

Clinical Guideline: Fever in Infants 0-90 days old

The following is intended as a clinical guideline and may need to be adapted to meet the special needs of a specific patient, as determined by the medical practitioner.

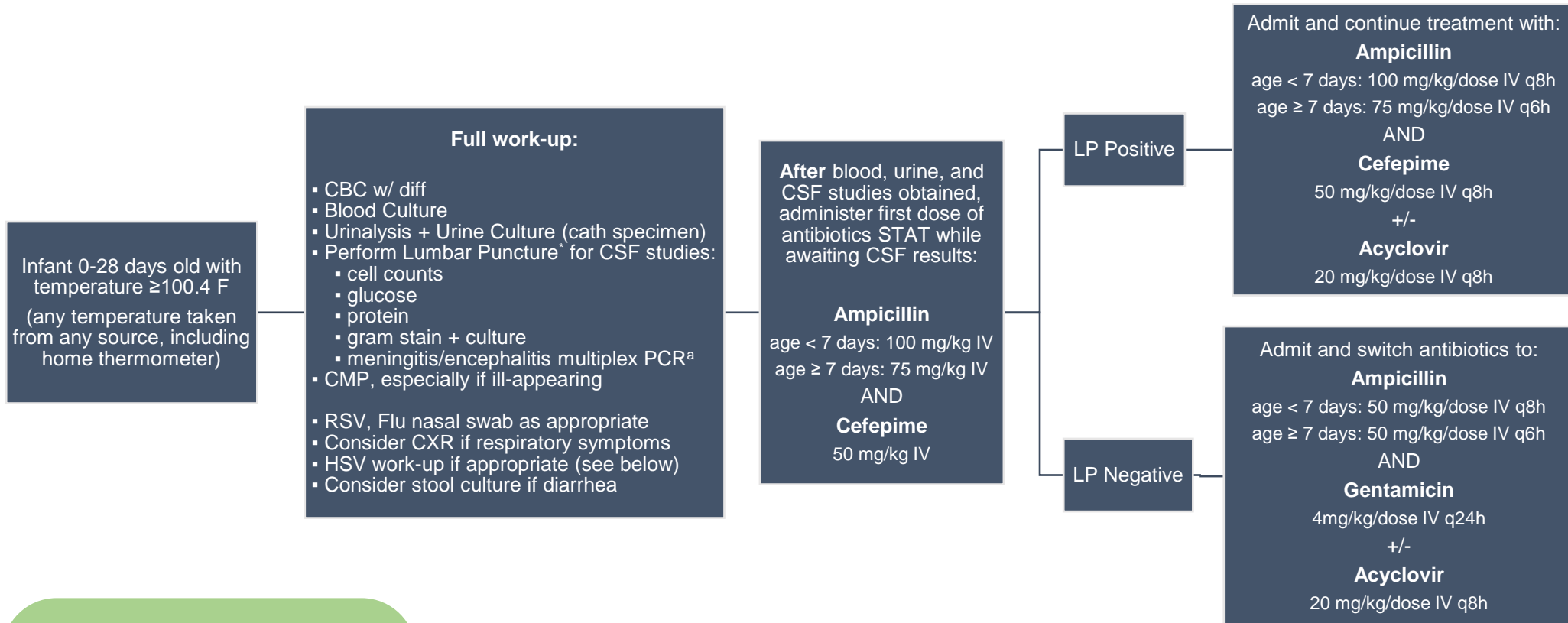
Infants between 0-3 months of age are particularly vulnerable to serious bacterial infections (i.e. meningitis, sepsis, and UTI) and may present with vague or non-specific symptoms, making it difficult to differentiate between viral and bacterial etiologies. Thus, appropriate evaluation and treatment for fever in this age group has been the topic of much investigation and debate in the pediatric community. The following guideline is a recommended approach to the evaluation and initial treatment for infants 0-90 days old presenting with fever at a facility in the Alaska Native Tribal Health Consortium. Additional considerations include:

