

Title of case: 45 day old female with fever  
Authors: Chen, Chien-Rong  
Faculty reviewers: Sarah Gustafson and Patricia Padlipsky  
Email: cchen5@dhs.lacounty.gov  
Affiliations: Harbor-UCLA Medical Center, Torrance, CA  
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Learning Objectives: KAS 15-20

HPI: A 45 day old F, born via C-section at 39 weeks and 4 days, is brought to the clinic for irritability and an axillary temperature of 39.5°C this morning. Last night she had been doing well but this morning she seemed less interested in her bottle and was harder to console. The patient otherwise has not had any cough, congestion, or rhinorrhea. Oral intake is decreased by about 25% but parents otherwise deny any vomiting, diarrhea, or foul smelling diapers. The parents report that they and two older children at home all feel well. They report that they had visited some family friends the day before for lunch. On examination the infant is alert and sucking vigorously on a pacifier.

Pertinent ROS:

- Irritable with decreased oral intake
- No cough, congestion, or rhinorrhea
- No vomiting, diarrhea or otherwise foul smelling diapers

Birth hx: ex 39 weeks and 4 days, C-section, uncomplicated nursery course, GBS positive with adequate prophylaxis, no maternal fever, rupture of membranes at time of C-section

No PMH, PSH, Meds, or allergies

Imm: received HBV vaccine at birth

Dev: normal for age

Social hx: lives with mom, dad, and two siblings

Family hx: father with hyperlipidemia and hypertension, mother with hypothyroidism on levothyroxine

Vitals: 39.0 °C (rectal), heart rate 160, 82/56, RR 38, satting at 100%

PE:

GENERAL APPEARANCE: well-nourished, well developed

HEAD: anterior fontanelle open, soft, & flat, no cranial hematomas

EYES: conjunctiva, sclera, & pupils normal; red reflexes present bilaterally

EARS: normal position & rotation; canals present

NOSE: passages patent

MOUTH: palate intact; no deformities noted

NECK: supple, no masses palpated, clavicles intact

HEART: RRR, normal S1 & S2, no m/r/g

PULSES: 2+ brachial & femoral pulses bilaterally

LUNGS: CTA bilaterally, no tachypnea/retractions

ABDOMEN: soft, non-tender, non-distended; no masses, no hepatosplenomegaly; umbilicus clean and without erythema or induration

GU FEMALE: normal appearance

EXTREMITIES: no deformities, full range of motion

SKIN: scattered flat and non-tender erythematous macules on the chest and trunk

BACK: no midline defects

NEURO: cries but consolable; good Moro, suck, & grasp reflexes; normal tone & strength

**Question 1.** Based on the patient's history and physical, which of the following sets of diagnostic labs would it be most appropriate to obtain?

- a. Blood culture and CBC
- b. Urinalysis, urine culture, blood culture, and CBC
- c. Urinalysis, urine culture, blood culture, CBC, CRP, and procalcitonin**
- d. Urinalysis, urine culture, blood culture, CBC, CRP, procalcitonin, and CSF studies

Explanation: With increasing age the risk of bacteremia is lower but still high enough to warrant a blood culture. In the absence of localizing symptoms, urine should be tested to rule out a urinary tract infection. Inflammatory markers, when readily available, are highly sensitive for invasive bacterial infections. As independent predictors of invasive bacterial infections, CRP and procalcitonin are the most reliable. However no inflammatory marker should be used alone. 20% of febrile infants with bacterial meningitis had negative procalcitonin levels.

Learning Goal: KAS 15-17

**Question 2.** The urinalysis comes back without any signs of infection or inflammation. Which of the following factors most strongly influences the decision to initiate parenteral antibiotics on this infant?

- a. CBC
- b. Rectal temperature of 39.0 °C**
- c. Absolute Neutrophil Count of 3000/mm<sup>3</sup>
- d. Maternal history of GBS positive

Explanation: Parenteral antibiotics are generally recommended if any inflammatory marker is positive. Inflammatory markers include temperature 38.5 °C, procalcitonin >0.5 ng/mL, CRP >20 mg/L, and ANC >4000-5200/mm<sup>3</sup>. Inflammatory markers are predictive of invasive bacterial infection including bacterial meningitis. However the risk is still low at about 0.25%. CSF studies therefore may be considered in the presence of positive inflammatory markers but are not required. Parenteral antibiotics are not indicated if all inflammatory markers are negative; however, oral antibiotics should be given if a urinalysis is positive to cover for a urinary tract infection.

Learning Goal: KAS 18-19

**Question 3.** The procalcitonin comes back elevated at 1.0 ng/mL. The other labs are normal. The infant has just taken in 2 ounces of formula and is sleeping comfortably. The risk of bacteremia in an otherwise well appearing 29-60 day old newborn with these lab findings is approximately:

- a. <1%
- b. <5%**
- c. 20%
- d. 50%

Explanation: The risk of bacteremia is increased if an inflammatory marker is abnormal. With either an ANC  $>4000/\text{mm}^3$  or procalcitonin  $>0.5 \text{ ng/mL}$ , the risk of bacteremia is 3.2%, compared to a risk of 0.2% if all inflammatory markers are negative. However the risks and costs associated with hospitalization does not clearly outweigh the benefits in this age group. For low risk infants, the decision whether to hospitalize or not should be a shared decision with the parents and should be made after physicians clearly provide estimates of the risks of underlying invasive bacterial infections and benefits of home versus hospital monitoring.

Learning Goal: KAS 20

**Question 4.** The team decides not to obtain CSF studies. After a thorough discussion on the risks and benefits of observing closely in the hospital or at home, the parents decide they would prefer to take care of their baby girl at home. Which of the following is the next best step?

- a. Discharge home after administering parenteral antimicrobials with follow up for the next day**
- b. Discharge home after administering parenteral antimicrobials without follow up
- c. Discharge home without parenteral antimicrobials with follow up for the next day
- d. Discharge home without parenteral antimicrobials without follow up

Explanation: Parenteral antibiotics are generally recommended if any inflammatory marker is positive. Holding antimicrobials may be an option if CSF studies, if obtained, are negative. Obtaining CSF studies is not routinely indicated and should be a shared decision with the family. Patients may be managed at home if all of the following criteria are met: CSF studies (if obtained) are normal, parenteral antimicrobials are administered, appropriate parental education has been provided, follow up plans for reevaluation in 24 hours have been developed and are in place, and plans have been developed and are in place in case of change in clinical status, including means of communication between family and providers and access to emergency medical care.

Case resolution: The parents agree to a next day follow up and are discharged. They present to their PCP the next day with a healthy infant who no longer has a fever. Blood and urine cultures are otherwise negative at 36 hours.

Citations:

Pantell R H, Roberts K B, Adams W G, et al. Evaluation and Management of Well-Appearing Febrile Infants 8 to 60 Days Old. *Pediatrics*. 2021;148(2):e2021052228