# Febrile Infant Clinical Pathway

Phoenix Children's Hospital

100% For Children

# Pathway for Diagnosis and Management of Febrile Infants

## Pathway Key

### Exclusion Criteria

1

- Age < 8 days of age
- Neonates born prior to 37 weeks gestation
- Significant chronic comorbid condition (e.g. congenital heart disease, neuromuscular disease, genetic/ chromosomal abnormality, lung disease, etc.)
- Evidence of focal infection
- Neonates on current or previous antimicrobial therapy
- Neonates presenting with seizures
- Neonates with severely ill appearance or those requiring intensive care management

### Bacterial Infection Risk Assessment

2

All Ages, high risk if:

- Prolonged newborn nursery course or History of prolonged hospitalization
- CBC WBC < 5000/cc or >15000/cc
- bands >1500/cc
- procalcitonin elevated > 0.5
- History of unexplained hyperbilirubinemia

Patients 8-28 days, also high risk if:

- UA positive for nitrites, LE or WBC >5/HPF

### HSV Checklist

- Maternal history of HSV (prior disease or active lesions)?
- History of seizures or seizures during evaluation?
- Vesicles on skin exam (including scalp)?
- AST > 50?
- CSF with pleocytosis for age?

If any "yes" proceed to HSV High Risk recommendation

### HSV High Risk Recommendations

3

- HSV PCR of the plasma and CSF
- Direct HSV PCR from surface and vesicles lesions, only if lesions present
- Acyclovir Dosing: Acyclovir 20mg/kg IV every 8 hours

### Antibiotic Recommendations

4

8-28 days:

- Ampicillin 300mg/kg/day IV every 8 hours + Gentamicin 4mg/kg/day IV every 24 hours **or**
- If CSF concerning for meningitis: Ampicillin 300mg/kg/day IV every 8 hours + Cefepime 50mg/kg/dose IV every 8 hours

29-60 days:

- Ceftriaxone 50mg/kg IV or IM every 24 hours **or**
- if CSF concerning for meningitis: Ceftriaxone 50mg/kg IV or IM every 12 hours + Vancomycin 15mg/kg/dose IV every 6 hours

### Discharge Criteria

5

- Admitted Patients:
  - May D/C at 24-36 hours if cultures negative to date and infant is afebrile and well-appearing
- ED Patients:
  - Admit patients 8-28 days for observation, even if low risk (for further nuance regarding 22-28 day infants, see page 5)
  - May D/C patients 29-60 days of age who meet low risk criteria when the following discharge criteria are met:
    - Parents comfortable monitoring patient at home
    - Parents have reliable means of receiving communication from the hospital/ED
    - Pt can follow-up with PCP in 24 hours
  - If low risk but positive UA, patient can be given ceftriaxone and prescribed appropriate po antibiotic regimen and be discharged if other discharge criteria above met
  - If patient 29-60 days is high risk but CSF obtained and reassuring (atraumatic and without pleocytosis), may consider discharge after receiving antibiotics if above criteria can be met

