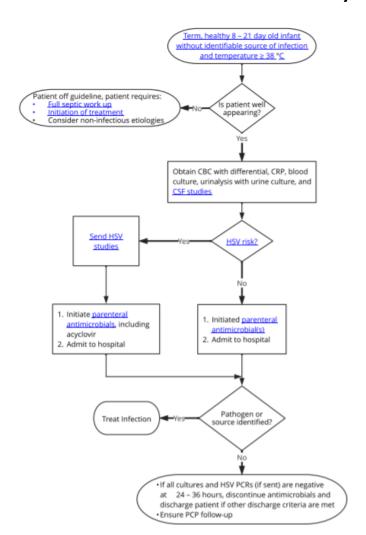


# Children's Mercy Kansas City (CMKC) Evidence Based Practice Clinical Practice Guide Committee

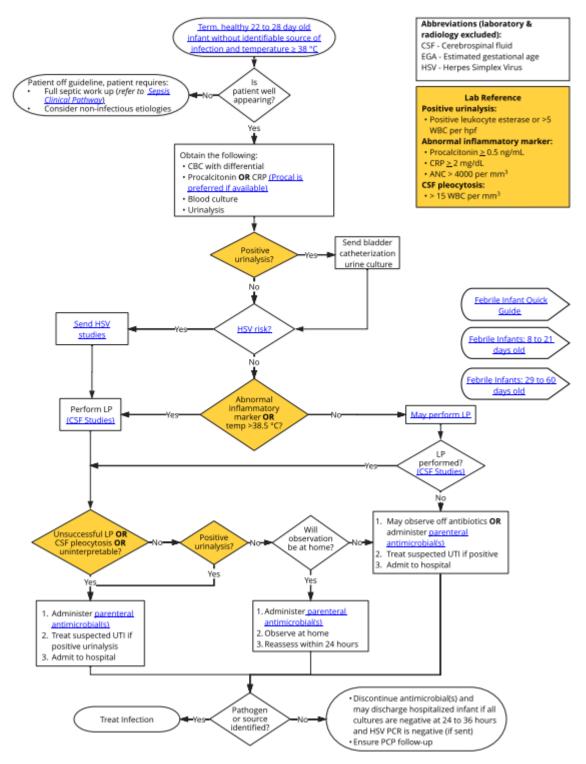
#### Febrile Infant 8 to 60 Days



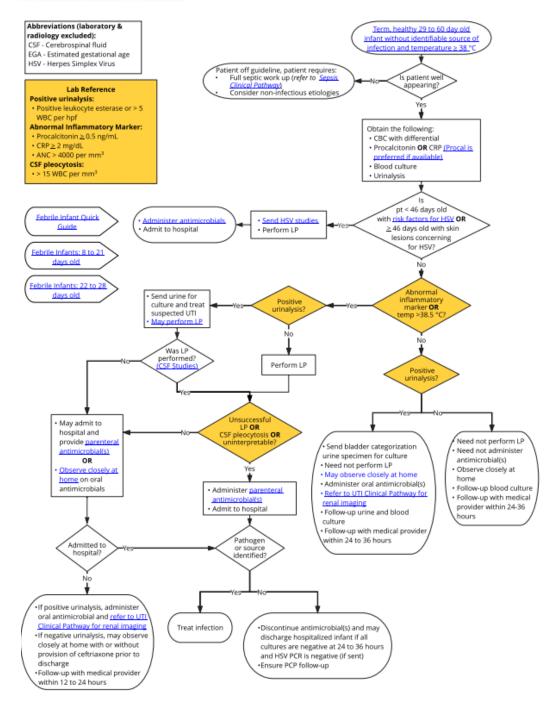
Abbreviations (laboratory & radiology excluded):

EGA - Estimated Gestational Age CSF - Cerebrospinal Fluid HSV - Herpes Simplex Virus





### **Evidence Based Practice**





#### Background

Fever in infants can at times be the only sign of invasive bacterial infection. Although rates are lower than in the past (Pantell et al, 2021), missed diagnoses can have serious long-term adverse outcomes. Many febrile infants undergo extensive laboratory evaluations, including blood, urine, and cerebrospinal fluid cultures, followed by empiric broad spectrum antibiotics and hospitalization (Powell et al, 2019). However, risks associated with these medical interventions are increasingly recognized (Pantell et al, 2021), prompting the development of evidence-based strategies for a more targeted approach. In 2021, the American Academy of Pediatrics (AAP) Subcommittee on Febrile Infants updated the clinical practice guidelines, providing recommendations based on patient age, clinical presentation, and laboratory findings. These recommendations assist providers in identifying infants at low risk of invasive bacterial infection and choosing diagnostic and therapeutic interventions for those at higher risk (Pantell et al, 2021).

