

## Inpatient Management of Febrile Infants (<90 days of age)

Version: 1

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### 1.0 Introduction

The hospitalisation of febrile infants (< 90 days of age) is one of the leading causes of hospital admission in the paediatric population. While a majority of these infants most likely have an underlying viral infection, they are inherently at higher risk of invasive bacterial infections as compared to the general paediatric population. Indeed, up to 2% of febrile infants are bacteremic and up to 0.9% have bacterial meningitis (1,2). Therefore, febrile infants are often treated with broad-spectrum antibiotics until results of final cultures are obtained.

While such management of febrile infants with certain risk factors is a well-established practice which has significantly reduced the morbidity and mortality related to invasive bacterial infections in this population, significant practice variability remains in the duration of antibiotic treatment and the duration of hospitalization of these infants. While several studies and local data have shown that a 36-hour incubation period for cultures obtained is sufficient to detect the vast majority of underlying bacterial infections, many clinicians continue antibiotics for 48-hours or longer (3,4). These inconsistencies in practice have led to unnecessarily prolonged antibiotic use and hospitalization of many febrile infants with underlying viral infections.

### Objectives

In the target population, the objectives of this guideline are to:

- Streamline the medical management of febrile infants (<90 days of age) admitted to Paediatric Medicine by establishing clear guidelines regarding the interpretation of culture results (i.e. when blood cultures can be considered negative within the context of the lab reporting system), the minimum duration of broad-spectrum antibiotics and by establishing clear discharge criteria
- Limit the use of broad-spectrum antibiotics to 36-hours in febrile infants with a probable underlying viral infection
- Decrease hospital length of stay
- Ensure appropriate follow-up of blood cultures after patients have been discharged and enhance appropriate utilisation of community resources for patient follow-up

### Target Users

Include, but are not limited to:

- Emergency department physicians, physician assistants, trainees, nurses and nurse practitioners
- Inpatient physicians, physician assistants, trainees, nurses and nurse practitioners

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- Pharmacists
- Patients and families

# PRINTABLE VERSION OF INPATIENT MANAGEMENT PATHWAY

## 2.0 Clinical Practice Recommendations

### Target Population:

- **Inclusion criteria:** This management pathway is primarily intended for use in previously healthy infants (<90 days of age) admitted to hospital with fever ( $\geq 38.0^{\circ}\text{C}$  rectally) or hypothermia ( $<36.0^{\circ}\text{C}$  rectally)
- **Exclusion criteria:** This management pathway is not intended for use in infants with:
  - History of prematurity (born <37 weeks)
  - History of current or recent use of antibiotics
  - Diagnosis of a chronic illness
  - Persistence of abnormal vital signs despite antipyretics and fluid administration
  - Lethargy
  - Irritability or seizures
  - Poor perfusion
  - Documented bacterial infection

### Diagnosis:

- In infants <90 days of age, fever is defined as a temperature of:
  - $\geq 38.0^{\circ}\text{C}$  rectally
- In infants <90 days of age, hypothermia is defined as a temperature of:
  - $<36.0^{\circ}\text{C}$  rectally

### Assessment:

- A thorough clinical history should include, but is not limited to:
  - Prenatal history including maternal serologies, ultrasound results and maternal illness
  - Birth history including maternal Group B Streptococcus status, maternal antibiotic coverage, maternal fever, duration of rupture of membranes, gestational age, birth weight, Apgar score and any history of neonatal complications or illness
  - Any history of possible exposure to the HSV-1 or HSV-2 viruses
  - Duration of fever
  - Any prior diagnosis of chronic illness
  - Any immunizations received
  - History of sick contacts
- Physical examination should be performed in search of an underlying bacterial focus and should include, but is not limited to:
  - Vital signs
  - Assessment of perfusion and hydration status

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- Neurological assessment including anterior fontanelle and tone
- Respiratory distress or abnormal respiratory sounds
- Abdominal tenderness or underlying hepatosplenomegaly
- Skin rash, erythema or swelling
- Evidence of joint effusion or limitation in musculoskeletal movements

**Diagnostic tests:**

- A complete blood count (CBC) should be performed in all infants
- Blood culture should be performed in all infants
- Urine culture and a urine dipstick should be performed in all infants via either urinary catheterization or a clean-catch technique
- Indications for lumbar puncture (LP) are beyond the scope of this clinical practice guideline and is deferred to the discretion of the most responsible care provider (MRP). However, lumbar puncture should be considered in all febrile infants less than 28 days of age or those who appear unwell unless there are contraindications.
- Further investigations may be warranted depending on clinical signs and symptoms (e.g. Chest X-Ray if evidence of respiratory distress)
- Viral testing (nasopharyngeal swab) is **NOT** routinely recommended
- Testing for other viral illnesses (HSV-1, HSV-2, enterovirus) should be considered based on clinical history, lab results (i.e elevated LFTs) and physical examination

