Neonatal sepsis
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Clinical syndrome of bacteremia with systemic signs and symptoms of infection in the first four weeks of life
Neonatal sepsis

COMMONEST CAUSE OF NEONATAL DEATHS

- Prematurity: 15%
- Others: 13%
- Asphyxia: 20%
- Sepsis: 52%

Source: Bang AT et al, Lancet 1999
Common organisms

- Klebsiella pneumoniae
- Escherichia coli
- Staphylococcus aureus
- Pseudomonas
## Early vs Late onset sepsis

<table>
<thead>
<tr>
<th></th>
<th>Early</th>
<th>Late</th>
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<tbody>
<tr>
<td><strong>Onset</strong></td>
<td>Upto 72 hrs</td>
<td>After 72 hrs</td>
</tr>
<tr>
<td><strong>Source</strong></td>
<td>Maternal</td>
<td>Postnatal environment</td>
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<tr>
<td><strong>Presentation</strong></td>
<td>Fulminant multisystem Pneumonia</td>
<td>Slowly progressive, focal Meningitis</td>
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<td></td>
<td>frequent</td>
<td>frequent</td>
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<tr>
<td><strong>Mortality</strong></td>
<td>15-50%</td>
<td>10-20%</td>
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Symptoms of neonatal sepsis

- CNS
  - Lethargy, refusal to suckle, limp, not arousable, poor or high pitched cry, irritable, seizures

- CVS
  - Pallor, cyanosis, cold clammy skin

- Respiratory
  - Tachypnea, apnea, grunt, retractions
Symptoms of neonatal sepsis

- **GIT**
  - Vomiting, diarrhea, abdominal distension

- **Hematological**
  - Bleeding, jaundice

- **Skin**
  - Rashes, purpura, pustules
Signs of neonatal sepsis

- Cold to touch (hypothermia)
- Poor perfusion (CRT)
- Hypotension
- Renal failure
- Sclerema
- Bulging fontanels, neck retraction
- Poor weight gain*

* Indicates low grade sepsis
Clinical features of severe infections
WHO Young Infant study 2003

1. Feeding ability reduced
2. No spontaneous movement
3. Temperature >38°C
4. Prolonged capillary refill time
5. Lower chest wall indrawing
6. Resp. rate > 60/minute
7. Grunting
8. Cyanosis
9. H/o of convulsions
Diagnosis of neonatal sepsis

Direct
- Isolation of organisms from blood, CSF, urine is diagnostic

Indirect
- Screening tests
Sepsis screen

- Leukopenia (TLC < 5000mm³)
- Neutropenia (ANC < 1800/mm³)
- Immature neutrophil to total neutrophil (I/T) ratio (> 0.2)
- Micro-ESR (> 15mm 1st hour)
- CRP +ve

*If two or more tests are positive treat infant as neonatal sepsis
Neutrophils

Mature neutrophil

Band cell

Teaching Aids: NNF

NS-12
Meningitis

- 10-15 percent cases of sepsis have meningitis

- Meningitis can be often missed clinically

- LP must be done in all cases of late onset & symptomatic early onset sepsis
Management: Supportive care

- Keep the neonate warm
- If sick, avoid enteral feed
- Start IV fluids, infuse 10% dextrose- 2 ml/kg over 2-3 minutes to maintain normoglycemia
- Maintain fluid and electrolyte balance and tissue perfusion. If CRT >3 sec, infuse 10 ml/kg normal saline
Supportive care

- Start oxygen by hood, if cyanosed or having RR >60/min or severe chest retractions

- Consider exchange blood transfusion, if there is sclerema
Choice of antibiotics

- **Pneumonia or Sepsis**
  - Penicillin
    - (Ampicillin or Cloxacillin) + Aminoglycoside
    - (Gentamicin or Amikacin)

- **Meningitis**
  - Ampicillin + Gentamicin
  - Or
  - Gentamicin or Amikacin + Cefotaxime or Ceftriaxone
Suspected neonatal sepsis

- Start parenteral antibiotics
- Send cultures (report in 72 hrs)

Culture -ve
- Clinically not sepsis (Stop Ab)
  - Pneumonia, Sepsis (Cont Ab X 7-10D)

Culture +ve
- Clinically ill (Cont Ab x 7-10D)
  - Meningitis, Osteomyelitis (Cont Ab X 3-6 wks)
Superficial infections

- **Pustules**
  - After puncturing, clean with betadine and apply local antimicrobial

- **Conjunctivitis**
  - Chloramphenicol eye drops

- **Oral thrush**
  - Local application of nystatin or Clotrimazole
Prevention of infections

- Exclusive breastfeeding
- Keep cord dry
- Hand washing by care givers
- Hygiene of baby
- No unnecessary interventions
Six steps of hand washing

Step 1
Wash palms with fingers

Step 2
Wash back of hands

Step 3
Wash fingers & knuckles

Step 4
Wash thumbs

Step 5
Wash finger tips

Step 6
Wash wrists
Hand washing

- Simplest, most effective measure for preventing hospital acquired infections
- 2 minutes hand washing prior to entering nursery
- 15 seconds of hand washing before touching baby
- Alcohol based hand rub effective but costly
Control of hospital infections

- Hand washing by all staff
- Isolation of infectious patient
- Use plenty of disposable items
- Avoid overcrowding
- Aseptic work culture
- Infection surveillance
Work culture

- Sterile gowns and linen for babies
- Hand washing by all
- Regular cleaning of unit
- No sharing of baby belongings
- Dispose waste-products in separate bins
Control of hospital outbreak of infections

- Epidemiological investigation
- Increased emphasis on hand washing
- Reinforce all preventive measures
- Review of protocols of nursery
- Screen all personnel
- Review of antibiotic policy
- Cohorting of infants
Fumigation

Use Potassium permanganate 70 gm with 170 ml of 40% formalin for 1000 cubic feet area for 8-24 hours alternatively Bacillocid spray for 1-2 hours may be equally effective
Conclusion

- High index of clinical suspicion
- Look for lab evidence of sepsis
- Start parenteral antibiotics (I.V.)
  - Ampicillin + Aminoglycoside
- Provide supportive care
- Review culture reports
- Practice barrier nursing to prevent cross-infection