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Editorial: Clinical Policy for Children Younger Than Three Years Presenting to the Emergency Department With Fever

See related article, p. 530.


In this issue of Annals, the American College of Emergency Physicians (ACEP) Clinical Policies Committee presents ACEP’s “Clinical Policy for Children Younger Than Three Years Presenting to the Emergency Department With Fever.” This evidence-based guideline is one of many developed by this committee and published in Annals. I am pleased that so many physicians and medical organizations have recognized the value of evidence-based medicine, have overcome initial apprehensions about “cookbook medicine” and potential malpractice risks, and have adopted the use of complaint-specific guidelines as a starting point to determine the appropriate diagnostic tests and treatments in carefully selected groups of patients. I await the day when these guidelines will be incorporated into an electronic medical record and can be used contemporaneously with patient care by the majority of practicing physicians.

In general, this clinical policy restates much of what was noted in an article I authored in Annals in 2000, which was an update of a guideline developed by experts in pediatric emergency medicine and pediatric infectious diseases published simultaneously in Pediatrics and Annals of Emergency Medicine in 1993. The original guideline was primarily created for the following reasons: (1) to reduce the number of hospital admissions in the 1- to 3-month age group using the
“Rochester” or low-risk clinical and laboratory criteria and (2) to reduce the risk of sending an infant or small child aged 3 months or older home with occult pneumococcal bacteremia that might progress, if untreated, to bacterial meningitis. The latter aspect of the guideline was controversial because both the risk of occult pneumococcal bacteremia and the risk of subsequent pneumococcal meningitis varied in different publications depending on methodology and because of concerns of excessive testing and treatment.

**Occult Bacteremia**

The clinical policy states, “Once the pneumococcal vaccine becomes broadly included within pediatric practice, future studies will be necessary to determine whether empiric antibiotic treatment of children suspected of harboring occult bacteremia is warranted.”

Although the currently licensed vaccine (Prevnar, Wyeth Laboratories, Madison, NJ) is active against only 7 of the 90 serotypes of *Streptococcus pneumoniae*, it has already dramatically reduced the risk of invasive diseases resulting from *S pneumoniae* in young children by approximately 90%. This vaccine is now routinely included in pediatric practice, and vaccine shortages no longer exist in any state. In children who have received 3 doses of this vaccine, the risk of occult pneumococcal bacteremia and subsequent bacterial meningitis is sufficiently remote to no longer warrant the use of WBC counts, blood cultures, and empiric antibiotics. In fact, in a recent study of a newer nonavalent conjugate vaccine, after 2 doses, more than 95% of infants had serotype-specific antibody and after 3 doses more than 98% had serotype-specific antibody for all 9 serotypes. Thus, I believe that after 2 doses of conjugate *Haemophilus influenzae* and *S pneumoniae* vaccines, the only occult bacterial infection one need be concerned about is a urinary tract infection. Conjugate pneumococcal vaccines reduce nasopharyngeal acquisition of vaccine-specific serotypes of *S pneumoniae*, which may in turn reduce the incidence of pneumococcal disease among nonvaccinated individuals; this is termed indirect or herd immunity. Although the emergence of antibiotic-resistant strains has complicated disease management, pneumococcal conjugate vaccines have been shown to protect against pneumococcal disease caused by such strains because most antibiotic-resistant strains are of the serotypes included in these vaccines. Thus, widespread use of these conjugate vaccines may prevent disease by providing both direct and indirect immunity and may reduce the use of antibiotics and the development of antibiotic resistance worldwide.

**Occult Urinary Tract Infections**

As noted in the clinical policy, occult urinary tract infections are relatively common in infants and young children with fever without source, especially in females and uncircumcised males younger than 2 years and circumcised males younger than 1 year, and a catheterized urine specimen should be obtained to exclude this diagnosis. Bag urine specimens are not acceptable because cultures obtained from these specimens are often contaminated. Emergency nurses who are able to accomplish intravenous lines in young children should be competent in obtaining catheterized urine specimens. Parents need to be informed that a catheterized urine specimen for culture will be necessary anyway if a bag specimen urinalysis is positive, and that obtaining a catheterized urine specimen will decrease time in the emergency department (ED). I do not think a urine culture needs to be sent whenever a urine specimen is obtained; this is only necessary in children younger than 3 months. In infants older than 3 months, urinary tract infection is unlikely if results for urine leukocyte esterase and nitrate are negative or there is no significant pyuria. It may be appropriate to consider occult urinary tract infections in children with fever greater than 39°C (>102.4°F) with minor respiratory infections or inconclusive signs of acute otitis media.

