1.0 PURPOSE AND INTENT

1.1 To provide a process for diagnosis, treatment and monitoring of health-care associated infection in neonates in the Neonatal Intensive Care Units within the WRHA.

Note: All recommendations are approximate guidelines only and practitioners must take into account individual patient characteristics and situation. Concerns regarding appropriate treatment must be discussed with the attending neonatologist.

2.0 PRACTICE OUTCOME

2.1 Infections are diagnosed and treated appropriately in order to minimize the impact on the neonate

3.0 DEFINITIONS

3.1 Blood-stream infection (BSI): A positive blood culture is considered a BSI if a recognized pathogen is isolated from any blood culture or a commensal organism (e.g. Coagulase negative staphylococci, Bacillus species are isolated from 2 or more blood cultures. A BSI is considered primary if no other site of infection is identified.

3.2 Central line associated blood stream infection (CLABSI): A laboratory-confirmed bloodstream infection where central line or umbilical catheter was in place for greater than 2 calendar days on the date of event, with day of device placement being Day 1, and the line was also in place on the date of event or the day before.

3.3 C-reactive protein (CRP): A nonspecific indicator of systemic inflammation. A normal CRP on 2 occasions is predictive of not having a systemic bacteremia. CRP can be elevated by many factors and an elevated CRP should not be used to continue antibiotics in infants in which infection is not proven.

3.4 Healthcare-associated Infection (HAI): An infection is considered a HAI with the following criteria:
   - MRSA day 3 or greater of hospitalization
   - Respiratory virus longer than 3 days
   - Influenza: Healthcare-associated
   - Must meet one of the following criteria:
     i. onset of symptoms is greater than 96 hours after hospital admission
     ii. re-admitted with a positive test less than 24 hours after discharge from hospital
   - Enteric longer than 3 days

3.5 Sepsis: Life-threatening organ dysfunction caused by a response to infection.
4.0 GUIDELINES

Diagnosis

4.1 When infection is suspected, conduct an evaluation using the standard order sheet or order set (see appendix A). Minimum evaluation consists of:

- Two blood cultures. If any central venous or arterial devices are in place, take one culture from the device (if possible) and one from a peripheral site. Otherwise use two separate peripheral sites. Obtain one ml of blood for each blood culture.
- Lumbar puncture
- Complete blood count and differential
- CRP at time of evaluation and repeated at 12-24 hours
- Tracheal aspirate culture if intubated (bacterial and viral)
- Suprapubic aspiration (if indicated). Catheter cultures are not appropriate unless a suprapubic is contraindicated as the rate of false positives is unacceptably high. Ref
  Must include urinalysis with any catheter urine culture. (Note: procedure for suprapubic aspiration found in Elsevier Clinical Skills)
- Viral cultures (as indicated)
- Chest x-ray (CXR) if clinical change in respiratory status
- Blood for AST, ALT, coagulation profile (if indicated)
- If Candida species suspected, send urine for culture (fungal culture is captured on routine urine culture) – suprapubic sample preferred.

Treatment

4.2 Determine initial antibiotic therapy by clinical situation. Initial choice may also be guided by prior cultures (e.g., tracheal aspirate cultures). Unless specifically written all empiric antibiotic orders are stopped at 48 hours. Once antibiotic sensitivities are known change the antibiotic coverage to minimize the emergence of antibiotic resistance. Recommended initial therapies:

4.2.1 Central line/UAC/UVC present or removed less than 24 hours prior to evaluation: Vancomycin and Gentamicin
4.2.2 No central line: Ampicillin and gentamicin
4.2.3 Suspect/definite Necrotizing Enterocolitis: Ampicillin and gentamicin. For severe disease or extensive pneumatosis addition of metronidazole may be considered
4.2.4 Abnormal CSF: Addition of cefotaxime (ID consult required) and or acyclovir (ID consult required). Reassess Gentamicin at this time.

4.3 Guide management of positive blood cultures by the results of the complete septic work-up performed prior to starting antibiotic coverage, clinical condition of the infant and Pediatric Infectious Diseases Service Consultation (if obtained).

4.4 Initial blood cultures

4.4.1 When the initial blood cultures are negative at 48 hours, stop antibiotics and observe infant. If infant unstable consider other causes for clinical status, repeat septic work-up and consider other pathogens.

4.4.2 When the initial blood cultures are positive, repeat blood culture 48-72 hours after the positive culture(s). Only a single culture is required. Remove central line if this is a primary BSI.
4.5 Repeat blood cultures (after antibiotic therapy has started as above)
4.5.1 If repeat cultures are negative, continue appropriate antibiotic(s) for 10-14 days from negative culture date. If the CSF culture is positive – treat as meningitis (i.e. 14-21 days of antibiotics (organism dependent) from initiation of appropriate treatment)
4.5.2 When repeat cultures are positive, remove central line if not already done. This is the single most important treatment of CLABSI. If possible, wait 2-3 days before placing new central line. Reinsertion of a CVL in a new site even if bacteremic is not associated with colonization of the line and prolongation of infections. Repeat blood culture again in 48 hours. Search for sources of persistent infection consider:
   • echocardiography
   • ultrasound of major vessels
   • abdominal ultrasound
   • Consult to Pediatric Infectious Diseases Service

4.6 Continue antibiotics for 10-14 days after negative culture obtained.

4.7 Management of positive urine cultures:
4.7.1 Associated with a positive blood culture for the same organism, treat as indicated for BSI.
4.7.2 Isolated positive urine culture from supra pubic aspiration: Treat 7-10 days with appropriate antibiotic(s). May be switched to oral antibiotics after 3-5 days.
4.7.3 Isolated positive urine culture from a catheter specimen: Stop antibiotics, repeat urine culture by supra pubic aspiration. CRP may be normal or elevated in simple urinary tract infections and is not helpful in distinguishing contamination from infection.
4.7.4 Investigate any infant with a true positive urine culture for urinary tract abnormality at the timing recommended by the Canadian Pediatric Society guideline for management of urinary tract infections in infants and children.

4.8 Management of positive tracheal aspirates:
4.8.1 If associated with a positive blood culture for the same organism treat as indicated for BSI.
4.8.2 Isolated positive tracheal aspirate without change in initial CXR or respiratory status, stop antibiotics.
4.8.3 Isolated positive tracheal aspirate with change in initial CXR or respiratory status, Repeat CXR in 48 hours if changes have cleared then stop antibiotics. If persistent rule out other causes for radiological changes (ie PDA, atelectasis). If other causes of persistent new infiltrate have been ruled out consider treatment with appropriate antibiotics for 7-10 days. CRP may be normal or elevated in ventilator associated pneumonia and is not helpful in distinguishing colonization from infection.

5.0 REFERENCES


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