- Leading studies and guidelines vary with respect to the upper age limit for standardized work-up, with some limited to 0-60 days of age, and others extending up to 90 days. We have chosen to include all febrile infants up to 90 days of age at this time due to high rates of serious bacterial infections in the Alaska Native population.
- Infants presenting with a focal source of infection (i.e. acute otitis media, pneumonia, omphalitis, cellulitis, osteomyelitis) may require targeted antibiotic therapy instead of, or in addition to, the standard antibiotics outlined in these guidelines.
- We have chosen not to include inflammatory markers (i.e. CRP and procalcitonin) as part of the guideline at this time. However, there is emerging evidence regarding procalcitonin as a useful marker in distinguishing between viral and bacterial infections in this age group, so future revisions may include procalcitonin if its availability and clinical use becomes more widespread.
- We do not recommend routine use of respiratory viral PCR panels, as bacterial infections may be overlooked if a fever is entirely ascribed to the presence of a virus, which may or may not be clinically significant.
- ANMC pediatric hospitalists are available 24/7 to answer questions regarding management of febrile infants.

References

- Gomez, et al. Diagnostic Value of Procalcitonin in Well-Appearing Young Febrile Infants. *Pediatrics*. 2012; 130 (5): 815-22.
- Hui C, et al. Diagnosis and Management of Febrile Infants (0–3 months). Evidence Report/Technology Assessment No. 205 (Prepared by the University of Ottawa Evidence-based Practice Center under Contract No. HHS 290-2007-10059-I.) AHRQ Publication No. 12-E004-EF. Rockville, MD: Agency for Healthcare Research and Quality. March 2012. <http://www.ahrq.gov/clinic/epcix.htm>.
- Milcent, et al. Use of Procalcitonin Assays to Predict Serious Bacterial Infection in Young Febrile Infants. *JAMA Pediatr*. 2016; 170 (1): 62-9.
- Seattle Children's Hospital, et al. Neonatal Fever Pathway. 2017 February. Available from: <http://www.seattlechildrens.org/pdf/neonatal-fever-pathway.pdf>
- Smitherman, H & Macias, C. Febrile infant (younger than 90 days of age): Management. UpToDate. Waltham, MA: UpToDate Inc.
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- YKHC Clinical Guidelines. Fever $\geq 100.4\text{F}$ (38C) in Infants 0-90 days. 2017 March. Available from: [https://yk-health.org/wiki/Fever_%E2%89%A5100.4F_\(38C\)_in_Infants_0-90_days](https://yk-health.org/wiki/Fever_%E2%89%A5100.4F_(38C)_in_Infants_0-90_days)

Fever in Neonates 0-28 days old



*LP Considerations

Normal CSF	0-28 days
WBC	<20
Glucose	>40
Protein	<120

- “LP Positive” – concerning for meningitis; “LP Negative” – reassuring against meningitis
- Absence of neutrophils (polys) makes bacterial meningitis unlikely. CSF neutrophils (polys) >75% increases likelihood of bacterial meningitis.
- **If unable to obtain LP:** re-attempt in 12-24h, treat as if LP Positive in the meantime
- **If LP difficult to interpret/bloody:** Do not use correction formulas for WBC on traumatic LPs. Perform meningitis/encephalitis multiplex PCR on sample and treat as if LP Positive in the meantime

Consider HSV work up and empiric acyclovir in infants with:

