Febrile Infants 0-21 Days

ED Evaluation & Management

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Center for Clinical Excellence

Inclusion Criteria:
Well appearing
Infant 0-21 days **&** measured temperature
≥ 38° C / 100.4° F

[Temperature Measurement]

Exclusion Criteria:

- Temp < 35.5° C / 96° F)
- Preterm < 37 weeks gestation
- Infants < 2 weeks of age with perinatal complications (maternal fever, infection, or antimicrobial use)
- Focal bacterial infection (cellulitis, omphalitis, osteomyelitis, septic arthritis, pneumonia)
- Concerns for ophthalmia neonatorum
- Immune compromise
- Congenital/chromosomal abnormalities
- Technology dependent

[Management Details]

Initial Evaluation:
(See Febrile Infant 0-21 days Order Set)

Obtain:

- Blood Culture
- CBC with Diff
- Procalcitonin
- CRP
- ALT
- Chem 10
- Blood Entero/Parecho PCR
- Blood HSV PCR
- Urine Culture
- Urinalysis (UA) with Microscopy
- CSF Cell Count, Diff and Gram Stain, Culture and MEID Panel, Protein, Glucose
- Chest X-ray as indicated by symptoms

Risk Factors for HSV?

Yes → [Acyclovir per protocol]

No

[Antimicrobials based on age/CSF results]

Admit to Infectious Disease

Is patient hypothermic and/ or ill appearing and requiring resuscitation?
[See Escalation of care]

[Risk Factors for HSV]

- Age ≤ 14 days old
- Known exposure
- Temp < 35.5° C / 96° F
- Toxic appearing/lethargy/ irritability
- Hemodynamically unstable
- Severe resp distress/ apnea/pneumonia on CXR
- Abnormal neuro exam
- Seizure
- Vesicular or petechial rash
- Conjunctivitis
- CSF WBC > 15 and negative Gram stain
- Platelet < 150,000
- Any elevation of ALT

Temperature Measurement

Inclusion Criteria:
Well appearing
Infant 0-21 days **&** measured temperature
≥ 38° C / 100.4° F

- Rectal thermometry is the most accurate method for measuring temperature in this patient population.
- When a non-rectal temperature is obtained, the reported temperature should not be altered

Algorithm

Risk Factors for HSV

- Age < 14 days old
- Known exposure
- Temp < 35.5° C / 96° F
- Toxic appearing/lethargy/irritability
- Hemodynamically unstable
- Severe resp distress/apnea/pneumonia on CXR
- Abnormal neuro exam
- Seizure
- Vesicular or petechial rash
- CSF WBC >15 and negative Gram stain
- Platelet < 150,000
- Any elevation of ALT

Escalation of Care

- Recommended HSV studies in the Emergency Department are HSV PCR from blood and CSF.
- Surface studies, when time sensitive, may be performed in the ED by infectious disease resident team.

HSV and enterovirus/PEV surface studies

One swab total: first swab eye, then throat, then rectum in viral transport media
Separate HSV PCR swab of vesicle (unroofed) if present

Algorithm

Instructions for Obtaining Surface Swabs for Entero/parechovirus and HSV

- You will only need to collect 1 swab. Both tests can be run off of the same swab.
- The swab to collect the sample is the M6 media (the same swab for the FARVPP test). Please ask the patient's RN to bring a swab to bedside for you since they are stored in the refrigerator.
- You will need to write your initials and employee ID number on the collection tube. This is how the lab documents who collected the swab.
- Undress the patient to expose their face, abdomen, and diaper area.
- Wash your hands and apply gloves.
- Remove the sterile M6 swab from its packaging. Do not place the swab down on any surfaces in order to prevent contamination.
- Swab the conjunctiva first. Gently pull the lower eyelid down and rub the swab in a back-and-forth motion on the conjunctiva for 5 seconds. Please take care not to rub the cornea.Next, gently grab the patient's bottom lip to pull down and out to expose the buccal mucosa. Gently rub the swab in a back-and-forth motion on the buccal mucosa for 5 seconds. It is okay if food material gets on the swab.

- Finally, gently use one hand to pick up the patient's legs to help expose their anus. Gently rub both sides of perianal area for 5 seconds. It is okay if stool gets on the swab.
- Place the swab in the fluid of the collection tube. There is a perforated line on the end of the swab that you can bend and break on the collection tube. Discard this piece of plastic in the trash.
- Screw the lid of the collection tube on the tube. Place the closed tube in the biohazard bag and leave on the computer stand.
- Take off and discard your gloves. Wash your hands. Please notify the patient's RN that you have collected the swab, and they will bring it to the lab. *Of note, the specimen needs to be received by lab before 9 am to result on the same day.*

Algorithm

Escalation of Care

If patient is hypothermic and/or ill appearing and requiring resuscitation:
Obtain standard evaluation labs inclusive of CSF and HSV/EV/PEV studies
Consider sepsis alert/sepsis watcher pathway and order sets

- **Initiate resuscitation**
- **Encourage obtaining blood, urine and CSF cultures prior to antibiotic administration**
- **Obtain HSV and EV/PEV PCR in blood and CSF**
- **Antibiotics:**
  - Cefotaxime 50mg/kg/dose &
  - Acyclovir 20 mg/kg/dose&
  - Ampicillin:
    - 0-7 days: 100mg/kg/dose
    - 8-21 days: 75mg/kg/dose &
  - Gentamicin 5mg/kg/dose &
  - Vancomycin 20mg/kg/dose (hemodynamic instability)

If IV unavailable, consider IM antibiotics
Exception: Do not give Vancomycin or Acyclovir IM

Algorithm

NCH Intravenous Medication Recommendations

Normal CSF
0-14 Days

- Acyclovir 20 mg/kg/dose &
- Gentamicin 5 mg/kg/dose &
- Ampicillin:
  - 0-7 days: 100 mg/kg/dose
  - 8-14 days: 75 mg/kg/dose

15-21 Days

- Gentamicin 5 mg/kg/dose &
- Ampicillin 75 mg/kg/dose &
- Acyclovir 20 mg/kg/dose *(if HSV risk factors)*

Abnormal CSF or LP not successful/ uninterpetable

- Acyclovir 20 mg/kg/dose
- Cefotaxime 50 mg/kg/dose &
- Gentamicin 5 mg/kg/dose &
- Ampicillin:
  - 0-7 days: 100 mg/kg/dose
  - 8-14 days: 75 mg/kg/dose

Add Vancomycin 20 mg/kg/dose if concerned for Streptococcal Pneumoniae or Staphylococcus aureus on gram stain or MEID.

If IV unavailable, consider intramuscular antibiotics
(do not give Vancomycin or Acyclovir IM)

For further management questions or concerns, please consult Infectious Disease

Algorithm

Management Comments

This clinical pathway is based on the American Academy of Pediatrics (AAP)
Clinical Practice Guideline: Evaluation and Management of Well-Appearing Febrile Infants 8-60 Days Old (2021).

The following NCH team consensus modifications were made to the AAP CPG recommendations to contextualize care for NCH:

- **Inclusion of infants 1-7 days** old: Care of these infants outside of the NCH Newborn Nursery/NICU does not differ from recommendations for infants 8-14 days old.
- Infants with **clinical bronchiolitis are not excluded** due to risk of invasive bacterial infections in this age group
- Infants > 14 days of age **on oral antibiotics** should follow the guidelines in this pathway: NCH team consensus is that oral antibiotics do not decrease the risk of invasive disease in this age group enough to forgo the recommended evaluation.
- NCH team consensus is to **include well appearing infants with suspicion for HSV** on this specific pathway in order to decrease risk of missed HSV in this population.
- **Urinalysis (UA) and urine culture ordered simultaneously**: This is consistent with NCH current practice and avoids the potential need for an additional urine specimen and possible delay in starting antibiotics.
- The risks of invasive bacterial infection (IBI) in infants < 28 days with a **positive viral test** is high enough to warrant completing the recommendations in this clinical pathway. In the literature, the risk of invasive bacterial infection in infants < 28 days with a positive viral test ranges from 0.8%-2.1%.
- **Obtain Inflammatory Markers (IM)**: While the results of IM will not determine initial treatment, there is potential to benefit ongoing clinical decisions.

Age < 14 days is an indication for **HSV testing** and empiric treatment with Acyclovir: NCH team consensus recommendation even in the absence of additional risk factors.

Algorithm

Quality Measures

Goals:
- To promote evidence-based use of broad-spectrum antimicrobials for well appearing febrile infants
- To implement use of inflammatory markers to identify infants 0-21 days old who are at risk for serious bacterial infection.

Process measure:
ED/UC Order set utilization

Outcome measures:
- UC length of stay
- ED length of stay

Balancing measure:
Percent of patients 15-21 days with a positive HSV PCR (blood, CSF or surface swabs) who did not receive empiric acyclovir

Algorithm

References

1.) Pantell RH, Roberts KB, Adams WG, et al. Evaluation and management of well-appearing febrile infants 8-60 days old. *Pediatrics*. 2021;148(2) .doi:10.1542/peds.2021-052228.

2.) Niven DJ, Gaudet JE, Laupland KB, et al. Accuracy of peripheral thermometers for estimating temperature: a systematic review and meta-analysis. *Ann Intern Med*. 2015;163(10):768. doi:10.7326/M15-1054.

3.) Thomson J, Sucharew H, Cruz AT, et al. Cerebrospinal fluid reference values for young infants undergoing lumbar puncture. *Pediatrics*. 2018;141(3) .doi:10.1542/peds.2017-3405.

Algorithm

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Clinical Pathway Development

This clinical pathway was developed using the process described in the NCH Clinical Pathway Development Manual Version 6, 2022. Clinical Pathways at Nationwide Children's Hospital (NCH) are standards which provide general guidance to clinicians. Patient choice, clinician judgment, and other relevant factors in diagnosing and treating patients remain central to the selection of diagnostic tests and therapy. The ordering provider assumes all risks associates with care decisions. NCH assumes no responsibility for any adverse consequences, errors, or omissions that may arise from the use or reliance on these guidelines. NCH's clinical pathways are reviewed periodically for consistency with new evidence; however, new developments may not be represented, and NCH makes no guarantees, representations, or warranties with respect to the information provided in this clinical pathway.

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Algorithm