This issue presents information about most aspects of managing children with fever, including financial issues such as home management and reducing the cost of antibiotics. Febrile children are common, and their management consumes a large part of pediatric care. They also are stressful. It would be helpful to all if protocols could be used to manage febrile children, and you can bet that health maintenance organizations (HMOs) would want these if they existed. At first glance, it seems like protocols should not be that hard to develop. With all the clinical tools at our disposal, how hard should it be to outline a management scheme that selects the few children who have sepsis, meningitis, encephalitis, or bone and joint infections? But this is not a simple matter. The following history of the management of febrile infants younger than 2 months illustrates the complexity in coming up with defined management strategies for febrile children.

Before 1973, our policy at Nashville General Hospital was to admit all children <2 months who presented with fever. All were to undergo blood, urine, and spinal fluid cultures before being placed on intravenous antibiotics for presumed occult bacterial disease. If cultures were negative after 3 days and no infection requiring longer therapy had become apparent, these children were sent home.

In 1973, we noticed two things. First, there were a lot of these children: 9% of all medical admissions were for this problem. Second, few seemed to have a serious occult bacterial infection. So we initiated a study of all children younger than 2 months admitted with a temperature of ≥37.9°C. This was retrospective from January 1972 to mid-1973 and then prospective through December 1975: 147 qualified and only three had clear evidence of a life-threatening bacterial infection (one with empyema due to Staphylococcus aureus and one each with meningitis and septic arthritis due to group B streptococci.) That all three had a serious infection was evident when they were first seen. Another four had positive urine cultures, four had otitis, and one mastitis, but none of these nine were seriously ill.

We concluded that serious occult bacterial disease was rare in our series and that our routine management was too aggressive. So we began to allow individualized management. We also wondered whether others had the same policy of routine admission and intravenous antibiotics. Therefore, a questionnaire was mailed to all 107 chief residents of US university training programs and to 136 American Academy of Pediatrics (AAP) members in private practice from seven representative US cities, asking how they managed outpatients <2 months who presented with a temperature ≥37.9°C.

Seventy-three percent of chief residents and 53% of practitioners responded, but their answers clustered near opposite ends of the spectrum: 53% of university programs and 9% of practitioners said they admitted virtually all or more than 90% of such children while 7% of universities and 52% of practitioners estimated 10% or fewer were hospitalized. This was our first insight into the complexity of this issue. Anyway, we presented this at the plenary session of the Ambulatory Pediatric Society with the conclusion that routine admission and intravenous antibiotics might not be necessary for all febrile infants <2 months.

The next sign that this topic was complex came continued on page 602
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from our inability to get this paper published. Multiple journals rejected our manuscript, indicating their reviewers found it "too controversial, not safe, not the way we do it" and flawed because some of our febrile patients were not hospitalized after 1973 and we could have missed serious infections if follow-up occurred elsewhere. So we added a prospective study that followed all 37 febrile children <2 months seen in our clinics and emergency center over 6 months. Again, we failed to find occult serious infections but it was clear that management at home or admitting and following without routine intravenous antibiotics was more stressful and required closer follow-up (with frequent changes in course) compared to admitting and treating all of them. The paper was finally published in 1981.1

Other studies about management for febrile infants <2 months followed. In general, these studies have reported considerable variation in the proportion of children with serious or occult bacterial infections, in the usefulness of various laboratory tools and clinical signs to identify serious infections, and in the opinions about how these children should be managed.2-3 For example, immediately following our study, Roberts and Borzy4 found of 61 febrile infants <8 weeks had bacteremia, and 8 of these could not be distinguished from the others by height of fever, white count/differential, or evidence of a focus of infection (other than meningitis) on presentation. Most other studies found more bacterial disease than we had identified.

Why don't we just admit and give intravenous antibiotics to all infants <2 months who have fever? The cost is too high in both dollars and iatrogenic risks. Catherine DeAngelis studied 190 infants <2 months admitted with fever and found 20% had iatrogenic complications: half were from intravenous therapy, and about 5% of all children had sloughing of skin due to intravenous infiltration. Another 26 had a "misadventure" such as contamination of cerebrospinal fluid and blood cultures, procedural problems with lumbar punctures, and wasted hospital days or laboratory tests.5 So a key factor is that the management of febrile children must consider the risk/benefit ratio and balance risks in both treating and observing without treatment.

The past few years has seen more consensus about the management of young febrile children, aided by some large series.6-8 But we still are a long way from having specific protocols. The recent practice guidelines discussed by Sectish in this issue are fairly complicated although they are the best we have.

Twenty years after our original studies, we manage febrile children <2 months very much like the recent guidelines.3 We don't automatically treat those beyond 3 or 4 weeks of age if they lack signs of serious infection, especially if there is a history of exposure or evidence of a benign viral infection. We admit and observe many of these without antibiotics, especially if we are worried about the family's ability to recognize deterioration at home and get the child back to us. Once you start antibiotics for presumed sepsis, you have "bought" 3 days of hospitalization for intravenous treatment while waiting for blood culture results. Many of these children become afebrile during the first hospital day, and you can send them home if you have not started antibiotics. But when we follow without antibiotics, in the hospital or at home, we "stick like glue." The patient always is reexamined in 24 hours because a new diagnosis often appears. We look for osteomyelitis and septic arthritis because these can be subtle in young infants. We still do a full sepsis work-up, trying hard not to contaminate cultures because this wastes time and money, in almost all. Lumbar puncture, urine and blood cultures, urinalysis, and complete blood count and differential are routinely performed to guide therapy. We no longer do routine chest radiographs because these add little or nothing if the infant has no signs of a respiratory infection.9 And we manage those with a history of prematurity, nursery complications, or congenital anomalies more aggressively.

Managed care should help us overcome a major confounder in the management of febrile children. The incidence of different organisms and their susceptibility to antibiotics differ by season and over the years. This temporal fluctuation is compounded by the fact that the mix of organisms in a community, from benign viral infection to highly pathogenic bacteria, also fluctuates from region to region. For example, we could have two 6-week-old babies who both had a temperature of 38.5°C and the same unremarkable past history and physical examination. However, one lives in an area experiencing an epidemic of influenza and has two older siblings with fever and a mild cough. The other lives in a place with several recent case of meningococcal meningitis. You can see how it would be difficult to incorporate all these variables into a protocol. But HMOs could give their physicians up-to-the-minute information about those infectious agents active in their community and their antibiotic sensitivities.

What does all this mean for us? The good news is that we are not likely to be replaced soon by computers or nurse practitioners following protocols to manage young febrile children. The bad news is that managed care will force us to walk closer to the risk/benefit line that separates unnecessary expense and safe care for febrile children. It is more difficult to observe febrile outpatients younger than 2 months without treatment than to admit them and start intravenous
antibiotics. You can’t sleep as well. So the pediatrician will need more knowledge and ability to tolerate stress to deliver quality care at lower cost. Incidentally, next month’s issue of Pediatric Annals will describe “how to” do common pediatric procedures including those needed by febrile children.

REFERENCES


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