'

Signs

Look for:

- Septic spots in the eyes, the umbilicus, the nails and the skin
- Tenderness in joints and limbs suggestive of osteomyelitis or osteoarthritis
- Signs of pneumonia in the chest
- Bulging of the fontanelle suggesting raised intracranial pressure
- not always detectable in babies with neonatal meningitis
- Abdominal distension and tenderness
- auscultate for bowel sounds
- inspect stool for macroscopic blood
- petechiae, bleeding diathesis
- systemic signs of sepsis such as tachycardia, poor perfusion, reduced tone, quiet, sleepy

INVESTIGATIONS **(to be performed before starting antibiotics)**

Swabs for culture

- Swab any suspicious lesion (e.g. skin, umbilicus or nails)
- Routine swabs are not useful

Blood cultures

- From a peripheral vein, using aseptic technique

Complete blood count

- A neutrophil count <2 or >15 x 10^9/L (supportive but not diagnostic, and marginally more sensitive than a total white cell count)
- Platelet count of <100 x 10^9/L
- Toxic granulation in neutrophils (or if measured : an Immature to Total (I:T) neutrophil ratio >0.2)

CRP

- Take 2 samples 24 hr apart
- a rise may support diagnosis of infection but failure to rise does not exclude it where other findings are supportive
- if blood culture negative and clinical condition satisfactory, failure of CRP to rise during first 24 hr is a useful indicator that antibiotics may be safely stopped

Urine

- Clean catch, supra-pubic aspiration (SPA) or in-out catheter (use U/S to check urine in bladder before SPA)
- do not send urine collected in a bag for culture

CSF

- If baby unstable, discuss advisability with consultant

Others

- **Chest X-ray**
- If abdominal distension noted, **abdominal X-ray**
- If features of intrauterine infection: urine CMV PCR, toxoplasma or syphilis serology, swab vesicles or throat for herpes simplex culture
- Clotting profile, in septicaemia

EMPIRICAL TREATMENT

Early onset sepsis

- Do not use oral antibiotics to treat infection in neonates
- Give penicillin and gentamicin (see **Neonatal Formulary** for doses and intervals)

Late onset sepsis

- Empiric treatment may vary according to local microbiology isolates. Generally:
- give penicillin and gentamicin if not already on antibiotics
- If not responding after 24 hr:
- add flucloxacillin to penicillin and gentamicin
- If not responding after 24 hr:
- give IV cefotaxime and vancomycin
- if meningitis excluded by LP give Tazocin and vancomycin
- If not responding after 24 hr:
- give meropenem and vancomycin
- When culture results available, always change to narrowest spectrum
- Give nystatin (oral and nasogastric) to all neonates treated with broad spectrum antibiotics if policy in your unit
- If the baby has improved clinically and bacteriological cultures are so far negative, stop antibiotics after 48 hr

SPECIFIC INFECTIONS

Prolonged rupture of membranes (>18 hr)

- If baby is clinically well, antibiotics are not indicated
- Take microbiology specimens and treat if there is any clinical deterioration in baby's condition

Prelabour rupture of membranes

- **Preterm (<37 weeks):** take blood culture and treat with empiric antibiotics until cultures back /48 hrs if negative
- **Term**: investigate only if clinical deterioration

Chorioamnionitis

Symptoms and Signs

- Maternal temperature >38° C
- Maternal tachycardia, elevated CRP or neutrophil count

- Foul or purulent vaginal discharge
- Fetal tachycardia
- Fundal tenderness

Management

- Empiric antibiotics for mother and immediate delivery, regardless of gestational age

Empiric antibiotics for neonate: if cultures negative stop antibiotics, otherwise treat as appropriate for that organism

Discharging eyes

- See **Conjunctivitis** guideline

Umbilicus sepsis (omphalitis)

- Only if local induration or surrounding reddening of the skin, systemic antibiotics required

Meningitis

Empirical treatment whilst CSF results pending:

- CSF visually clear – give penicillin and gentamicin
- CSF cloudy – give cefotaxime and amoxicillin

Subsequent management

- If culture negative (and CSF taken before antibiotics), stop after 48 hr
- If high suspicion of meningitis and no growth (and CSF taken after antibiotics), stop after 21 days
- If >5 WBC in CSF, give cefotaxime and amoxicillin
- Bloody CSF taps cannot exclude meningitis; in general, consider a RBC:WBC ratio of 500:1 as within normal range
- If low clinical suspicion, CSF glucose >2/3 simultaneous blood glucose and CSF protein <1 g/L, stop antibiotics after 48 hrs if neonate remains well and cultures negative
- Group B Streptococcus isolated, give benzylpenicillin and gentamicin for 14 days
- Gram negative bacillus isolated, give cefotaxime; if resistant to cefotaxime, give meropenem. Treat for 21 days
- Other organisms isolated, treat according to microbiological sensitivity
- If other focus found, treat as for other infection

Urinary infection

Do not delay treatment, start immediately after urine collection

- Give cephalexin until cultures available; then treat according to sensitivities
- Continue antibiotic until imaging investigations completed
- Exclude obstruction by renal ultrasound scan within a few days (or as soon as available)

Subsequent management

- Prophylaxis: a single night time dose of trimethoprim (2 mg/kg/dose) for all with confirmed UTI
- For further information on management of UTIs in neonates – see **Paediatric** guidelines

Necrotizing enterocolitis

- See **Necrotizing enterocolitis** guideline

ADJUNCTIVE THERAPY

- No substantive trials show benefit yet of intravenous immunoglobulin, recombinant cytokines etc