#### **Objective of Guideline**

To provide care standards for well-appearing febrile infants throughout the care continuum.

#### **Perspective of Guideline**

- Provider
- Patient/Family
- Health System (CMKC)
- Community

#### **Target Users**

- Emergency Department and Urgent Care Clinic Providers
- General Pediatricians
- Pediatric Hospitalists
- Fellows
- Resident Physicians
- Pediatric Nurse Practitioners

#### **Target Population**

#### **Guideline Inclusion Criteria**

- Well-appearing
- Full-term (≥ 37 weeks estimated gestational age)
- 8 to 60-days of age
- Temperature ≥ 38 °C at home in the past 24 hours or determined in a clinical setting
- Without an identifiable source of infection

#### Guideline Exclusion Criteria

- ≤ 7 days
- Preterm infants ≤ 37 weeks
- Younger than 2 weeks of age whose perinatal courses were complicated by maternal fever, infection, and/or antimicrobial use
- High suspicion of herpes simplex virus (HSV) infection (e.g., vesicles).
- Focal bacterial infection (eg, cellulitis, omphalitis, septic arthritis, osteomyelitis). These infections should be managed according to accepted standards
- Infants with clinical bronchiolitis, with or without positive test results for respiratory syncytial virus (RSV)
- Documented or suspected immune compromise
- Neonatal course was complicated by surgery or infection
- Congenital or chromosomal abnormalities
- Medically fragile infants requiring some form of technology or ongoing therapeutic intervention to sustain life
- Infants who have received immunizations within the last 48 hours

#### **Clinical Questions Answered by Guideline**

The American Academy of Pediatric national Guidelines provided guidance to the Febrile Infant CPG committee (Pantell et al., 2021). See Table 1 for AGREE II.



Table 1.

AGREE II<sup>a</sup> Summary for the Guideline Patell et al. (2021)

Domain	Percent Agreement	Percent Justification
Scope and purpose	97%	The aim of the guideline, the clinical questions posed and target populations were identified.
Stakeholder involvement	88%	The guideline <b>was developed</b> by the appropriate stakeholders and represents the views of its intended users.
Rigor of development	95%	The process used to gather and synthesize the evidence, the methods to formulate the recommendations and to update the guidelines <b>were</b> explicitly stated.
Clarity and presentation	100%	The guideline recommendations are clear, unambiguous, and easily identified; in addition, different management options are presented.
Applicability	96%	Barriers and facilitators to implementation, strategies to improve utilization and resource implications <b>were addressed</b> in the guideline.
Editorial independence	100%	The recommendations <b>were not</b> biased with competing interests.
Committee's recommendation for guideline use	Yes with modification	

Note: Three Evidence Based Practice (EBP) Scholars completed the AGREE II on this guideline.

#### **Practice Recommendations:**

Please refer to the American Academy of Pediatrics (Pantell et al., 2021) Clinical Practice Guideline for full practice recommendations, evaluation, and treatment recommendations.

#### Children's Mercy Practice Recommendations and Reasoning:

Children's Mercy adopted the majority of the practice recommendations made by the AAP Clinical Practice Guideline. Deviations include:

- The AAP recommends gentamicin for infants 8-21 days of age with suspected UTI or suspected infection with no focus identified. Gentamicin is generally not preferred at Children's Mercy; choices should be made based on clinical factors and local susceptibility patterns.
- The AAP advises that providers may obtain inflammatory markers (i.e., procalcitonin, CRP, CBC) for infants 8-21 days of age. They are not strongly recommended due to the fact that lumbar puncture is recommended in infants of this age regardless of inflammatory markers. However, Children's Mercy does recommend CRP and CBC for infants 8-21 days of age. Lumbar puncture may be unsuccessful, yield too little CSF, or yield CSF with many red blood cells, making it difficult to interpret CSF WBC count and/or culture. In these cases, inflammatory markers may help guide the treatment plan.
- The AAP recommends that providers **may** obtain CSF studies for those infants 29-60 days of age with positive inflammatory markers and a negative urinalysis. However, we recognize the importance of consistency in care among settings and providers across our institution. To safely minimize variation in practice, Children's Mercy recommends providers obtain CSF



for infants 29-60 days of age with elevated inflammatory markers and no identifiable source.

