Major Specific Neonatal infections:

1. Pneumonia:
   a. Congenital
   b. Aspiration
   c. Staphylococcal
   d. airborne

2. Pyogenic meningitis

3. Pylonephritis

4. Osteomyelitis + septic arthritis

5. Epidemic diarrhea

6. Tetanus neonatorum

1. Pneumonia:

   Inflammation of lung parenchyma

   Pneumonia classification according to the time of acquiring infection:
   a. Transplacental: HSV, CMV, TB, Rubella, Varicella-HZV
   b. Perinatal: Aerobic bacteria, clamydia, CMV, Enteric bacteria, GABHS, Hemophilus infleunzae, HSV, mycoplasma
Pneumonia can be:

1. **Congenital Pneumonia**: More in preterm babies, it is contracted in utero mostly through ascending route after rupture of membranes, or transplantal. The microorganisms are GABHS, E Coli, Staph, occasionally clamydia and listeria.

   It has the same presentation as RDS, MAS. They presents with SOB, chest indrawing, granting, with or without cyanosis, decreased air entry bilaterally, dullness on percussion and crepititation. It is usually bronchopneumonia, but may begin as lobar. DX by CBP, BC&S, Chest X Ray, gastric aspirate C&S RX: Supportive like Incubator care, o2, IVF, resp. support. Specific: Ampicillin + cloxacillin

2. **Aspiration pneumonia**: mostly in preterm because of weak suckling, swallowing, coughing reflexes, so when take milk directly will aspirate it, sometimes it may occur following regurgitation. It is usually bilateral pneumonia but may be in the right upper lobe. Now less incidence because of use of NG tube feeding. Clinically, they occur during or shortly after feeding which is followed by SOB, cyanosis which may lead to death if not treated. There may be bilateral crepitation on both lung bases. RX stop feeding, aspirate milk from oropharynx, put in incubator, o2, prophylactic antibiotics as milk is a good culture media for bacteria.

3. **Staphylococcal pneumonia**: it is a dangerous condition that affect neonates. The younger the neonate, the more possibility of getting infection. It is characterized by progression of illness, usually blood born from septic spots from the baby himself or another neonate in the NCU. It starts as lobar pneumonia then progress to empyema and then may spread to the other lung to produce bronchopneumonia with small abscesses, which may rupture into bullae then pneumatocele( group of dialated ruptured alveoli ) causing emphysema or pneumothorax. Rx by supportive measures including incubator care, o2, IVF, antistaph. Antibiotics like cloxacillin + gentamicin, or newly used vancomycin, which should be continued for 3-4 weeks. The radiological improvement usually follows the clinical one.
4. **Airborn pneumonia**: it usually follow common cold by 2-3 days as secondary bacterial infection. There is progressive SOB with crepitations on both lung fields. CXR will show bronchopneumonia on both lung fields. RX by ampicillin + cloxacillin, but may need to add 3rd generation cephalosporins.

2. **Pyogenic meningitis**:
   - Carries high morbidity and mortality (20-50%)
   - 1/3 of survivors have sequel like MR, epilepsy, CP, intellectual abnormalities
   - Organisms: G-ve like E. coli, GABHS, less Staph., salmonella
   - Clinical features: it start gradually as non specific symptoms as lethargy, hypothermia, vomiting, poor feeding, failure to gain weight, then classic symptoms of meningitis as irritability, bulging fontanels, convulsion, high pitched cry, then dangerous signs like ventriculitis, cerebritis(high mortality).
   - DX: CBP, B& cs, Blood sugar, LP and CSF examin. May need Head U/S, CT scan (ventriculitis and brain abscess).

   Normal CSF in neonates show protein up to 150 mg/dl, sugar 46+- 10 mg/dl or 2/3 of blood sugar, cells up to 25 cell/cm3, of them up to 75% are lymphocytes. In meningitis, there will be turbid CSF, increase cell count, protein, decreased sugar. Gram stain, culture of CSF should also be done.

