Hot Hot Tot: Fever in Kids <36 months

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The Hot Tot

- 1 day of fever to 38.5
- Mild cough
- PE: T 38.2, o/w WNL
- Do weeks matter?:
  - 2 week old?
  - 7 week old?
  - 6 month old?

Goals

- A short history of the kiddie fever business
- Vaccinations
- Rapid viral testing
- Role of biomarkers (CRP/procalcitonin)
- Month by month approach to fevers in little folks including management
Some immutable facts

- Controversial topic
- Most infants with fever have viral infections
- Bacterial infections in young kids can have bad outcomes

what about Vaccinations?

- Early 1990's: H. influenzae type b (Hib)
- 2000: Pneumococcal-PCV-7
- 2010: PCV-13 (serotype 19a)

Impact:
- Hib: Big
- PCV-7:
  * <90 days: herd immunity
  * >90 days: direct and huge
- PCV 13?
Rapid Viral Testing

- Rapid testing available:
  - RSV
  - Influenza A/B
  - Parainfluenza

- Kids with viral infections are less likely to have bacterial infections

- Impact on <90 day group: potentially significant

- Test all admitted patients

Role of Biomarkers

- **CRP** (rises slowly over 12 hrs; peak in 48 to 72 hrs) and **procalcitonin** (rises over 4-6 hr; peak 12-24 hr)

- Sensitivity inadequate to r/o SBI if high risk

- May be useful in 1-3 month age group to risk stratify

- PECARN and RNA transcriptional signatures
Some Fever ground rules

- Fever:
  - >38.0 **rectal** if <3 months
  - >39.0 if >3 months

- Fevers at home count!

- Fever length (if <5 days) & antipyretic response don’t count

- Kids who look sick are sick!

What does Sick Look Like?

- Lethargic/irritable
- Respiratory distress
- Pale or cyanotic/CRT>2 sec
- Poor suck/tone
- Rash: petechiae, vesicles

Fresh out of the Oven

- 2 week old term female 1 day fever to 38.5
- Maternal GBS+ --> got ampicillin peri-partum
- PE: T 37.9 o/w WNL
- What now?

Neonatal (<30 days) Fever

- 12-28% will have SBI: lots of meningitis
- Bad bugs: GBS, *E. coli*, *Enterococcus, Listeria*
- Even viruses are bad (herpes)
- Can’t tell which are sick
Approach to <30 day neonate

- BCx, UA/UCx (cath or SPA only), LP for all
- CXR if: RR, hypoxia (<97%), G/F/R, abnormal lung exam
- Viral studies not helpful: RSV+ still have high rate of SBI
- CRP/PCT? NPV not high enough to rule out SBI

A word on the LP...

- Position: consider upright
- No lidocaine in the kit???
- Neonates are sensate..be kind:
  - EMLA or other topical analgesic
  - lidocaine
  - glucose water orally
MANAGEMENT OF NEONATES

- ADMIT THEM ALL
  - 3rd generation cephalosporin like cefotaxime or gent AND
  - Increasing ampicillin resistance; vancomycin if sick or if maternal ampicillin
  - Add acyclovir if risks for HSV

Now I can Smile....

- 7 week old term male with 2 days T to 38.9
- PE: T 39, RR 70, O₂ 98% smiles, o/w WNL
- What next?
Do a few weeks make a Difference?

<table>
<thead>
<tr>
<th>&lt;30 days old</th>
<th>30-60 days old</th>
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<tr>
<td>vegetable</td>
<td>social smile</td>
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- Up to 6% of low risk kids have SBI
- Lab tests can better predict high risk
- OB/mening risk*: 2.7-4.1%
- OB/mening risk#: 0.7-1.9%

*Pantell, JAMA 2004
#Morely, Pediatr Emerg Care 2012

Approach to 30-60 day old

- Clinical exam helpful, but still misses SBI
- Rochester/Philadelphia criteria?
- Work-up:
  - UA/UCx?
  - CBC/BCX?
  - LP for all?
  - CXR and stool?
- Social: reliable caretaker? transportation? willing parent?
Role of Viral Studies (RVT)