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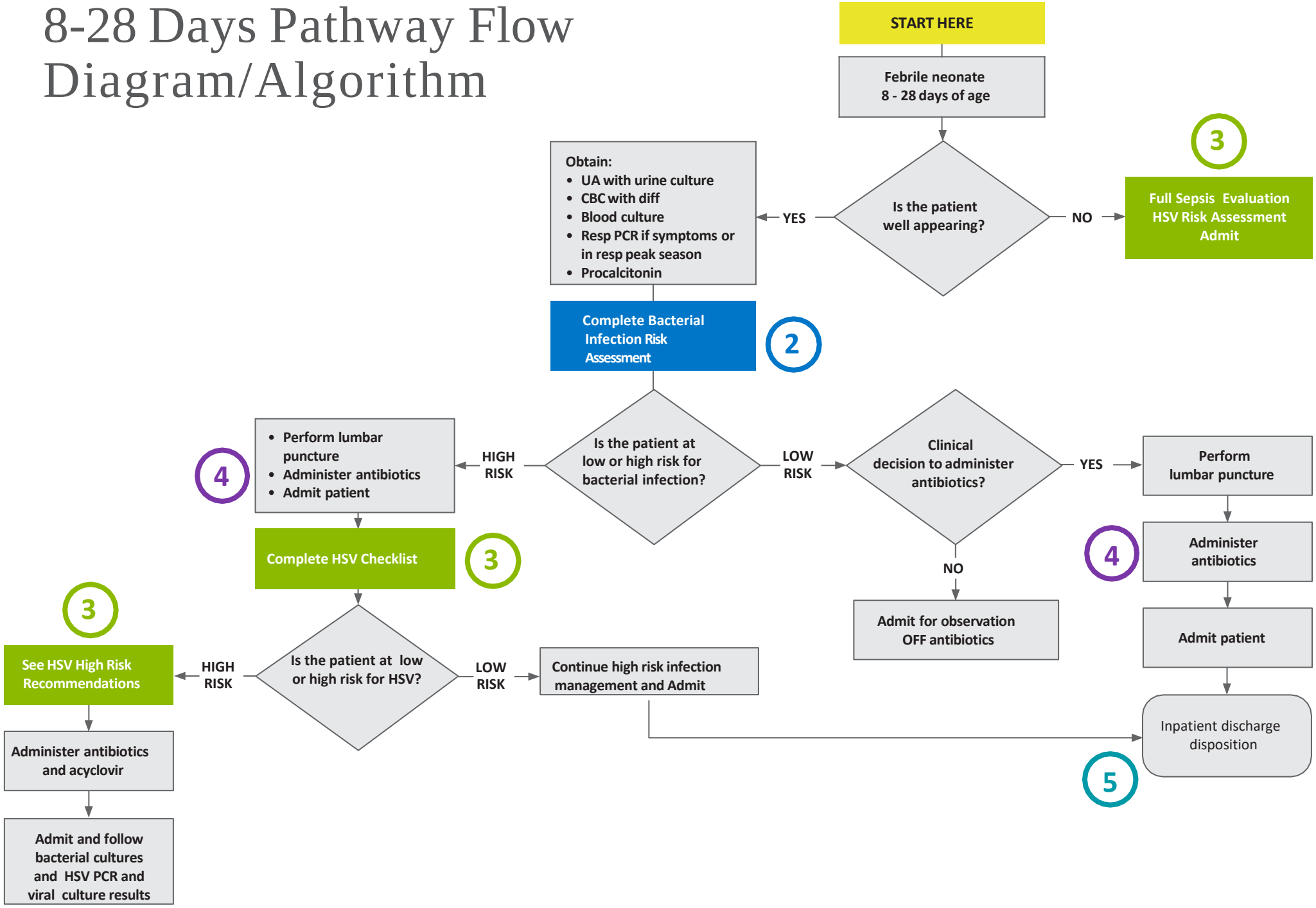
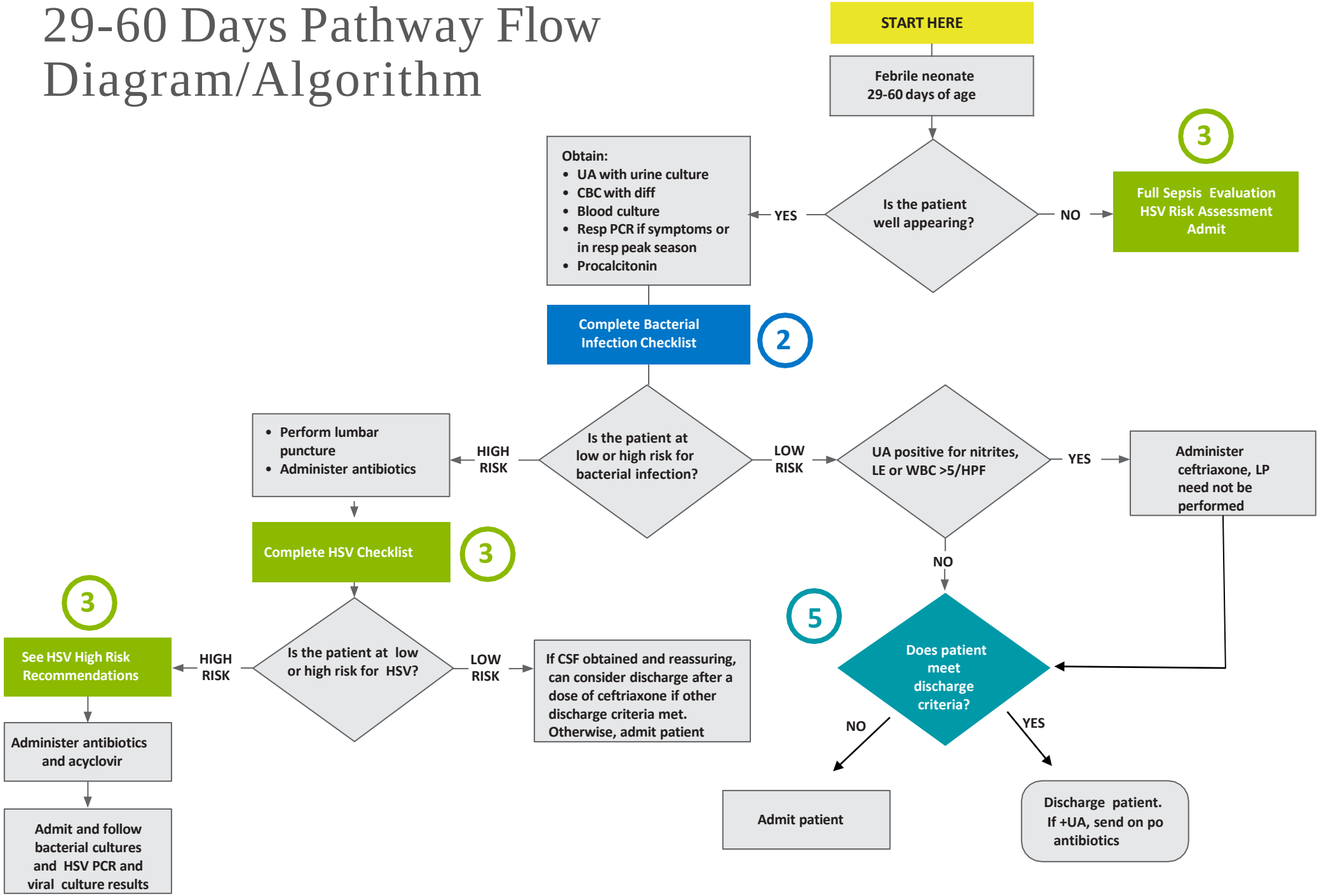
# 8-28 Days Pathway Flow Diagram/Algorithm



