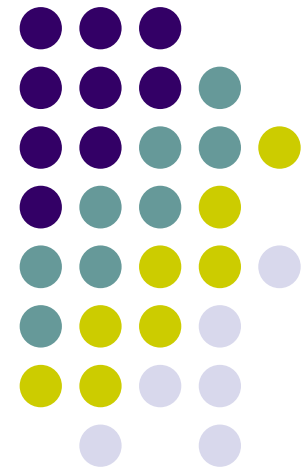


Neonatal sepsis



Neonatal sepsis

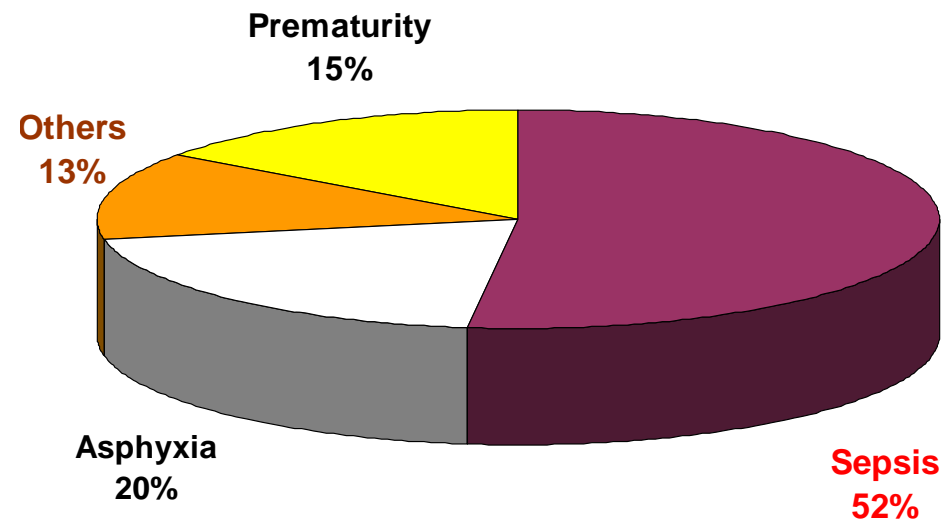


Clinical syndrome of bacteremia with systemic signs and symptoms of infection in the first four weeks of life

Neonatal sepsis



COMMONEST CAUSE OF NEONATAL DEATHS



Source: Bang AT et al, Lancet 1999

Common organisms



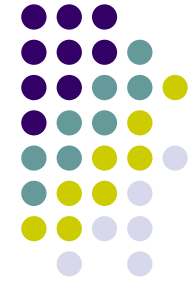
- ✦ **Klebsiella pneumoniae**
- ✦ **Escherichia coli**
- ✦ **Staphylococcus aureus**
- ✦ **Pseudomonas**

Early vs Late onset sepsis



	Early	Late
Onset	Upto 72 hrs	After 72 hrs
Source	Maternal	Postnatal environment
Presentation	Fulminant multisystem Pneumonia frequent	Slowly progressive, focal Meningitis frequent
Mortality	15-50%	10-20%

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 fontanel, 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 $>38^{\circ}$ 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

