Nationwide Children's
When your child needs a hospital, everything matters.

Evaluation & Management of Well Appearing Febrile Infants 29-60 Days Old

Emergency Department

Center for Clinical Excellence

Inclusion Criteria:
Well appearing
infant 29-60 days & measured temperature
≥ 38° C / 100.4° F
Temperature Measurement

Exclusion Criteria:
- Hypothermia (< 35.5° C / 96° F)
- Preterm < 37 weeks gestation
- Clinical presentation consistent with bronchiolitis
- Focal bacterial infection (cellulitis, omphalitis, septic arthritis, osteomyelitis, pneumonia)
- Concern for Herpes Simplex Virus infection (HSV)
- Immune compromise
- Congenital/chromosomal abnormalities
- Technology dependent
- Received immunizations in last 24 hours

Positive Viral Test

- Blood Culture
- CBC with Diff
- Procalcitonin
- CRP
- Urine Culture
- Urinalysis (UA) with microscopy
- Consider serum Entero/Parecho PCR
- Consider FARVPP
- Chest Xray as indicated by symptoms

Abnormal Inflammatory Markers* (IMs)?

Yes

No

May obtain CSF based on:
risks vs. benefits
and
viral test result
Parents should be sufficiently informed to participate in decision.

LP Performed

CSF abnormal** or unobtainable or uninterpretable?

Yes

No

LP Not Performed

UA Abnormal**?

Yes

IV antibiotics

No

Ceftriaxone IV/IM

UA Abnormal**?

No

Yes

Discharge
- No antibiotics
- Follow-up within 24 hours

Discharge
- Oral antibiotics
- Follow-up within 24 hours

Admit for observation? *Shared decision making with family*

Yes

Admit to Infectious Disease

No

Discharge
- If not completed already, consider FARVPP
- Follow-up within 24 hours

Discharge Criteria
- Adequate PO intake
- Parents & provider comfortable
- Reliable phone and transportation
- Follow-up in 24 hours

Is patient hypothermic and/ or ill appearing and requiring resuscitation?
See escalation of care

***Abnormal Inflammatory Markers (IMs):**
- Procalcitonin > 0.5 ng/mL
- ANC > 4000 or ANC < 1000
- CRP > 2.0 mg/dL

****Abnormal Labs:**
- UA: > 5 WBC or any LE or + Nitrites
- CSF: ≥ 10 WBC

Management Comments

Viral Test Result

A **positive viral test** does not **preclude** entry into this pathway, BUT for this age group it may be considered in individualizing evaluation and management decisions.

Bacteremia rate has been shown to be significantly lower in viral-positive infants compared to viral-negative infants (0.6% versus 1.8%). Specifically, rhinovirus positivity has been associated with a lower prevalence of bacteremia (1.4%) compered to virus negative infants (3.7%) in this age group.

Infants 29-60 days old who are overall well appearing with **clinical bronchiolitis** and a **positive RSV** test are at low risk for bacteremia and meningitis and therefore are excluded from this pathway. *Risk of UTI is still significant for RSV positive infants, however, and should be considered during evaluation.*

Algorithm

LP in 29-60 day old
Risk vs Benefit Assessment

Clinicians may obtain CSF for analysis if any IM obtained is abnormal. Evidence Quality: C; Weak Recommendation

Benefits	**The prevalence of meningitis in this age group is 0.12–0.32.**[17,22,24,61,94]
	Early detection of meningitis.
	Early treatment may lead to decreased neurologic morbidity. Identification of pathogen from CSF to target type and duration of antimicrobial treatment.
	Avoids unnecessarily prolonged antimicrobial therapy if CSF was obtained after antimicrobial agents started and diagnosis of meningitis is uncertain.
Risks, harm, cost	Discomfort for infant.
	Potential for transient respiratory compromise during positioning for LP.
	Traumatic LPs have been documented to prolong length of stay for hospitalized infants.
	Unnecessary prolongation of hospitalization from false-positive bacterial culture result.
	Substantial cost if hospitalizing because of ambiguous CSF or prolonged hospitalization for bacterial contaminant.
	Parental anxiety.
Benefit–harm assessment	Preponderance of benefit if CSF obtained.
Shared decision-making	Because parents must consent for this procedure, shared decision-making is required and their risk tolerances a consideration. KAS 4 extensively discusses rates and consequences of unsuccessful LPs, uninterpretable CSF analysis, and false-positive bacterial culture rates. If, for whatever reason, a parent is resistant or unwilling to consent to an LP, risk of meningitis, the evidence quality, benefit/harm assessment, and value judgments should be communicated to the parent to foster informed decision-making. The potential need for a future LP, depending on further clinical information and progress, is an important part of the discussion. These discussions should be documented.
Key references	17, 22, 24, 106, 132, 148