# 29-60 Days Pathway Flow Diagram/Algorithm



# PCH Febrile Infant Clinical Pathway

**Disclaimer:** This clinical pathway is not intended to replace clinical judgment. It is meant to assist licensed independent practitioners and other health care providers in clinical decision- making by describing a range of generally acceptable approaches to the diagnosis and management of a particular condition. A particular patient's circumstances should always be taken into account when a practitioner is deciding on a course of management.

## Definition

Infants 8-60 days of age presenting with documented or parent reported fever to Phoenix Children's Hospital (PCH) or Phoenix Children's Care Network (PCCN) facility.

## Inclusion Criteria

- Neonates 8-60 days of age
- Documented or parent reported fever > 38.0C

## Exclusion Criteria

- Age < 8 days of age
- Infants born prior to 37 weeks gestation
- Significant chronic comorbid condition (e.g. congenital heart disease, neuromuscular disease, genetic/ chromosomal abnormality, lung disease, etc.)
- Evidence of focal infection
- Infants on current or previous antimicrobial therapy
- Infants presenting with seizures
- Infants with severe ill appearance or those requiring intensive care management

## Key Clinical Recommendations

- Infants presenting with fever outside an Emergency Department should be referred to an Emergency Department to ensure rapid availability of labs and further care.
- Infants presenting with fever should be evaluated with a CBC with differential, blood culture, catheterized urine analysis, catheterized urine culture, and procalcitonin.
- Infants presenting with fever should be stratified into low risk and non-low risk categories.
- Lumbar puncture should not be pursued in well appearing, low risk infants.
- Antibiotics should not be administered in well appearing, low risk infants.
- For infants that do not meet low risk criteria (WBC <5000/cc or >15000/cc; or elevated procalcitonin >0.5; and for patients <29 days: UA positive for nitrites, leukesterase or WBC >5/HPF), full sepsis evaluation should be performed including lumbar puncture with CSF analysis and antibiotics administered; may also consider for borderline results with Temp >38.5
- For infants 29-60 days that have UA positive for nitrites, leukesterase or WBC >5/HPF but who otherwise meet low risk criteria, lumbar puncture need not be performed. Those patients should receive a dose of ceftriaxone and prescription for oral antibiotic course and can be discharged from ED if meeting discharge criteria, including ability to f/u with PCP within 24hrs.