#### **Measures**

In coordination with the AAP Value in Pediatrics Network REVISE II collaborative, quality measures include:

- Primary Outcomes
  - o Appropriately obtained CSF, if indicated
  - o Appropriate disposition from the emergency department
  - Correct receipt of antibiotics, if indicated
  - Timely discharge from the hospital within 36 hours of blood culture being received by the lab
- Balancing Measures
  - o Emergency department revisit within 7 days
  - o Readmission within 7 days
  - o Delayed diagnosis of invasive bacterial infections

#### **Cost Implications:**

The following potential improvements may reduce costs and resource utilization for healthcare facilities and reduce healthcare costs and non-monetary costs (e.g., missed school/work, loss of wages, stress) for patients and families.

- Decreased risk of overdiagnosis
- Decreased risk of overtreatment (i.e., treatment for meningitis when treatment for urinary tract infection is more appropriate)
- Decreased frequency of admission
- Decreased inpatient length of stay
- Decreased unwarranted variation in care

#### **Organizational Barriers:**

- Variability of acceptable level of risk among providers
- Challenges with follow-up faced by some families

#### **Organizational Facilitators:**

- Collaborative engagement across care settings in CPG development
- High rate of use of CPG
- Standardized order set for Urgent Care Clinic, Emergency Department, and Hospital Medicine

#### Order Sets (see Appendix)

#### How guideline was placed into practice

Once approved, the guideline was presented to appropriate care teams and implemented. In coordination with the AAP Value in Pediatrics Network REVISE II collaborative, care measurements will be assessed and shared with appropriate care teams to determine if changes need to occur.

#### **Guideline Preparation**

This guideline was prepared by the Evidence Based Practice (EBP) Department in collaboration with content experts at Children's Mercy Kansas City. The development of this guideline supports the Service and Performance Excellence initiative to promote care standardization that builds a culture of quality and safety that is evidenced by measured outcomes. If a conflict of interest is identified, the conflict will be disclosed next to the committee member's name.

#### **Febrile Infant CPG Committee Members and Representation**

- Christopher Veit, MD, MHPE, FAAP | Hospital Medicine | Committee Chair
- Stephanie Karnik, MD | Emergency Medicine | Committee Chair
- Josh Herigon, MD, MPH, MBI | Infectious Diseases | Committee member
- Maria Blanco, MD | Urgent Care | Committee member
- Alaina Burns, Pharm.D., BCPPS | Pharmacy | Committee member
- Jordan Marquess, MD | Pediatric Resident | Committee member



#### **EBP Committee Members**

- Katie Berg, MD, FAAP | Evidence Based Practice & Hospital Medicine | Committee member
- Jarrod Dusin, MS, RD, LD, CPHQ | Evidence Based Practice | Committee member

#### **Guideline Development Funding**

The development of this guideline was underwritten by the Department of EBP and the divisions of Hospital Medicine, Emergency Medicine, Infectious Diseases, and Urgent Care.

#### **Approval Process**

This guideline was reviewed and approved internally by Hospital Medicine, Emergency Medicine, Infectious Diseases, Urgent Care, Content Expert Committee, the EBP Department, Medical Executive, and other appropriate hospital committees deemed suitable for this guideline's intended use. Guidelines are reviewed and updated as necessary every 3 years within the EBP Department at CMKC. Content expert committees will be involved with every review and update.

**Approval Obtained** 

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Department/Unit	Date Approved	
Hospital Medicine	February 2022	
Emergency Medicine	February 2022	
Infectious Diseases	February 2022	
Urgent Care	February 2022	
Medical Executive	March 2022	

**Version History** 

Date	Comments	
2/2/2022	Version 2	

#### Disclaimer

The content experts and the Office of EBP are aware of the controversies surrounding the Febrile Infant CPG. When evidence is lacking or inconclusive, options in care are provided in the guideline and the order sets that accompany the guideline.

These guidelines do not establish a standard of care to be followed in every case. It is recognized that each case is different, and those individuals involved in providing health care are expected to use their judgment in determining what is in the best interests of the patient based on the circumstances existing at the time.