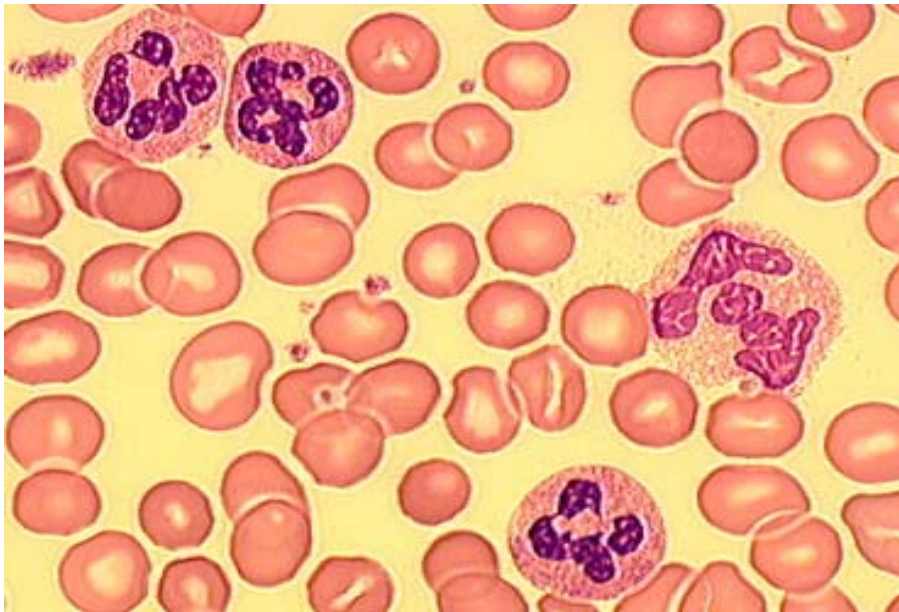
Sepsis screen



- ✱ Leukopenia (TLC $< 5000\text{mm}^3$)
- ✱ Neutropenia (ANC $< 1800/\text{mm}^3$)
- ✱ Immature neutrophil to total neutrophil (I/T) ratio (> 0.2)
- ✱ Micro-ESR ($> 15\text{mm}$ 1st hour)
- ✱ CRP +ve

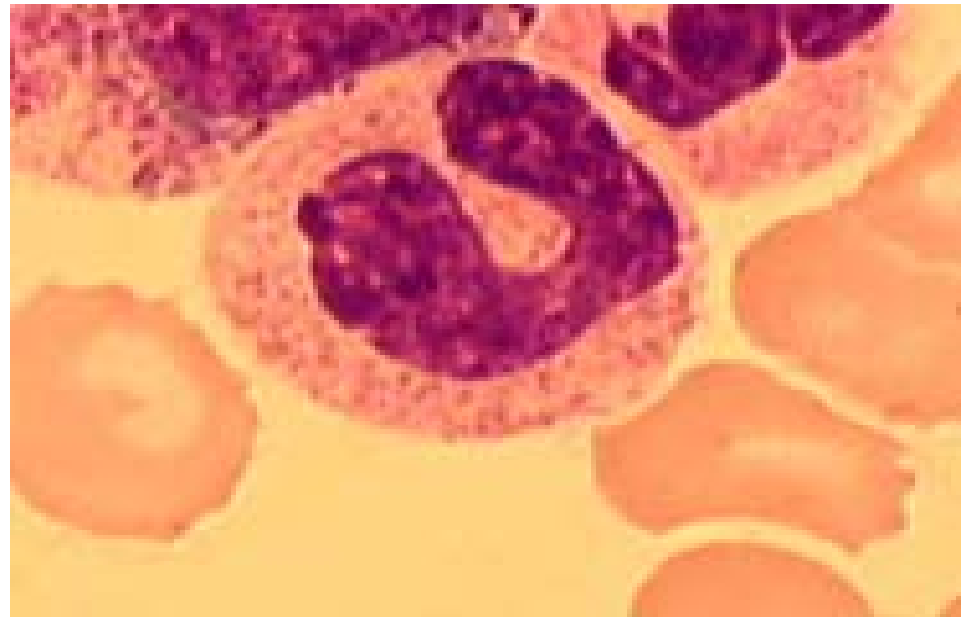
*If two or more tests are positive treat infant as neonatal sepsis