7. **Antibiotic recommendations:**
   Infants 8-28 Days of Age:
   Ampicillin 300mg/kg/day IV every 8 hours + Gentamicin 4mg/kg/day IV every 24 hours
   **Or** if concern for meningitis based on CSF preliminary results:
   Ampicillin 300mg/kg/day IV every 8 hours + Cefepime 50mg/kg/dose IV every 12 hours

   Infants 29-60 Days of Age:
   Ceftriaxone 50mg/kg IV or IM every 12 hours if concerns for meningitis or every 24 hours if no concerns for meningitis, contraindicated in neonates with hyperbilirubinemia
   Vancomycin 15mg/kg/dose IV every 6 hours should be added if CSF studies are concerning for bacterial meningitis

8. All neonates categorized as high risk should be screened for neonatal HSV. Neonates with concern for HSV (positive maternal history, presence of skin vesicles, elevated AST, CSF pleocytosis) should undergo appropriate evaluation and treatment. This includes obtaining direct HSV PCR from surface and vesicle lesions as well as HSV PCR of the plasma and CSF. If there are no surface lesions, only HSV PCR from plasma and CSF are required. Recommended treatment is parenteral acyclovir while work-up is in process.

   - Acyclovir Dosing: Acyclovir 20mg/kg IV every 8 hours

9. Infants who meet low risk criteria and whose blood and urine cultures are no growth at 24 hours should be discharged home with appropriate follow-up
10. Infants who are high risk, whose blood, urine and CSF cultures are no growth at 24-36 hours should be discharged home with appropriate follow-up.
11. Infants who have a positive blood, urine or CSF culture should be treated per current evidence for urinary tract infection, bacteremia or meningitis.
12. Consider discharge from the Emergency Department in infants greater than 28 days who meet discharge criteria

# Pathway Goals

1. Standardize the evaluation of infants with fever.
2. Decrease the number of unnecessary admissions for infants presenting with fever to the Emergency Department
3. Place patients on appropriate antimicrobial therapy when antibiotics are indicated
4. Discharge patients in the appropriate timeframe based on risk category (24-36hrs)

# Admission Criteria

1. Febrile infants 8-28 Days of Age
2. Febrile Neonates 29-60 Days of Age who meet high risk criteria or do not meet discharge criteria; though can still consider avoiding admission of high risk infants if CSF obtained with reassuring results and other discharge criteria are met

# Discharge Criteria

ED Patients:

May D/C patients 29-60 days of age who meet low risk criteria when the following discharge criteria are met:

- Parents comfortable monitoring patient at home
- Parents have reliable means of receiving communication from the hospital/ED
- Pt can follow-up with PCP in 24 hours

May also D/C patients 29-60 days of age in the following circumstances:

- If low risk but positive UA, patient can be given ceftriaxone and prescribed appropriate po antibiotic regimen and be discharged if other discharge criteria above met
- If patient 29-60 days is high risk but CSF obtained and reassuring, may consider discharge after receiving antibiotics if above criteria can be met

Admit patients 8-28 days for observation, even if low risk. However: For patients 22-28 days who have CSF obtained with reassuring results (atraumatic and no pleocytosis), and meet above criteria, discharge after being given Ceftriaxone can be considered based on clinical judgment.

All Admitted patients:

May discharge at 24-36 hours if cultures negative to date and patient is afebrile and well-appearing

# Evidence Based Supporting Material

Fever in infants is common and results in visits to primary care physicians, urgent cares and emergency departments. The evaluation, treatment and management of infants varies widely across the continuum of pediatric care. This clinical pathway aims to standardize the evaluation and treatment of infants with fever within Phoenix Children's Hospital.

Historically, many pediatricians have used criteria such as the Rochester Criteria, Boston Criteria and Philadelphia Criteria in regards to the evaluation and treatment of neonates with fever. Recent literature has demonstrated a change in the etiology of bacteria causing serious bacterial infection in neonates.[7,8] Current evidence demonstrates a predominance of *Escherichia coli* (42%), Group B *Streptococcus* (23%), and Streptococcus pneumoniae as the etiology of serious bacterial infection in neonates.[7]

Progress has also been made regarding time of detection of bacterial illness.[5,9] Identification of true bacterial pathogens via blood culture have been documented at 97% at 36 hours of incubation, urine cultures at 95% at 36 hours of incubation and cerebral spinal fluid cultures 86% of true positives were identified at 36 hours of incubation.[9]

This pathway originally implemented in 2018 has been updated taking into consideration recommendations from the AAP Clinical Practice Guideline published in 2021. Variations from those recommendations have been made where institutional data is present to justify such variation.

# Works Cited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# Development and Approval and Implementation Process

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- Approved by Clinical Effectiveness Committee: 11/17/2021