It is impossible to anticipate all possible situations that may exist and to prepare guidelines for each. Accordingly, these guidelines should guide care with the understanding that departures from them may be required at times

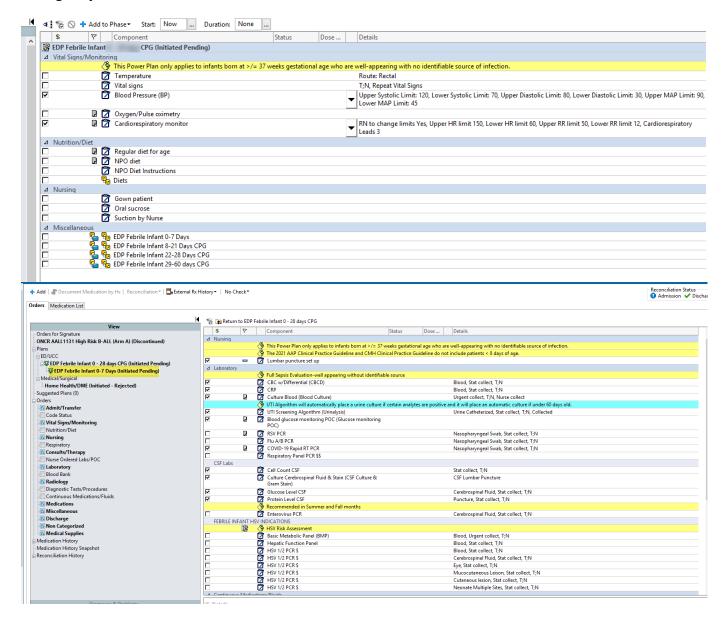


#### References

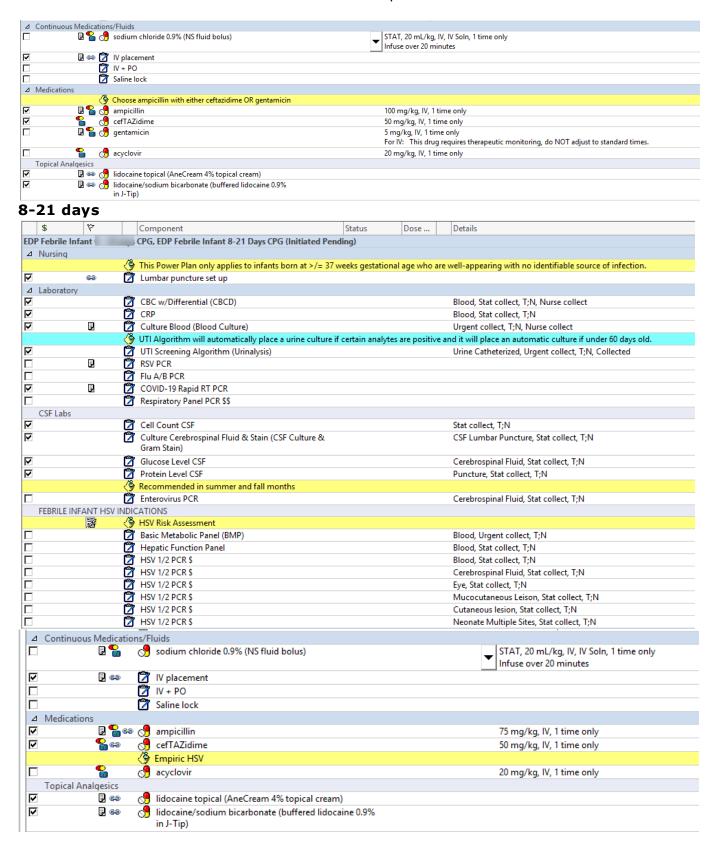
- Brouwers, M.C. et al. for the AGREE Next Steps Consortium. (2010) AGREE II: Advancing guideline development, reporting and evaluation in healthcare. *Canadian Medical Association Journal*, 182, E839-842. Retrieved from <a href="https://www.agreetrust.org/wp-content/uploads/2017/12/AGREE-II-Users-Manual-and-23-item-Instrument-2009-Update-2017.pdf">https://www.agreetrust.org/wp-content/uploads/2017/12/AGREE-II-Users-Manual-and-23-item-Instrument-2009-Update-2017.pdf</a>
- Pantell, R. H., Roberts, K. B., Adams, W. G., Dreyer, B. P., Kuppermann, N., O'Leary, S. T., ... & Teichman, J. S. (2021). Evaluation and management of well-appearing febrile infants 8 to 60 days old. *Pediatrics*, 148(2).
- Powell, E. C., Mahajan, P. V., Roosevelt, G., Hoyle Jr, J. D., Gattu, R., Cruz, A. T., ... & Lillis, K. (2018). Epidemiology of bacteremia in febrile infants aged 60 days and younger. *Annals of emergency medicine*, 71(2), 211-216.

