PedsCases Podcast Scripts

This is a text version of a podcast from Pedscases.com on "Fever Without a Focus (< 3 months)." These podcasts are designed to give medical students an overview of key topics in pediatrics. The audio versions are accessible on iTunes or at www.pedcases.com/podcasts.

Fever Without a Focus (< 3 months)

Developed by Peter MacPherson and Dr. Sarah Forgie for PedsCases.com.
September 27, 2010.

Peter: Hi everyone, my name is Peter MacPherson and I'm a medical student at the University of Alberta. I'm joined today by Dr. Sarah Forgie, a Pediatric Infectious Disease specialist and an Associate Professor of Pediatrics at the University of Alberta. How are you doing today Dr. Forgie?

Dr. Forgie: Very well, thanks.

Peter: So today, we're going to be talking about an approach to fever without a focus in children younger than 3 months of age. We'll start by defining fever without a focus, then we'll discuss the risk of a serious infection in a case of fever without a focus. From there, we'll give you an approach to neonates (children under the age of 28 days) as well as an approach to infants between the ages of 1 and 3 months. As you will see, the approaches differ between the two age groups.

So why don't we get started. How do we define fever without a focus?

Dr. Forgie: Well there are really two things to define. We define 'fever' as a rectal temperature greater than 38 degrees Celsius. Any child with a recent, documented history of a fever who is afebrile in the ER or your office should also be treated as febrile.

'Without a focus' means that there are is no apparent source of infection after a complete history and physical examination. This is only the case in about 20% of febrile infants and young children. In the other 80% of cases, there are signs and symptoms of a focal infection (for example, an acute otitis media).

Peter: So what's the major worry in a case of fever without a focus?

Dr. Forgie: Our biggest concern is that up to 5-10% of these neonates will have a serious bacterial infection. This means that a fever in a child younger than three months should always suggest the possibility of a serious bacterial infection. We worry about

bacteremia, pneumonia, occult urinary tract infections, or early bacterial meningitis, because these children cannot effectively compartmentalize infections.

Peter: So in a febrile child younger than 3 months, we should always consider a serious bacterial infection. Next question – which bacteria are causing these infections?

Dr. Forgie: The causative organisms are different in the two age groups we are considering. Under one month of age, the bugs we are worried about are *Escherichia coli*, Group B Streptococci, and *Listeria monocytogenes*. The source of these bacteria is the mother's vaginal tract. For infants between the ages of 1 and 3 months, the neonatal pathogens are still on the list, but we add the community-acquired pathogens *Streptococcus pneumoniae*, *Neisseria meningitidis* and *Haemophilus influenzae* type B.

Peter: Alright, now that we've got a sense of the bugs, why don't we start by talking about the approach to fever without a focus in a neonate?

Dr. Forgie: Sure. We tend to deal with neonates in this scenario conservatively. It's hard to evaluate their behaviour, they can't effectively compartmentalize infections and their immune systems can't handle certain pathogens so there is a higher frequency of serious bacterial infections. So all neonates are admitted into hospital and receive a full "septic work-up" and empiric antimicrobial therapy.

A "septic work-up" means that you need to do a complete blood count and differential, blood culture, urinalysis and urine culture from a catheterized urine sample, and a lumbar puncture. If there are any respiratory symptoms, then the child should also have a chest X-ray. The goal here is to search for a source of the fever and rule out serious bacterial infection.

We start parenteral antimicrobial therapy empirically. Good choices would be ampicillin and gentamicin or ampicillin and cefotaxime. Remember that you are trying to cover *E. coli*, Group B Strep and *Listeria monocytogenes*.

Peter: So to summarize, under 28 days of age we have a 'one size fits all' approach for fever without a focus. Everyone gets admitted to hospital for a full septic work-up. Everyone gets parenteral antimicrobial therapy. And we would treat with either ampicillin and gentamicin or ampicillin and cefotaxime.

Let's move on to the 1-3 month olds. And here our approach gets a bit trickier because we start talking about risk stratification.

Dr. Forgie: That's right, not all infants in this age group require admission to hospital or antimicrobial therapy. As such, we need a way to identify the low-risk infants. There are a number of criteria to be classified as low-risk, and these criteria are both clinical and laboratory-based.

An easy first decision point is whether or not the infant looks toxic. A toxic-appearing infant is pale or cyanotic, lethargic or inconsolably irritable (they won't settle with parents). In addition, they may have tachycardia, tachypnea and poor capillary refill. If the child looks toxic, then we will follow the same approach as with the neonates – admission to hospital for parenteral antimicrobial therapy and a full septic work-up.