Neutrophils



Mature neutrophil

Teaching Aids: NNF



Band cell

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

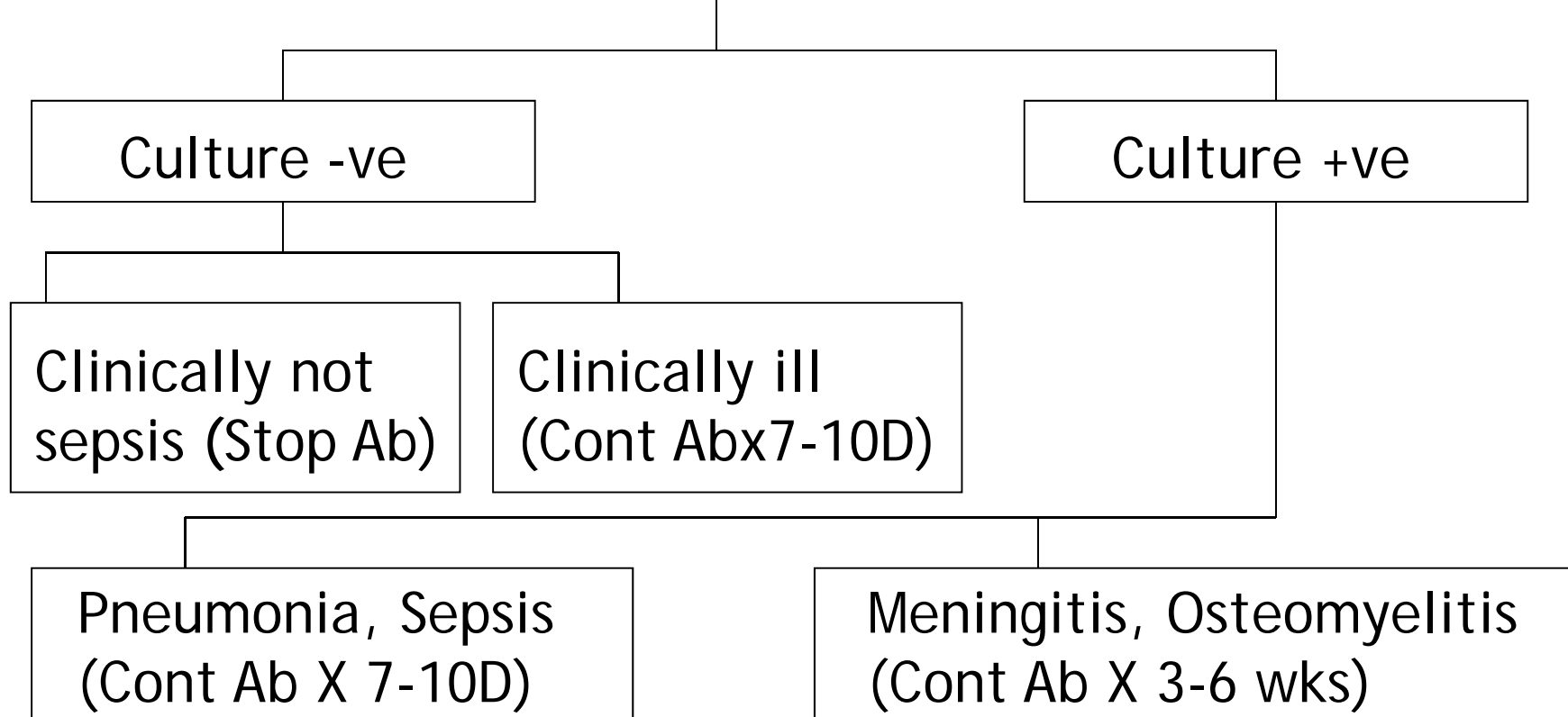
Or

Gentamicin or Amikacin + Cefotaxime or Ceftriaxone

Suspected neonatal sepsis



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



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

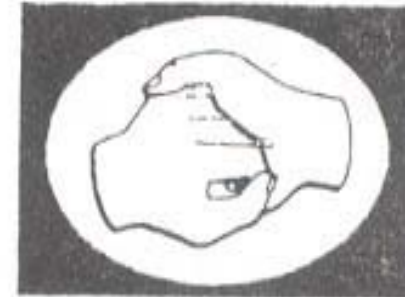
Six steps of hand washing



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