The Febrile Infant: What’s new in management

Megan Sikkema
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Disclosures

• I have no financial disclosures
• I will not discuss any off label use of medications
History

- **1970s**
  - GBS emergence

- **1983 De Angelis et al**
  - Iatrogenic complications when hospitalizing young infants

- **1980s and 90s**
  - Clinical prediction model development

- **Early 2000s**
  - Multiple febrile infant studies

- **2021**
  - AAP Guideline Development
Clinical Prediction Models

• Used to detect serious bacterial infections (SBI)

• Combined lab and clinical data
  – Parameters for age and lab cut offs were not statistically derived and often picked arbitrarily

• “SBI” – a lot of heterogeneity
Clinical Prediction Models

• A shift in predicting who was at low risk rather than who was at high risk
  – <29 days automatic hospitalization, extensive workup, empirical abx
  – 29-60 could go home, IM ceftriaxone, pending labs
Clinical Prediction Models

- Rochester Criteria
- Yale Observational Score
- Barrett Guidelines
Evaluation and Management of Well-Appearing Febrile Infants 8 to 60 Days Old

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Overview

• 21 action statements
• WELL – appearing, 37 week gestation and above
• Rectal temp 38.0 C and above
• Three separate algorithms
  – 8-21 days, 22-28 days, 29-60 days
• Serves as a guide
Laying the groundwork
Changing bacteriology

• Shift from gm+ to gm-
  – Prenatal GBS screening
  – Improved food safety measures
  – *S.pneumo* vaccination
• Bacteremia – E. coli
• Meningitis – GBS
Impact of unnecessary care

• Unnecessary hospitalizations
• Financial and social costs
• Hospital-acquired infections
• Iatrogenesis in prolonged hospitalizations
Advances in Testing

• Historically: WBC, ANC, band count + clinical appearance + urinalysis
  – Less useful with e. coli
• CRP widely available (and now POCT)
• Procalcitonin: less available, most accurate for risk stratification
Advances in Testing

• Automated blood culture systems
  – Most pathogens identified in <24 hours
• Multiplex meningoencephalitis panels for CSF
• Viral PCR testing
Exclusions

- <37 week gestation
- HSV risk factors
- Focal bacterial infection (omphalitis, cellulitis, septic arthritis, osteo)
- Bronchiolitis (+/- RSV)
- Congenital/chromosomal abnormalities

- Immunocompromised
- Neonatal infection/surgery
- Medically fragile infants requiring technology or ongoing therapeutic intervention to sustain life
- Immunizations in last 48 hrs
Inclusions

- Respiratory symptoms (that are not bronchiolitis)
- Diarrhea
- Otitis Media
- Current/recent use of antibiotics
- Positive viral test results
8-21 days
- Admit, work-up (including CSF) and parenteral antibiotics

- “May” obtain inflammatory markers

- Cath U/A, culture if positive
  - LE+, >5 WBCs/hpf, >10 WBCs/mm3

HSV risk

- Maternal hx of genital HSV lesions
- Maternal fever from 48 hours before to 48 hours after delivery
- Vesicles, seizures, hypothermia, mucous membrane ulcers
- CSF pleocytosis w/o positive gm stain
- Leukopenia, thrombocytopenia, ↑ALT

Enterovirus PCR

• CSF pleocytosis and when seasonal increase in enterovirus infections (even if no pleocytosis)
  – Ideally multiplex when available
• Likelihood of bacterial meningitis is low when enterovirus positive
• Does not replace cultures
# Initial Treatment

**TABLE 3 Initial Empirical Antibacterial Therapy for Well-Appearing Febrile Infants 7 to 60 Days Old**

<table>
<thead>
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<th>Suspected Source of Infection</th>
<th>8–21 d Old</th>
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<td>UTI*</td>
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*UTI = Urinary tract infection
*No focus identified
*Bacterial meningitis

Discharge Criteria

• Culture negative x 24-36 hours
• Continues to appear well or is improving
• No other reasons for hospitalization
22-28 days
LP *may* be avoided

- Urinalysis results is negative or positive
- No IM is abnormal
- Blood and urine cultures have been obtained
- Infant is hospitalized

- IMs **should** be done as initial work-up
- Urinalysis with cath **or** bag

Inflammatory Markers

- Procalcitonin $>0.5$ ng/mL
- Temp $>38.5$°C
- CRP $>20$ mg/L
- ANC $<4000$ and $>5200$ cells/mm$^3$
Home Management

- **U/A normal**
- **No** abnormal IMs
- CSF normal or + enterovirus
- Parenteral (IM) antibiotics even if everything normal
- Verbal teaching and written instructions provided
- Repeat evaluation in 24 hrs

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29-60 days
• Start with U/A from bag, spontaneous void or stimulated void

• Bcx and IMs should be done

• CSF only if IMs are abnormal

• No abx while awaiting cultures

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<td>YES</td>
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<td>Blood Culture</td>
<td>YES</td>
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<tr>
<td>Inflammatory Markers</td>
<td>Optional</td>
</tr>
<tr>
<td>CSF</td>
<td>YES</td>
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<td>Antibiotics</td>
<td>YES</td>
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<td>Disposition</td>
<td>Hospital</td>
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Challenges

• First week of life excluded
• “SBI” meaning
• Meningitis is uncommon – small sample size
• Changing epidemiology, resistance patterns, geography
• “Well-appearing” vs “Ill-appearing”
• Variable access to testing
• Barriers to follow-up
Challenges

- Fever in this age group 14 per 1000
  - UTI >10%
  - Bacteremia <2%
  - Bacterial meningitis <0.5%
• BCH CPG - Febrile, well-appearing infants 8-21 d
• BCH CPG - Febrile, well-appearing infants 22-28 d
• BCH CPG - Febrile, well-appearing infants 29-60 d
Feedback/Questions?

BCH Sharepoint site

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