#### **Appendix**

#### **Emergency Order Set**

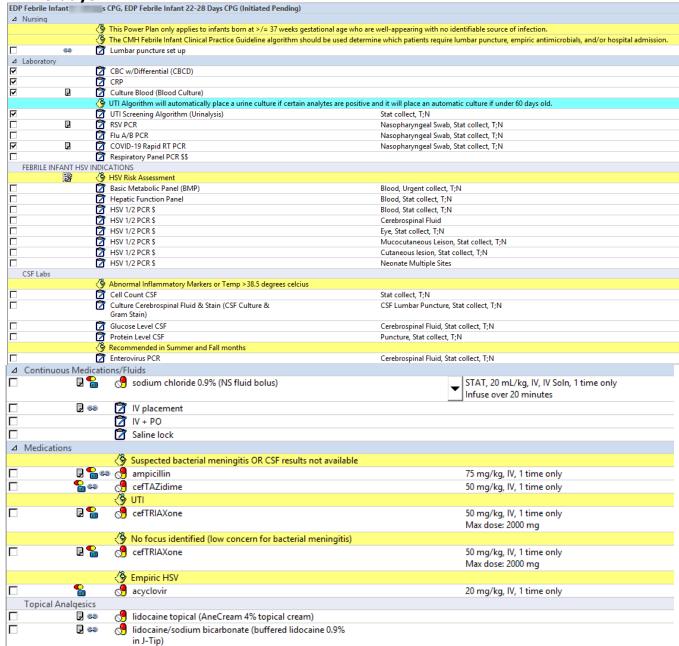








### 22-28 days

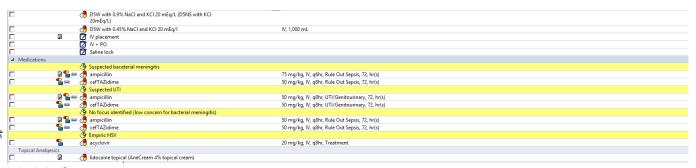


#### 29-60 days

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		The CMH Febrile Infant Clinical Practice Guideline algorithm should	d be used determine which patients require lumbar puncture, empiric antimicrobials, and/or hospital admission
		Lumbar puncture set up	
Labor		_	
		CBC w/Differential (CBCD)	Blood, Stat collect, T;N
		CRP CRP	Blood, Stat collect, T;N
	₽ (	Culture Blood (Blood Culture)	Stat collect, T;N, Nurse collect
		🦫 UTI Algorithm will automatically place a urine culture if certain ana	lytes are positive and it will place an automatic culture if under 60 days old.
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		RSV PCR	Nasopharyngeal Swab, Stat collect, T;N
		Tlu A/B PCR	Nasopharyngeal Swab, Stat collect, T;N
		COVID-19 Rapid RT PCR	Nasopharyngeal Swab, Stat collect, T;N
		Respiratory Panel PCR \$\$	rasopharynges strub, stat concee, 1,14
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			PL LOVE WATER
		Basic Metabolic Panel (BMP)	Blood, Stat collect, T;N
		Hepatic Function Panel	Blood, Stat collect, T;N
		HSV 1/2 PCR \$	Blood, Stat collect, T;N
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#### **Inpatient Order Set** Febrile Infant 0 - 28 days (Inpatient), Febrile Infant 0-7 Days (Planned Pending) This Power Plan only applies to infants born at >/= 37 weeks gestational age who are well-appearing with no identifiable source of infection. The 2021 AAP Clinical Practice Guideline and CMH Clinical Practice Guideline do not include patients < 8 days of age.</p> Lumbar puncture set up | Full Sepsis Evaluation-well appearing without identifiable source | CBC w/Differential (CBCD) | CRP | Culture Blood (Blood Culture) | UTI Algorithm will automatically place a urine culture if certain analytes are po | UTI Screening Algorithm (Urinalysis) | Blood glucose monitoring POC (Glucose monitoring | POC) | POC| Blood, Stat collect, T;N Blood, Stat collect, T;N Urgent collect, T;N, Nurse collect and it will place an automatic culture if under 60 days of Urine Catheterized, Stat collect, T;N, Collected COVID-19 Rapid RT PCR CSF Labs Cell Count CSF Culture Cerebrospinal Fluid & Stain (CSF Culture & Gram Stain) Stat collect, T;N CSF Lumbar Puncture Glucose Level CSF Protein Level CSF Cerebrospinal Fluid, Stat collect, T;N Puncture, Stat collect, T;N Protein Level CSF Recommended in S Enterovirus PCR mmer and Fall months FEBRILE INFANT HSV INDICATIONS FEBRILE INFANT HSV INDICATIONS FINANCIA STATEMENT HSV INDICATIONS FINANCIA STATEMENT HSV INDICATIONS FINANCIA STATEMENT