   • RX: supportive, specific as empiric antibiotics until results of C&S appear, then we can change antibiotics accordingly. Ampicillin and gentamicin for early onset meningitis. Vancomycin and gentamicin for late and nosocomial meningitis to cover staph. for 21 days.

3. **Pylonephritis**:
   - more in males and preterm
• Usually mild disease, but may presents with fever, lethargy, poor feeding, failure to thrive, jaundice, diarrhea, septicemia

• Mostly associated with obstructive uropathy, which need to be corrected quickly.

• The difficulty in DX is in urine contamination, so do suprapubic aspiration of urine, or catheterization for urine exam and culture.

• The microorganisms usually G-ve like E Coli, enterococci.

• Treatment: antibiotics ampicillin+ 3rd generation cephalosporins for 10-14 days

• Repeat urine C&S after completing RX, U/S abdomen, later IVP ,or MCUG. Prophylactic amoxicillin can be given until we can do IVP ,or MCUG.

4. Osteomyelitis & septic arthritis:

• Rare in neonates, Mostly blood born, or direct extension from septic spot.

• Mostly due to staphylococci, other organisms like GABHS, G –ve as E coli, N. Gonorrhea. It present with rigor, fever irritability, excessive cry, localized erythema, pseudoparalysis with swelling of the limb and adjacent joint effusion. In septis arthritis, the most common joints involved are hip, knee, wrist, while in oseteomyritis , femur, humerous, tibia,maxilla.

• DX: by blood C&S, CBP,CRP, urine ,CSF c&s, needle aspirate of affected joint. X ray needs 10 days to show changes.

• TR: Antistaph like cloxacillin, naficillin,or vancomycin+ gentamicin for 3-4 weeks

• Joint effusion by surgical drainge ,send for Gram stain , c&s
5. **Epidemic diarrhea:**

- Caused by salmonella, shigella, E. histolyica, and rota virus
- The source of organisms from birth canal, later mothers` hands
- Clinically present with: vomiting, diarrhea, poor feeding. signs of dehydration, shock, oliguria develop early.
- Treatment: Correct dehydration by ORS, IVF, plasma and Antibiotics after C&S

6. **Tetanus neonatorum:**

- Caused by poor care of umbilical cord, or unhygienic birth, by clostridium tetani organisms
- Prevented by tetanus toxoid to mothers after first trimester (2 doses)
- Onset 3-14 days of age
- Clinically: present with poor feeding, irritability, then features of tetanus like trismus, locked jaw, risus sardonicus, difficulty in swallowing, arched back. Bronchopneumonia may occur due to aspiration
- Treatment: Human tetanus IG to neutralize toxin, omphalectomy, antibiotics like penicillin + metronidazole and Other supportive measures like anticonvulsant, respiratory support, muscle relaxants.

**Principles for the Prevention of Nosocomial Infection in the Neonatal Intensive Care Unit:**

- Gloves, Gowns, mask, and isolation as indicated
- Appropriate nursing: patient ratio
- Avoid overcrowding and excessive workload
- Readily accessible sinks, antiseptic solutions, soap, and paper towels
• Improve hand washing compliance
• Wash hands before and after each patient encounter
• Appropriate use of soap, alcohol-based preparations, or antiseptic solutions
• Alcohol-based antiseptic solution at each patient bedside
• Provide emollients for nursery staff
• Education and feedback for nursery staff
• Maximal sterile barrier precautions during CVC insertion
• Local antisepsis with chlorhexidine gluconate
• Minimize repeated entry into the line for laboratory tests
• Aseptic technique when entering the line
• Minimize CVC days
• Sterile preparation of all fluids to be administered via a CVC
• Observe recommendations for universal precautions with all patient contact
• Nursery design engineering
• Hand washing
• Minimizing risk of CVC contamination
• Meticulous skin care
• Encourage early and appropriate advancement of enteral feeding
• Continuous monitoring and surveillance of nosocomial infection rates in the NICU