Bottom Line Recommendations: Summary of Pediatric Emergency Care Information for Healthcare Providers

Fever in Infants ≤ 60 days

Febrile infants ≤60 days have a 2-3% risk of invasive bacterial infections (IBIs; bacteremia and meningitis).[1] Most will have viral illnesses, but clinical exams alone cannot determine infection severity. Clinicians must balance the risks of a potentially serious infection with the harms of over-investigation.

This document reflects the recommendations in the Canadian Pediatric Society Position Statement on the management of well-appearing febrile young infants.[2]

What is Fever?

- The gold standard for fever is a *rectal* temperature of ≥ 38.0°C. While less accurate, tactile and elevated temperatures measured at other body sites likely also correlate with true fever.[3,4]
- **Any** suspicion of fever in infants ≤ 60 days requires evaluation; even one episode ≥ 38.0°C is significant.[5,6] Consider repeat rectal measurements over a few hours if the temperature is near 38.0°C.
- Fever should not be attributed to over-bundling unless serious illness is ruled out, as it rarely causes temperatures ≥ 38.0°C.[7]

General Management Principles

If a temperature is ≥ 38.0°C at home or in hospital, proceed with urgent evaluation:

- Complete history and physical exam with vital signs, including repeat rectal temperature measurement.
- Assess ABCs and intervene as necessary.
- Discuss the risk of infection, recommended workup and management of febrile young infants with caregivers.

MANAGEMENT DEPENDS ON THE INFANT'S CLINICAL STATUS

- **Severely ill infant** (e.g., unstable vital signs, poor perfusion): refer to TREKK's Sepsis (if > 28 days old) or Critically Ill Neonate (if 0-28 days old) algorithms.
  - **DO NOT DELAY** antimicrobials if the infant is too unstable, or there are insufficient resources or provider experience to obtain all cultures.
  - Contact Pediatric Referral Centre to prepare for transport.
- **Ill-appearing but otherwise stable infant:** perform full septic workup and promptly initiate antimicrobials.
  - Full septic workup: blood culture, CBC with differential, procalcitonin (PCT; if available), electrolytes, glucose, liver enzymes, urinalysis and microscopy, urine culture (catheter sample) and, if clinically stable, a lumbar puncture (LP) for CSF testing including cell count, Gram stain and culture.
- **Well-appearing infant:** perform partial septic workup and risk stratification.
  - Partial septic workup: blood culture, CBC with differential, PCT (if available), electrolytes, glucose, urinalysis and microscopy, urine culture (catheter sample).
  - Assess risk of invasive bacterial infection (IBI) using one of the validated risk-stratification strategies outlined in Table 1 below. Refer to TREKK's Fever in Infants ≤60 days Algorithm for further guidance regarding need for LP, empiric antimicrobials or admission to hospital.

Table 1: Risk-stratification Strategies

PECARN Rounded Rule [8] (PCT available; preferred method)	Aronson Rule [9] (PCT unavailable)
Infant is low-risk if: ▪ Urinalysis negative (no leukocyte esterase (LE), no nitrites and ≤5 WBCs/hpf) **AND** ▪ Absolute neutrophil count ≤4000/μL **AND** ▪ PCT ≤0.5 ng/mL	Infant is low-risk if ≤1 point total: ▪ Age < 21 days **(1 point)** ▪ Highest rectal temperature measured in ED: - Afebrile in ED **(0 points)** - 38.0°C-38.4°C **(2 points)**; or - ≥38.5°C **(4 points)** ▪ Absolute neutrophil count ≥ 5185/μL **(2 points)** ▪ Urinalysis positive (any LE, nitrites or >5 WBC/hpf) **(3 points)**
If infant does not meet low-risk criteria of either rule, they are considered HIGH-RISK.	

- In low-risk infants, the risk of IBI is very low. The number needed to test by LP to exclude one case of meningitis ranges between 333 to 2000 (Aronson)[9] or 500 to undefinably high (PECARN).[8]

Caution: For risk-stratification without PCT (Aronson), or infants with fever <2 hours,[10] maintain a lower threshold for LP and hospitalization, even if stratified as low-risk.

ADDITIONAL CONSIDERATIONS

- Infants with a focal infection (e.g., skin, soft tissue or osteoarticular infection) may require further investigation and tailored treatment. Discuss with Pediatric Referral Centre.
- Consider additional workup depending on symptoms: chest x-ray (respiratory signs/symptoms despite suctioning), viral panel testing (nasal congestion) and/or stool cultures/virology (diarrhea).
- Treat infants with elevated CSF WBCs (>15 cells/mm^3 for infants ≤28 days or >9 cells/mm^3 for infants 29 - 60 days) empirically for possible bacterial meningitis **AND** herpes simplex virus (HSV) infection.[11]
- Admit and observe infants until bacterial cultures are negative at 36 hours if high-risk OR 24 hours if low-risk. [12,13]

Age-Specific Management

- When more than one recommended option exists for a low-risk infant, providers should engage in shared decision-making, reflecting both provider and caregiver goals of care and risk tolerance.[14,15]
- See Treatment section below for choice and dosing of empiric antimicrobials.