- **Levine***: SBI in <60d with and without RSV
  - SBI ↓ 12.5 to 7% if RSV+
  - Most SBI were UTI

- **Krief##**: SBI in <60d with and without influenza
  - SBI ↓ 13.3% to 2.5% if flu +
  - Most SBI were UTI

- Large but underpowered to detect meningitis

*Levine, Pediatrics 2004  #Krief, Pediatrics 2009

Inflammatory Markers

- **CRP**: (>20 mg/L): general inflammation *later*

- **Procalcitonin**: (>0.5 ng/ml)
  - responds to bacterial endotoxin, TNF, IL *early*
  - better negative LR

- Better than WBC and ANC

- Inadequate sensitivity as stand alone tests but may help with risk stratification

Yo, Ann Emerg Med 2012
Gomez, Pediatrics 2012
Approach to 30-60 DAY old

**Full workup if toxic or high risk history***

**OPTION #1**
- UA/UCx
- CBC/BCx
- LP
- CXR/stool prn

**OPTION #2**
- UA/UCx
- CBC/BCx if T>40
- CXR/stool prn

*RVT- PCT/CRP ↑
*RVT+ PCT/CRP low

MD Risk tolerance?
Social situation?

*High risk: preemie, on antibiotics, prolonged hospitalization, immunocompromise

What about 60-90 day Babe?

- OB rate even lower! (approaching 0.25%)
- Clinical exam even more reliable
- If well appearing, option #2! *RSV/flu +CRP/PCT + UA
- If bronchiolitis: SBI rate extremely low--> just get UA
Management of 30-90 DAY old

- **Antibiotics (CTX+-Vanco) if:**
  - WBC < 5K > 15K, Band/Neut > 0.2
  - Elevated CRP/PCT
  - UA > 5 wbc/hpf
  - CSF > 8 wbc
  - Stool > 5 wbc/hpf
  - CXR with infiltrate

- <60 days: strongly consider LP if giving abx: multi-focal infections common

Management of 30-90 DAY Old

- **Admit:**
  - UA positive and < 60d or unable to tolerate po
  - CXR positive
  - LP positive
  - High risk

- **Discharge/antibiotics:**
  - Abnl CRP/PCT/WBC
  - >60d: UA+ and looks well

- **Discharge/no antibiotics:**
  - all tests normal
  - good follow-up!!
I’ll tell you what’s wrong..

- 6 month old girl fever of 39.3 for 2 days. Breast feeds well.
- 2 sets of vaccines
- PE: T 39.2. O₂ 96%. Otherwise normal.
- “What are you going to do to me???”

What should I worry about?

- Hx and PE work!!
- OB rate very low post PCV7: 0.25-0.5% (false positive rate BCx: 1-3.6%!!): JUST SAY NO TO BCX
- Pneumonia and UTI predominate so look for these
the under-immunized Kid

- < 2 PCV or Hib: higher risk although herd immunity present
- Danger of herd immunity loss
- Consider RVT and PCT/CRP in younger (<6-12 months) under-immunized kids-->Bcx/Abx if higher risk

Let’s talk about Pee Pee

- 2-5% overall risk UTI but some groups 2-3 x higher

UA/UCx indications:
- **All**: <3 months
- **Uncircumcised boys** <6 mos
- **Girls** <24 mos if T> 39 for >2 days and no clear source.

- Cath best but can try bag
- Abx: CTX then keflex
When do you suspect pneumonia?

- CXR only if clinical signs:
  - tachypnea
  - hypoxia (< 97%)
  - respiratory distress (G/F/R)

- CXR not good at bacterial vs. viral cause so antibiotics if abnormal

- Rx: amoxicillin or azithromycin

Cheat Sheet

- **< 30 days**: Full work-up and admit

- **30-90 days**: UA/UCx; CBC/BCx and/or LP if RVT negative and CRP/PCT up or if poor social - admit for focal infxn or high risk - LP if giving abx <60d

- **3 mo-36 mo**: UTI and pneumonia; bloodwork if high risk or < 2 PCV and ↓ CRP/PCT-->discharge if well appearing
Pediatric Fever References:


