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NICU Early Onset Sepsis (EOS <72 hours of life)

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Risk Factors for EOS:
+ blood or CSF culture within 72 hours of birth
> 35 wks gestation:
- Chorioamniotis/intra-amniotic infection (IAI)
- Prolonged rupture of membranes (ROM) >18 hours
- Maternal GBS colonization
- Lack of administration of appropriate intrapartum antibiotics if indicated

≤ 34 6/7 weeks gestation:

Higher Risk Factors:
- Delivery due to cervical incompetence
  - Preterm labor
  - Premature ROM
  - Chorioamniotis/IAI

Lower Risk Factors:
- Obstetric indications for preterm delivery (spectrum of maternal-hypertensive disorders, worsening maternal health, etc.)
- Birth via c-section
- Absence of labor, absence of attempt to induce labor, or absence of ROM prior to delivery

NICU Patient < 72 hours of age at risk for early onset sepsis

NO → Off pathway

YES

Need for sepsis evaluation recognized by team member

Team huddle:
- Bedside RN
- Team Leader
- LIP

Signs/symptoms of EOS*
- Temperature instability (hyper/ hypothermia)
- Unexplained tachycardia
- Increased number or severity of events (apnea, bradycardia, desaturations)
- Decreased urine output
- Hypotension
- Jaundice
- Poor feeding
- Physical exam changes: delayed capillary refill, cyanosis, decreased tone, lethargy, new/unexplained tachypnea or respiratory distress

Low Suspicion for Invasive Infection

Obtain CBC and blood/urine cultures

RN and Provider reassess every 30 – 60 minutes

Suspect Infection but No Organ Dysfunction

Initial Workup
- Consider congenital heart disease*
- Obtain IV access, consider NS bolus
- Perform lumbar puncture (CSF PCR/cultures)
- CBC, blood cultures
- Consider HSV studies
- Antibiotics: Administer ASAP (goal within 60 minutes)

Severe Sepsis or Septic Shock

Initial Workup
- Consider congenital heart disease*
- Obtain IV/IO access
- Perform lumbar puncture (CSF PCR/cultures)
- CBC, blood cultures
- Obtain HSV studies
- Rapid Fluid Resuscitation (NS) 10-20 mL/kg Bolus over 10-15 minutes
- Antibiotics: Administer ASAP (goal within 60 minutes)

For ongoing management of septic shock consider:
- Fluid Resuscitation
- Pressors
- Steroids

Antibiotic Recommendations

NICU specific antibiogram

***Congenital Heart Disease** can present similar to sepsis
For neonates < 2 weeks of age with perfusion abnormality and hypotension, consider:
- Evaluating for ductal dependent lesion (monitor pre- and post-ductal saturations)
- Cardiology consult
- ECHO
- Initiating prostaglandin infusion

Early Onset Sepsis Evaluation & Antibiotic Recommendations

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Evaluation:

- CBC at 6 – 12 hours of life (HOL); if > 12 HOL, collect specimen at evaluation initiation
- Consider LP and CSF studies
    - Positive blood culture
        - If not pretreated with antibiotics: gram stain and culture are first priority
        - If pretreated with antibiotics: CSF and cell count are first priority
    - Apnea in preterm/term infant
    - Suspected/confirmed seizures
    - Critically ill-appearing infant
- Consider HSV studies and Acyclovir
    - HSV 1&2 NAAT surface cultures, HSV PVR plasma, CSF sample for HSV PCR, ALT
- In the case of multiples, if one infant is diagnosed with EOS, the other infant(s) should be monitored closely and evaluated/treated empirically if any sign of illness occurs due to increased risk factors
- If a patient has a central line in place at the time of a positive blood culture, removal of the line should be considered unless additional intravenous access is not available

Antibiotic Management:

- Ampicillin 100 mg/kg/dose IV Q8 hours
- Gentamicin 4 mg/kg/dose IV Q36 hours < 28 weeks OR Q24 hours ≥ 28 weeks

Negative Cultures WITH concern for clinical sepsis:

- Suspected sepsis based on clinical status and other lab results, but without a positive culture, should be treated with Ampicillin and Gentamicin for 7 days
- Therapeutic drug monitoring of Gentamicin as listed below

Negative cultures WITHOUT suspicion for clinical sepsis:

- If blood culture (+/- CSF culture) is obtained appropriately and prior to the initiation of antibiotics, should continue for a minimum of 48 hours pending results
- At 48 hours, unless there is a site-specific infection and if the sterile body culture(s) remain negative, antibiotics may be discontinued
- The infant and sterile culture results should be monitored for any change in status

Positive cultures:
(Therapeutic Drug Monitoring of Gentamicin)

Indicated for patients continuing on Gentamicin for > 48 hours due to either suspected clinical sepsis or culture-positive sepsis

- Draw trough level if therapy is to continue > 3 days or if the patient is critically ill to ensure non-toxic level
- Check a trough with 3rd or 4th dose, after dose adjustment, or if renal function changes significantly
- Timing of serum samples:
    - Draw trough immediately before dose is given (normal trough < 1.5 mg/L)
    - Draw peak 30 min after infusion is complete. Discuss results with pharmacist
- If both peak and trough are drawn, recommend obtaining both levels around same dose (trough, dose, peak) to achieve most accurate kinetics
- Please check with pharmacist with any questions concerning levels and goals of therapy

Group B Strep

- Ampicillin is drug of choice
- 10 days from first negative blood culture (2 negative blood cultures before discontinuing Ampicillin)
- 14 days minimum for meningitis
    - Consult Infectious Disease
    - Consider repeat LP 24-48 hours into therapy
    - Close follow-up testing (hearing, neurologic, development) for any patient diagnosed with meningitis

Listeria

- Combination therapy of Ampicillin and Gentamicin is recommended
- 14 days for bacteremia
- 21 day minimum for meningitis
    - Consult Infectious Disease
    - Consider diagnostic imaging near end of treatment course to assess for parenchymal involvement

Other Gram-Positive Organisms (i.e., *Enterococcal* and other *Streptococcal* species)

- Initial empiric therapy with Ampicillin and Gentamicin (should be continued with coverage narrowed based on susceptibilities)
- *Varying degrees of resistance warrants Infectious Disease consult

Gram-Negative Organisms

- Bacteremia alone should be treated with Ampicillin and Gentamicin, or a cephalosporin (i.e. cefepime) based on susceptibilities for 10 – 14 days
- Meningitis should be treated with Ampicillin or a cephalosporin (i.e. cefepime) based on susceptibilities for a minimum of 21 days
    - Gentamicin should be considered initially if in combination with a cephalosporin as empiric therapy until susceptibilities are available
    - Consult Infectious Disease to guide meningitis treatment
    - Consider repeat LP 24 – 48 hours into therapy
    - Close follow-up testing (hearing, neurologic, development) is warranted for patient treated for gram-negative meningitis
- ID consult recommended for any infection involving multi-resistant organisms or ESBL-producing infection

Fungal Infections = IMMEDIATE Infectious Disease consult

Metrics

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