0-28 DAYS OF AGE IF STABLE AND WELL-APPEARING

- **Low-risk infants** are admitted; there are 2 options for management:

  Option 1- Admit for observation without LP or empiric antimicrobials.

  Option 2- Perform LP and admit infants with a normal CSF WBC count, with or without empiric antimicrobials.

- **Any positive blood or urine culture** should prompt LP for CSF testing (if not already performed) and initiation of empiric antimicrobials.
- **High-risk infants** should have LP for CSF testing, empiric antimicrobials and be admitted for close observation pending culture results.

29-60 DAYS OF AGE IF STABLE AND WELL-APPEARING

- **Low-risk infants** may be discharged; there are 2 options for management:

  Option 1- Discharge home and arrange follow-up within 24-48 hours. Provide caregivers with anticipatory guidance on when to return to the Emergency Department (ED). Ensure appropriate follow-up of culture results.

  Option 2- Admit for observation with no LP or empiric antimicrobials until all cultures are negative for 24 hours.

- Infants 29-60 days old with a suspected **ISOLATED UTI** (e.g., urine positive for leukocyte esterase, nitrites or >5 WBC/hpf **AND** otherwise meeting the remainder of low-risk criteria; see Table 1) **DO NOT** require LP**.** Treat empirically with PO or IV antibiotics (10-14 days). Use shared decision-making to decide on admission versus discharge home.
- **Any positive blood culture** should prompt LP for CSF testing (if not already performed) and initiation of empiric antimicrobials.
- **High-risk infants** should have LP for CSF testing, empiric antimicrobials, and be admitted for close observation pending culture results.

Herpes Simples Virus (HSV)

- HSV infection may have few signs but is associated with significant morbidity and mortality. Up to 50% of infants with HSV infections are afebrile.[16,17] Some infants may have hypothermia.

- Assess risk factors for HSV including maternal history of primary HSV infection, seizures/focal neurologic abnormalities, diffuse pneumonitis, skin vesicles, mucous membrane lesions, elevated CSF WBCs, coagulopathy, transaminitis, postnatal exposure to HSV. Consider using a HSV risk score.[18]
- If there is concern for HSV infection, collect viral samples from any vesicular skin lesions, all mucous membranes, CSF and blood (if available). Start empiric treatment with IV acyclovir and contact Pediatric Referral Centre.

Infants Requiring Special Consideration

- Infants with lab-confirmed viral illnesses still have a risk of IBI >1%.[19,20] Infants with respiratory symptoms, including bronchiolitis, should follow the age-based recommendations above. Consider early discharge at 24 hours for high-risk infants that have a laboratory-confirmed virus other than rhinovirus.[21]
- Further evaluation and **Pediatric Referral Centre** consultation is recommended for infants with:
  - Known comorbidities (e.g., congenital disorder, chromosomal abnormality, immunodeficiency, technology dependence)
  - Treatment with antimicrobials within the preceding 7 days
  - Prolonged newborn nursery/NICU course or recent hospitalization
  - Prematurity (< 37 weeks gestation)
  - Seizures

Treatment

Age	Empiric Antimicrobials*
0-7 days	Ampicillin 225 mg/kg/day IV divided q8h AND Gentamicin or Tobramycin 4 mg/kg/**dose** IV q24h – If suspected meningitis, add Cefotaxime 150 mg/kg/day IV divided q8h and discontinue Gentamycin/Tobramycin – If suspected HSV, add Acyclovir 60 mg/kg/day IV divided q8h
8-28 days	Ampicillin 300 mg/kg/day IV divided q6h AND Gentamicin or Tobramycin 5 mg/kg/**dose** IV q24h – If suspected meningitis, add Cefotaxime 200 mg/kg/day IV divided q6h and discontinue Gentamycin/Tobramycin – If suspected HSV, add Acyclovir 60 mg/kg/day IV divided q8h
29-60 days	Ceftriaxone 100 mg/kg/**dose** IV q24h – If suspected meningitis, Ceftriaxone 100 mg/kg/**dose** IV x 1 dose, and then 12 hours later continued Ceftriaxone 50 mg/kg/**dose** IV q12h – If suspected meningitis, add Vancomycin 60 mg/kg/day IV divided q6h – If suspected HSV, add Acyclovir 60 mg/kg/day IV divided q8h
29-60 days	If stable, well-appearing and suspected isolated UTI (positive urinalysis AND otherwise meeting remainder of low risk criteria), may treat with: – Cefixime 8 mg/kg/**dose** PO q24h x 10-14 days

*Reassess once cultures and sensitivities available.

Note: Ampicillin, gentamicin, tobramycin, cefotaxime and ceftriaxone may be given at doses above via the IO or IM routes if unable to establish an IV. Acyclovir and vancomycin may be given at doses above via the IO route if unable to establish an IV.

Maximum IM volume: 0 to 28 days old: 0.5 mL; 29 to 60 days old: 1 mL

IM site: anterolateral thigh (vastus lateralis)

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