HSV INCOME STATEMENT H Blood, Urgent collect, T;N Blood, Jurgent collect, T;N Blood, Stat collect, T;N Blood, Stat collect, T;N Blood, Stat collect, T;N Eye, Stat collect, T;N Eye, Stat collect, T;N Mucocutaneous Leison, Stat collect, T;N Neonate Multiple Sites, Stat collect, T;N Neonate Multiple Sites, Stat collect, T;N fications/Fluids Sodium chloride 0.9% (NS fluid bolus) STAT, 20 mL/kg, IV, IV Soln, 1 time only MSV 1/2 PCR \$ Neonate Multiple Sites, Stat collect, T;N Fluids Sodium chloride 0.9% (NS fluid bolus) STAT, 20 mL/kg, IV, IV Soln, 1 time only Infuse over 20 minutes DSW with 0.9% NaCl and KCl 20 mEg/L (DSNS with KCl 20 mEg/L) 20mEg/L) DSW with 0.45% NaCl and KCl 20 mEg/l IV placement V P placement Saline lock IV, 1,000 mL △ Medications ↑ Choose ampicillin with either ceftazidime OR gent ↑ ampicillin ↑ cefTAZidime ↑ gentamicin 100 mg/kg, IV, q8hr, Rule Out Sepsis, 72, hr(s) 50 mg/kg, IV Push, q8hr, Rule Out Sepsis, 72, hr(s) 5 mg/kg, IV, q2khr, Rule Out Sepsis, 72, hr(s) 5 mg/kg, IV, q2khr, Rule Out Sepsis, 72, hr(s) 6 mg/kg, IV, q8hr, Rule Out Sepsis, 72, hr(s) 20 mg/kg, IV, q8hr, Treatment **6** d acyclovir Return to Febrile Infant 0 - 28 days (Innatient) 8-21 days Febrile Infant 0 - 28 days (Inpa atient), Febrile Infant 8-21 Days CPG (Planned Pending) This Power Plan only applies to infants born at >/= 37 weeks gestational age who are well-appearing with no identifiable source of infection tumbar puncture set up △ Laboratory CBC w/Differential (CBCD) CRP Cutture Blood (Blood Culture) UTI Algorithm will automatically place a urine culture if certain analy UTI Screening Algorithm (Urinalysis) COVID-19 Rapid RT PCR Blood, Stat collect, T;N, Nurse collect Blood, Stat collect, T;N Urgent collect, T;N, Nurse collect nd it will place an automatic culture if under 60 days Urine Catheterized, Urgent collect, T;N, Collected CSF Labs Cell Count CSF Culture Cerebrospinal Fluid & Stain (CSF Culture & Gram Stain) CSF Lumbar Puncture, Stat collect, T;N Cerebrospinal Fluid, Stat collect, T;N Puncture, Stat collect, T;N Recommended in summer and fall months Enterovirus PCR FEBRILE INFANT HSV INDICATIONS SHOW Risk Assessment Basic Metabolic Panel (BMP) Hepatic Function Panel Hepatic Punction Panel Hepatic Function Pa Cerebrospinal Fluid A Continuous Medica Eye, Stat collect, T;N Mucocutaneous Leison, Stat collect, T;N Cutaneous lesion. Stat collect. T:N Neonate Multiple Sites, Stat collect, T;N sodium chloride 0.9% (NS fluid bolus) STAT, 20 mL/kg, IV, IV Soln, 1 time only Infuse over 20 minutes D5W with 0.9% NaCl and KCl 20 mEq/L (D5NS with KCl 20mEq/L) S0 D5W with 0.45% NaCl and KCl 20 mEq/l N placement IV, 1,000 mL





22-28 days



29-60 days