Pantell R H, Roberts K B, Adams W G, et al. Evaluation and management of well-appearing febrile infants 8-60 days old. Pediatrics. 2021;148(2):e2021052228

Algorithm

Temperature Measurement

Inclusion Criteria:
Well appearing
Infant 29-60 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

Escalation of Care

If patient is hypothermic and/or ill appearing and requiring resuscitation:
Obtain standard initial 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**

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

- **Antibiotics:**
  Ceftriaxone 100 mg/kg/dose (*Cefotaxime 50 mg/kg/dose if< 41 weeks CGA*) &
  Ampicillin: 75 mg/kg/dose &
  Gentamicin 5 mg/kg/dose &
  Acyclovir 20 mg/kg/dose &
  Vancomycin 20 mg/kg/dose (hemodynamic instability) *If corrected GA < 44 weeks, use 15 mg/kg/dose*

Algorithm

Risk Factors for HSV

- Known exposure
- Temp < 35.5° C / 96°F
- Toxic appearing/lethargy/irritability
- Hemodynamically unstable
- Abnormal neuro exam
- Seizure
- Vesicular or petechial rash

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

NCH Medication Recommendations

See Febrile Infant 29-60 Days Order Set

Abnormal CSF or LP not successful/uninterpretable

- Ceftriaxone 100mg/kg/dose IV &
- Ampicillin 75mg/kg/dose IV

LP not indicated or normal CSF but + concern for UTI

- Ampicillin 50 mg/kg/dose IV &
- Gentamicin 5 mg/kg/dose IV

Oral treatment of UTI

Cephalexin 75 mg/kg/day divided Q 8 hours for 7 days

Ceftriaxone prior to discharge home

75 mg/kg per dose IM/IV

If gram negative rods seen on CSF or any other specific organism concerns, discuss with Infectious Diseases.

Add Vancomycin if CSF is cloudy, purulent or there is concern for streptococcus pneumoniae or staphylococcus aureus

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

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:

- Infants with the following symptoms/signs should still be **included**: congestion, rhinorrhea, cough, diarrhea, otitis media.
- Infants 29-60 days old who are overall well appearing with clinical bronchiolitis are at low risk for bacteremia and meningitis and therefore are excluded from this pathway. *Risk of UTI is still significant, however, and should be considered during evaluation.*
- A **positive viral test** does not preclude entry into this pathway, but for this age group may be considered in individualizing evaluation and management decisions. Bacteremia rate has been shown to be significantly lower in viral-positive infants compared to viral-negative infants (0.6% versus 1.8%). Specifically, rhinovirus positivity has been associated with a lower prevalence of bacteremia (1.4%) compered to virus negative infants (3.7%) in this age group.
- If **CSF is felt to be indicated by the care team but is unobtainable or uninterpretable**, there are insufficient data for the AAP CPG to make specific recommendations. NCH pathway team recommends intravenous antibiotics and admission in these circumstances.

Algorithm

Quality Measures

Goals:
- To implement use of inflammatory markers to identify infants 22-60 days old who are at risk for serious bacterial infection.
- To promote evidence-based use of broad-spectrum antimicrobials for well-appearing febrile infants

Process measures:
ED/UC Order set utilization

Outcome measures:
- UC length of stay
- ED length of stay
- Rate of LP in patients with normal inflammatory markers and normal UA
- Rate of empiric antimicrobial use in patients with normal UA, inflammatory markers and CSF

Balancing measure:
- Rate of UTI, bacteremia, or bacterial meningitis in patients with a known viral source and abnormal inflammatory markers
- 7 day return visit to ED/UC
- UC to ED transfer rate

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.
4) Mahajan P, VanBuren JM, Tzimenatos L, et al. Serious bacterial infections in young febrile infants with positive urinalysis results. *Pediatrics*. 2022;150(4) .doi:10.1542/peds.2021-055633
5) Levine DA, Platt SL, Dayan PS, et al. Risk of serious bacterial infection in young febrile infants with respiratory syncytial virus infections. *Pediatrics*. 2004;113(6):1728-34. doi:10.1542/peds.113.6.1728. PMID: 15173498.
6) Hendaus MA, Alhammadi AH, Khalifa MS, Muneer E, Chandra P. Risk of urinary tract infection in infants and children with acute bronchiolitis. *Paediatr Child Health*. 2015;20(5) .doi:10.1093/pch/20.5.e25. PMID: 26175566; PMCID: PMC4472059.

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