Peter: So a toxic-appearing infant 1-3 months old does not qualify as low-risk. They receive empiric treatment as an inpatient and get a full septic work-up. Who does qualify as low-risk in this age group?

Dr. Forgie: Let's go through the low-risk criteria. To apply these criteria, you will need to have results from a complete blood count with differential, urinalysis and, in the case of a child with diarrhea, stool microscopy. There are clinical criteria and laboratory criteria.

The clinical criteria are:

- Non-toxic appearance, as we already mentioned
- Previously healthy, term infant
- No focal bacterial infections such as skin, soft tissue or bone and joint infections on examination

The laboratory criteria are:

- A white blood cell count between 5 and 15 x 10^9/ L (with fewer than 1.5 x 10^9/ L bands)
- Normal urinalysis (<10 WBC/hpf)
- If diarrhea is present, no blood in the stool and fewer than 5 WBCs/hpf in the stool.

If all these low-risk criteria are met, then outpatient management without antimicrobials is appropriate since the risk of a serious bacterial infection is quite low. These children should still get a partial work-up including a blood culture, a urine culture and they should remain under careful observation. This means that adequate follow-up must be assured.

Depending on physician and parent preference, a lumbar puncture and chest x-ray, with or without empiric antimicrobials can be added to this outpatient management for a more conservative approach.

Peter: Let's summarize that. We have both clinical and laboratory criteria to classify a child between the ages of 1 and 3 months as low risk.

The clinical criteria are a non-toxic appearance, the child was previously well, and the absence of focal bacterial infections.

The laboratory criteria are a white count between 5 and 15 (with fewer than 1.5 bands) and normal urinalysis. Additionally, if the child had diarrhea, we would need to see no blood in the stool and fewer than 5 WBCs/hpf.

And if we satisfy all these criteria, the infant can be managed as an outpatient without antimicrobials. We would do a blood culture and urine culture and ensure good follow-up.

Dr. Forgie: Right. And if you wanted to be fairly conservative, you could do a lumbar puncture and maybe even treat empirically.

Peter: Great. That brings me to the next point. What would our treatment be if antimicrobial therapy is indicated, for example, if the low-risk criteria were not met?

Dr. Forgie: For children between the ages of 1 and 3 months, we would treat with ampicillin and cefotaxime. If you suspected bacterial meningitis because of CSF findings, you would drop ampicillin and add vancomycin to the cefotaxime.

Peter: The last topic we have to cover is follow up in our low-risk infants. What do we do?

Dr. Forgie: That will depend on the results of your blood and urine cultures and the child's clinical condition:

- If all cultures are negative and the child is afebrile and appears well, then careful
- observation is all that is required.
- If all cultures are negative, the child appears well, but is still febrile, careful observation is required and you should consider giving more antimicrobial therapy.
- If the urine culture is positive and the child is afebrile and well, we would give antimicrobials in an outpatient setting.
- If the urine culture is positive and the child has a persistent fever, they should be admitted for a full septic work-up and antimicrobial therapy.
- If the blood culture is positive, the child should be admitted for a full septic work-up and parenteral antimicrobial therapy.

Peter: This brings us to the end of the podcast. Dr. Forgie, would you like to give the students some take-home points from this podcast?

Dr. Forgie: Of course. The key points to remember are as follows:

1) If you see a fever without a focus in a child under three months, consider the possibility about a serious bacterial infection
2) Your approach differs based on the child's age. Our two age groups are younger than 1 month, and between 1 and 3 months.

3) A fever without a focus in a child under 28 days of age mandates hospitalization, empiric antimicrobial therapy and a full septic work-up. A good antimicrobial choice would be ampicillin and gentamicin or ampicillin and cefotaxime. Your work-up will consist of a complete blood count and differential, urinalysis, urine culture, blood culture and lumbar puncture.
4) In children between the ages of 1 and 3 months, we use low-risk criteria (appearance, CBC, urinalysis, stool white blood cell count) to help us decide which children need hospitalization, further septic work-up and empiric treatment. If therapy is indicated, a good antimicrobial choice in these children is ampicillin and cefotaxime.
5) Your follow-up of low-risk children depends on culture results and the child's clinical condition.

Peter: That concludes the podcast. I'd like to thank Dr. Forgie for joining me and I'd like to thank you for listening.

References

References available upon request.