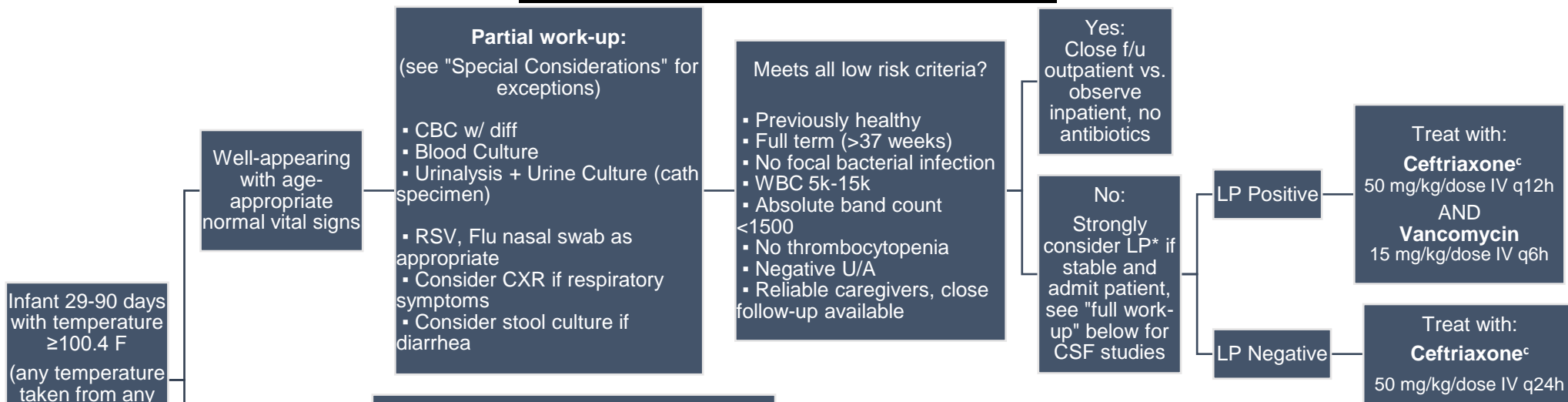
- Severe illness
- Hypothermia
- Lethargy
- Seizures
- Hepatosplenomegaly
- Known post-natal HSV contact
- Vesicular rash
- Conjunctivitis
- Interstitial pneumonitis
- Hepatitis
- Thrombocytopenia
- CSF WBC >20 with negative gram stain
- Concern for maternal primary HSV infection during pregnancy

HSV Work-Up

- Blood HSV PCR
- CSF HSV PCR (included in Meningitis/Encephalitis Multiplex PCR)
- Surface swabs from nasopharynx, bilateral conjunctivae, and anus sent for HSV PCR
- HSV PCR from fluid of vesicles (if present)
- CMP (for BUN, Cr, AST, ALT)

^a meningitis/encephalitis multiplex panel requires 1mL of CSF; sample can be goldstreaked to ANMC lab or sent with patient if transferring to ANMC – should be refrigerated but NOT frozen

Fever in Infants 29-90 days old



Full work-up:

- CBC w/ diff
- Blood Culture
- Urinalysis + Urine Culture (cath specimen)
- Perform Lumbar Puncture* for CSF studies:
 - cell counts
 - glucose
 - protein
 - gram stain + culture
 - meningitis/encephalitis multiplex PCR^a
- RSV, Flu nasal swab as appropriate
- Consider CXR if respiratory symptoms
- Consider stool culture if diarrhea
- Consider HSV work-up if ≤6 weeks^d

^a meningitis/encephalitis multiplex panel requires 1mL of CSF; sample can be goldstreaked to ANMC lab or sent with patient if transferring to ANMC – should be refrigerated but NOT frozen

Special Considerations

1. If received vaccines in past 24hr AND one-time fever <101F AND well-appearing: can consider just U/A + urine culture
 - a. U/A positive – draw blood culture and CBC, strongly consider LP, admit on antibiotics
 - b. U/A negative – close outpatient follow-up vs. inpatient observation without antibiotics; return to beginning of guideline if fever recurs
2. If well-appearing AND signs/symptoms consistent with bronchiolitis: can consider just U/A + urine culture; low risk of bacteremia/meningitis
 - a. U/A positive – draw blood culture and CBC, strongly consider LP, admit on antibiotics
 - b. U/A negative – close outpatient follow-up vs. inpatient observation without antibiotics

***LP Considerations**

Normal CSF	29-90 days
WBC	<10
Glucose	>40
Protein	<120

- “LP Positive” – concerning for meningitis; “LP Negative” – reassuring against meningitis
- Absence of neutrophils (polys) makes bacterial meningitis unlikely. CSF neutrophils (polys) >75% increases likelihood of bacterial meningitis.
- **If unable to obtain LP:** re-attempt in 12-24h, treat as if LP Positive in the meantime
- **If LP difficult to interpret/bloody:** Do not use correction formulas for WBC on traumatic LPs. Perform meningitis/ encephalitis multiplex PCR on sample and treat as if LP Positive in the meantime

^cFor infants with or at risk for hyperbilirubinemia (prematurity, liver issues, recent need for phototherapy, etc), avoid ceftriaxone and use alternative agent such as:

cefepime 50mg/kg/dose q8h

^dNeonatal HSV has rarely been reported for infants between 4-6 weeks of age; consider work-up and acyclovir if high clinical suspicion (see risk factors/work-up on 0-28 day chart)