**Management**

<b>Basic Management</b>	<ul style="list-style-type: none"> <li>• Upon admission, the responsible provider should ensure that either a partial septic workup or full septic workup has been performed based upon infant's age and clinical status.</li> <li>• Adequate hydration should be ensured by assessing oral intake. Should oral intake be insufficient, nasogastric (NG) tube feeds or intravenous hydration should be considered.</li> </ul>
<b>Antibiotic Coverage</b>	<ul style="list-style-type: none"> <li>• Refer to <a href="#">e-formulary</a> for empiric antibiotic regimen. Treat for possible meningitis if LP performed and there is evidence of pleocytosis on CSF analysis <b>OR</b> treat for sepsis if there is no evidence of pleocytosis on CSF analysis or if LP deemed unnecessary.</li> </ul>
<b>Follow-up Cultures</b>	<ul style="list-style-type: none"> <li>• Cultures should be reviewed on a daily basis</li> <li>• Should a culture come back positive, antimicrobials should be reviewed based on gram stain result and decisions made about the need to continue broad-spectrum coverage</li> <li>• Antibiotics should be subsequently adjusted as per bacterial sensitivities and site of infection</li> <li>• Lumbar puncture should be strongly considered depending on the organism if not previously completed.</li> <li>• In case of identified HSV infection, the infectious disease team should be consulted</li> </ul>
<b>Antibiotic Discontinuation</b>	<ul style="list-style-type: none"> <li>• Antibiotics can be discontinued if the infant is well <b>AND</b> if cultures are negative at <b>36-hours</b> of incubation during the following microbiology lab reporting period <b>(Monday-Friday: 10 AM to 6:30 PM and Weekends: 11 AM to 4:30 PM).</b></li> </ul>

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	<ul style="list-style-type: none"> <li>Should the 36-hours of incubation time fall outside of the above time period, antibiotic coverage should be continued until the next morning when culture negativity is confirmed <b>OR</b> the decision to discontinue antibiotics may be deferred to the discretion of the MRP</li> </ul>
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<p><b>Discharge and follow-up:</b></p> <ul style="list-style-type: none"> <li>Discharge should be considered in infants who have negative cultures at <b>36-hours</b> of incubation during the above time period (see above), <b>OR</b> if cultures fall outside of lab times, readiness for discharge is deferred to the discretion of the MRP for infants also meet the following criteria: <ul style="list-style-type: none"> <li>Hemodynamically stable</li> <li>Well appearing</li> <li>Afebrile &gt; 24 hours, unless suspected viral infection</li> <li>Feeding well</li> <li>Reliable for follow-up (i.e. no limiting social factors and readily contactable, in case of a positive culture following discharge)</li> <li>Follow-up with the infant's primary care provider in the community should be considered within 5 days of discharge</li> </ul> </li> </ul>
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### 3.0 Implementation and Evaluation Plan

#### Implementation Plan

- Education and awareness building by the Paediatric Medicine Division's practice champions during resident/fellow orientation meetings, resident educational rounds, nursing orientation/staff meetings and bedside teaching.
- Inpatient Medical Director to communicate any updates in practice to the Division of Paediatric Medicine.

#### Evaluation Plan

- Compare baseline pre-implementation and post-implementation data for Paediatric Medicine:
  - Time between initiation and discontinuation of antibiotic therapy orders on the electronic patient chart of infants with fever who have negative cultures.
  - Length of stay of infants < 90 days of age admitted with fever who have negative cultures
  - Culture positivity (excluding contaminated cultures) between 36-hours of incubation and 48-hours of incubation

### 4.0 Guideline Group and Reviewers

#### Guideline Group Membership:

- Dr. Hosanna Au, Staff Physician, Division of Paediatric Medicine
- Iris Liu, Nurse Practitioner, Division of Paediatric Medicine
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- Andrew Joaquin, Clinical Pharmacist, Division of Paediatric Medicine
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#### Internal reviewers:

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1. Carolyn Beck, Staff Physician, Division of Paediatric Medicine
2. Michael Weinstein, Staff Physician, Division of Paediatric Medicine
3. Michelle Science, Staff Physician, Division of Infection Diseases
4. Yvonne Yau, Microbiologist, Laboratory Medicine

## 5.0 Statement of Evidence

The recommendations presented in this guideline and the associated pathway have been created using an interdisciplinary panel of experts following extensive review of the literature, assessment and evaluation of local microbiology data regarding blood culture time to positivity, review of existing clinical guidelines, benchmarking with other reputable institutions and expert opinions. Reference lists of published guidelines and articles were also reviewed. Two major retrospective studies (3,4) were used to inform the conception and development of this guideline. Both studies supported a 36-hour incubation period to be of sufficient duration to detect the vast majority of underlying bacterial infections in febrile infants. The studies' findings are consistent with local microbiology data. Lastly, there was no conflict of interest amongst the panel in the development of the CPG.

## 6.0 References

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**Attachments:**

[febrile infants nov 24 2017.pdf](#)

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