1.19 NEONATAL FEVER

Introduction

Fever in a neonate (≤ 28 days of age) is defined as a rectal temperature above 38°C. Fever in this population is notable as it leads to concern for serious bacterial infection. However, infection may also present with hypothermia, usually defined as a rectal temperature below 36.5°C. Infection in neonates may occur as a result of both a naïve immune system and exposure to pathogenic bacteria during delivery, although pathogens acquired in the postnatal period must also be considered. Serious bacterial infections in neonates are most predominant in the renal, pulmonary, central nervous, and blood systems. The prevalence of each varies by age and gender. Neonates may also develop serious illness when they are exposed to viral infections, especially herpes simplex virus (HSV) which typically manifests between 7-21 days of life. In febrile neonates without a clear source of illness, distinguishing between those with self-limiting versus life-threatening infection is challenging. Well-appearing infants over 28 days of age may be managed without hospitalization in selected circumstances. However, more conservative inpatient evaluation, monitoring, and management of neonates younger than 28 days of age with abnormal temperature is currently the standard of care. Pediatric hospitalists should render evidence-based care for these neonates.

Knowledge

Pediatric hospitalists should be able to:

- Define hypothermia and hyperthermia in neonates and describe how to correctly obtain a temperature using a variety of modalities.
- Discuss the basic mechanisms of temperature regulation in neonates.
- Compare and contrast basic immune maturity differences in neonates versus older infants.
- Delineate the elements of the history (such as birth history, perinatal exposures, maternal infections, and others) and physical examination (such as skin lesions, neurobehavioral exam, and others) that aid in determining a diagnosis.
- Describe the differential diagnosis of neonatal sepsis and discuss how other potentially serious illnesses, such as inborn errors of metabolism, may mimic its presentation.
- List the organisms responsible for serious bacterial infection in neonates, including the types of infections they cause and the relative prevalence of each.
- Review the approach toward evaluation of the preterm infant, attending to extent of prematurity and neonatal intensive care course.
- Compare and contrast the signs and symptoms suggestive of bacterial versus viral illnesses.
- Distinguish between the standard laboratory evaluation for neonates with fever versus older infants with fever, using current literature for reference.
- Describe the role of viral testing, including interpretation of frequencies of disease, co-infections with bacterial disease, local turnaround time, and predictive value of testing.
- Describe indications for the use of antibiotics versus inpatient monitoring without the use of antibiotics, considering current validated scoring tools and evidence about reported rates of neonatal serious bacterial infection.
- Summarize the approach to empiric antimicrobial therapy and give examples of situations warranting expanded antimicrobial coverage.

Skills

Pediatric hospitalists should be able to:

- Obtain a complete history, including pregnancy and birth history, attending to prenatal laboratory screening and the use of antibiotic prophylaxis prior to delivery.
- Perform a comprehensive physical examination, attending to signs and symptoms that may indicate a source of infection or signify severe illness.
- Perform, supervise, or direct basic procedures to obtain specimens, including venipuncture, bladder catheterization, lumbar puncture, and placement of intravenous access, according to local context.
- Interpret the results of laboratory evaluations efficiently and adjust the differential diagnosis and plan of care accordingly.
- Select appropriate empiric antimicrobial coverage in an evidence-based manner.
- Perform careful reassessments daily and as needed, note changes in clinical status, and respond with appropriate actions.
- Communicate with the family/caregivers and healthcare providers regarding findings and care plans.
- Create a discharge plan which can be expediently activated when appropriate.

Attitudes

Pediatric hospitalists should be able to:

- Elicit and allay the concerns of the family/caregivers, educating them regarding the importance of a thorough evaluation for the source of infection and the need for empiric antimicrobial therapy.
- Realize the importance of educating the family/caregivers about the final diagnosis, clearly explaining the value of negative test results if applicable.
- Recognize the significance of performing invasive procedures on a neonate from the family/caregivers' perspective, maintaining empathy when discussing the risks and benefits of necessary procedures.
- Ensure an effective and safe discharge by communicating and coordinating effectively with the primary care provider.

Systems Organization and Improvement

In order to improve efficiency and quality within their organizations, pediatric hospitalists should:

- Lead, coordinate, or participate in the development and implementation of cost-effective, safe, evidence-based care pathways to standardize the evaluation and management of hospitalized neonates with fever.

- Lead, coordinate, or participate in efforts to develop institutional guidelines for the judicious use of antimicrobials in neonates with fever.

References

1. Roberts KB. Management and outcomes of care of fever in early infancy. *J Pediatr*. 2004;145(3):417. https://doi.org/10.1016/j.jpeds.2004.06.036.
2. Vachani JG, McNeal-Trice K, and Wallace SS. Current Evidence on the Evaluation and Management of Fever Without a Source in Infants Aged 0-90 Days: A Review. *Rev Recent Clin Trials*. 2017;12(4):240-246. https://doi.org/10.2174/1574887112666170816143308.
3. Puopolo KM, Benitz WE, and Zaoutis TE. Committee on Fetus and Newborn, Committee on Infectious Diseases. Management of Neonates Born at ≥35 0/7 Weeks' Gestation with Suspected or Proven Early-Onset Bacterial Sepsis. Pediatrics Dec 2018, 142 (6) e20182894. https://pediatrics.aappublications.org/content/142/6/e20182894.full Accessed August 28, 2019.