

Navigating toward Neonatology: Newborn Fever

Benjamin Hopkins, OSM IV, Joseph Hageman, MD

“Let me start by introducing myself. My name is Benjamin Hopkins, and I am currently a fourth-year medical student at Western University of Health Sciences in Pomona, California. When ‘I grow up,’ I want to be a Neonatologist. Recently, my wife and I welcomed our first child and are learning to be first-time parents. Follow along with this column as I navigate my way to becoming a neonatologist.”

Let me start by introducing myself. My name is Benjamin Hopkins, and I am currently a fourth-year medical student at Western University of Health Sciences in Pomona, California. When “I grow up,” I want to be a Neonatologist. Recently, my wife and I welcomed our first child and are learning to be first-time parents. Follow along with this column as I navigate my way to becoming a neonatologist.

I am in the midst of residency application season and undergoing interviews. Knowing that I am heading towards fellowship, my application was sent solely to “Categorical pediatrics” programs, most with high match rates in neonatology and programs that will offer me broad exposure to neonatal patients.

This past month, I had the privilege of rotating through the Kaiser-Permanente system. It was a great experience to see how an organization with vertical control over all aspects of its care operates. The physicians I worked with were knowledgeable and kind, and the residents I collaborated with were excellent. I spent most of my time on the inpatient pediatrics floor, with an occasional journey to the Emergency Department to consult on presenting children.

During this rotation, a patient helped me understand newborn fever; she was a 13-day-old female who came in with a fever of 102.3 F for one day. She was clinically well-appearing and in no acute distress, so I followed the [AAP Clinical Practice Guidelines](#) and proceeded with a urinalysis (UA), urine culture (UCx), blood culture (BCx), complete blood count (CBC) with differential, C-reactive protein (CRP), and a lumbar puncture (LP) with a cerebral spinal fluid (CSF) culture and Herpes Simplex Virus (HSV) Polymerase chain reaction (PCR)(1). The patient was then started on Acyclovir, Ampicillin, and Gentamicin for parenteral coverage, pending negative lab results (1). Labs came back quickly, and the UA was clean; CBC showed elevated White blood cells with

a left shift, and CRP was elevated in the low 100s. However, the UCx, BCx, CSF culture, and HSV PCR were still pending. Antibiotics and antivirals were continued as appropriate. We had little suspicion of HSV, and our suspicion was soon proven correct with a negative HSV PCR, which allowed us to stop Acyclovir. The patient was kept off of acetaminophen to observe for a recurrence of fever, which seemed to spike once a day. Otherwise, the patient had no constitutional symptoms and was feeding appropriately. At 24 hours, there was no culture growth, but the patient still presented with a fever. Later that day, the BCx returned positive for Staph Epidermidis, which was concluded to be contaminated, so a repeat BCx was taken. Nothing changed over the next 24 hours; there was no growth on any cultures, and the patient’s only symptom was occasional fever. Holding the patient for 36 hours out of precaution is recommended in the AAP guidelines; however, that would discharge the family at 3 AM, so it was decided to discharge the following afternoon, close to 48 hours if there was no clinical change or change in labs. That is what happened exactly; there was no change in clinical presentation and no growth in labs, and the patient was discharged with a follow-up with their general pediatrician in 2 days. I know this story is nothing exciting, and there is no definitive conclusion as to what was causing the fever. We concluded it was most likely a viral process we did not test for.

“However, these ‘everyday’ cases teach you what is expected and what to look for. This is one of those diagnoses that can present in many ways and one of the reasons why clinical presentation is crucial in deciding patient treatment pathways. This patient presented in no acute distress, was otherwise healthy, and had a non-concerning birth history.”

However, these “everyday” cases teach you what is expected and what to look for. This is one of those diagnoses that can present in many ways and one of the reasons why clinical presentation is crucial in deciding patient treatment pathways. This patient presented in no acute distress, was otherwise healthy, and had a non-concerning birth history. With this in mind, it is appropriate to follow the guidelines of a full sepsis workup to have time to discover what is causing the symptoms (2).

Guidelines struggle when the patient presents in any manner other than well-appearing, and the clinician’s experience comes to the forefront in determining the best approach. With an ill-appearing child, it is crucial to start with a sepsis workup, but there are additional steps to take depending on the presentation. With respiratory symptoms, get a chest x-ray, COVID-19 PCR, rapid influenza swab, and a rapid RSV swab (3-5). With GI symptoms, add a stool

culture, serum AST and ALT, and a fecal calprotectin study (3-5). With signs of septic shock, add PT, aPTT, INR, Fibrinogen, D-dimer, serum lactate, total bilirubin, ALT, ionized calcium, rapid blood glucose, arterial/venous blood gas, BUN, creatinine, and serum electrolytes (3-5). Along with labs, it is of vital importance to stabilize the patient; this is typically done by providing oxygen support (if needed), obtaining two peripheral large bore IVs, and, if there are no signs of fluid overload, giving a bolus of Normal Saline or Lactated Ringers (3-5).

“Through the countless typical presentations, such as this one, physicians encounter, they learn to differentiate those who present as well-appearing vs ill-appearing and know which direction of treatment to begin. However, even with experience, it is essential to collaborate with others and ensure that multiple thought processes and experts are being consulted.”

This is all determined by the clinical presentation of the newborn; since they cannot provide a history themselves, it is up to the clinician to observe and conclude which approach to take in treatment. Through the countless typical presentations, such as this one, physicians encounter, they learn to differentiate those who present as well-appearing vs ill-appearing and know which direction of treatment to begin. However, even with experience, it is essential to collaborate with others and ensure that multiple thought processes and experts are being consulted.

This is one of the many reasons I love medicine; even with a typical presentation and no definitive diagnosis, there is much to learn from each patient, and the experiences help us grow into better providers. I look forward to what my next “typical” patient will teach me while continuously watching for those once-in-a-lifetime cases.

I have also had the pleasure of meeting with Dr. Joseph Hageman, a retired neonatologist and the Director of NICU Quality Improvement at Comer Children’s Hospital, as well as the editor-in-chief of Pediatric Annals, and speaking about what makes an outstanding neonatologist.*

My first question is, “What qualities are most essential to excel as a neonatologist?”

Patience, having patience with your coworkers, the patient’s parents, and everyone in between. I feel that patience separates a doctor from “doing everything right” from “doing everything right except...” in the parent’s eyes. Also, doing your best, even if the outcome is not what you want, by knowing you did your best, you can be confident you did all you could to help the patient.

Next, “What do you now know that you wish you knew before going into neonatology?”

How I dealt with grief: it is crucial to learn how you deal with death and traumatic events and make sure you have time to process them and work through them. Use the resources offered to you.

“Do rotations in multiple areas of neonatology and figure out where you want to spend your time; there are numerous directions you can take as a neonatologist and what you get involved in, and it’s essential to learn where you want to be and where you want to spend your time.”

Additionally, “What would you encourage future neonatologists to prioritize and be involved in?”

Do rotations in multiple areas of neonatology and figure out where you want to spend your time; there are numerous directions you can take as a neonatologist and what you get involved in, and it’s essential to learn where you want to be and where you want to spend your time.

Further, “How do you think the critical care scenario of the NICU affects the chance of burnout? And how should we counter it?”

I think the amount of burnout has increased since the old “tough it out” days; there was a massive amount of burnout due to COVID-19, but there are other factors, too. We can combat this by monitoring our wellbeing; it’s nice we now have therapists and mindfulness. We can practice mindfulness and work-life balance, which are much more encouraged than they used to be. If I had learned of these earlier, I think it would have helped my stress levels and stopped me from “working myself to death.”

Lastly, “What are you currently working on?”

I am currently working on a clinical pearl about burnout; it will look at rates of burnout, suicidal ideation, and other mental health issues that affect healthcare providers.

“Neonatology and the journey to get there is wonderful. With plenty of ups and downs, complex and typical patients, and long days, it is a journey I am excited to embark on. Please stick around and follow me on my path as I navigate toward neonatology. I would like to also send a special thank you to Dr. Hageman for meeting with me this month.”

Neonatology and the journey to get there is wonderful. With plenty of ups and downs, complex and typical patients, and long days, it is a journey I am excited to embark on. Please stick around and

follow me on my path as I navigate toward neonatology. I would like to also send a special thank you to Dr. Hageman for meeting with me this month.

*Answered paraphrased from a video call.

References:

1. Robert H. Pantell, Kenneth B. Roberts, William G. Adams, Bernard P. Dreyer, Nathan Kuppermann, Sean T. O'Leary, Kymika Okechukwu, Charles R. Woods, SUBCOMMITTEE ON FEBRILE INFANTS; Clinical Practice Guideline: Evaluation and Management of Well-Appearing Febrile Infants 8 to 60 Days Old. *Pediatrics* August 2021; 148 (2): e2021052228. 10.1542/peds.2021-052228
2. Wing R, Dor MR, McQuilkin PA. Fever in the pediatric patient. *Emerg Med Clin North Am.* 2013 Nov;31(4):1073-96. Doi: 10.1016/j.emc.2013.07.006. Epub 2013 Sep 26. PMID: 24176480.
3. Gomez B, Mintegi S, Bressan S, Da Dalt L, Gervaix A, Lacroix L; European Group for Validation of the Step-by-Step Approach. Validation of the "Step-by-Step" Approach in the Management of Young Febrile Infants. *Pediatrics.* 2016 Aug;138(2):e20154381. doi: 10.1542/peds.2015-4381. Epub 2016 Jul 5. PMID: 27382134.
4. Gómez B, Mintegi S, Benito J, Egireun A, Garcia D, Astobiza E. Blood culture and bacteremia predictors in infants less than three months of age with fever without source. *Pediatr Infect Dis J.* 2010 Jan;29(1):43-7. doi: 10.1097/INF.0b013e3181c6dd14. PMID: 19934784.
5. Baker MD, Avner JR, Bell LM. Failure of infant observation scales in detecting serious illness in febrile, 4- to 8-week-old infants. *Pediatrics.* 1990 Jun;85(6):1040-3. PMID: 2339027.

Disclosure: *The authors have no conflicts of interests to disclose.*

NT



*Joseph R. Hageman, MD
Senior Clinician Educator
Pritzker School of Medicine
University of Chicago
5841 S. Maryland Ave.
Chicago, IL 60637
Phone: 773-702-7794
Fax: 773-732-0764
Email: jhageman@peds.bsd.uchicago.edu*

Corresponding Author



*Benjamin Hopkins, OMS IV
Western University of Health Sciences
College of Osteopathic Medicine of the Pacific
Email: Benjamin.Hopkins@llu.edu*