**Occult Pneumonia**

I am pleased the committee adopted the position that a chest radiograph should be obtained in febrile children aged younger than 3 months with evidence of acute res-
piratory illness and that there is insufficient evidence to
determine when a chest radiograph is required in a
febrile child aged older than 3 months. I think the same
standard should be applied to all febrile children: there
is no need for chest radiograph if there are no signs or
symptoms of pulmonary infection. The committee did
not comment on pulse oximetry, but the routine use of
triage pulse oximetry should result in the detection of
most clinically occult pneumonias, as well as other
occult pulmonary diseases.16 Most pneumonias in
non-toxic-appearing febrile children are viral in origin
and do not need antibiotics. The widespread use of
the pneumococcal conjugate vaccine has further decreased
the incidence of pneumococcal pneumonia with bacte-
meria in this population.17

FEBRILE NEONATES

The Committee recommended that infants between 1
and 28 days old with a fever should be presumed to have
a serious bacterial infection. These neonates should have
a full “sepsis workup” (ie, WBC count, blood culture,
urinalysis, urine culture, lumbar puncture), receive
antibiotic therapy in the ED, and be admitted. Many
infants with cerebrospinal fluid pleocytosis in this age
group will have viral meningoencephalitis including
enteroviral and, rarely, herpes simplex encephalitis.
The initial clinical and cerebrospinal fluid findings in
infants with herpes encephalitis may be no different
than in infants with other viral central nervous system
infections (fever and lethargy), but most cases of herpes
encephalitis evolve to demonstrate focal neurologic
signs and symptoms including seizures. Acyclovir is the
drug of choice for herpes simplex encephalitis and sub-
stantially reduces mortality and morbidity. The use of
acyclovir should be considered, especially in those who
have cerebrospinal fluid pleocytosis suggestive of viral
meningoencephalitis, until a herpes polymerase chain
reaction test on cerebrospinal fluid is negative.18
Enteroviruses are the most frequent causes of viral
meningitis in infants.19 Most infants with viral menin-
goencephalitis will have an enteroviral infection with a
benign outcome; however, acute neurologic complica-
tions, including complex seizures, increased intracra-
nial pressure, and decreased consciousness, occur in
approximately 10% of cases.19-21 Although these com-
plications generally are not associated with long-term
sequelae, neurologic sequelae have been described after
enteroviral meningitis and encephalitis.22 In the future,
pleconaril may play a role in these infections.23

YOUNG INFANTS 28 DAYS TO 3 MONTHS OF AGE

The committee did not address the issue of children 28
days to 3 months of age. These young infants may be
treated as outpatients if they meet clinical and labora-
tory low-risk criteria. There are 2 different published
low-risk criteria, the Rochester and Philadelphia crite-
ria. There is one important difference between them:
the Philadelphia criteria include a lumbar puncture and
the revised Rochester criteria do not.24,25 Of 872 low-
risk infants in 5 studies evaluated using the Rochester
criteria without a lumbar puncture, 10 (1.1%) had a
serious bacterial infection. None had or developed bac-
terial meningitis.4 Using the Philadelphia criteria, none
of 548 low-risk infants had meningitis; however, one
who met the WBC count and urinalysis criteria had
pneumococcal meningitis diagnosed by lumbar punc-
ture (personal communication, M. Douglas Baker, MD,
August 4, 2003). When a lumbar puncture is done, 10%
of febrile infants are diagnosed with aseptic meningi-
tis.25 Recently, Bonsu and Harper26,27 conducted a ret-
rospective review of all febrile infants, including those
not well appearing and without fever without source,
presenting to the Children’s Hospital, Boston ED during
a 7.5-year period. They reported that neither bacteremia
nor bacterial meningitis was reliably predicted by WBC
count.26,27 The WBC count is also not reliable as a screen
for urinary tract infections.28 The risk of bacteremia is
higher in young infants with fever without source than
in those with a viral respiratory source.29 I still believe
that for infants in this age group with fever without
source who are to be managed as outpatients, there are 2
strategies: (1) a full sepsis workup including lumbar
puncture with outpatient parenteral antibiotics or (2) if
the physician and parent are willing to accept the small risk of missed meningitis (approximately 1 in 1,000), a partial sepsis workup without a lumbar puncture.4,30 I do not think antibiotics should be given if a lumbar puncture is not performed because their administration will make subsequent differentiation of bacteria from viral meningitis difficult.

In conclusion, I would like to reemphasize some of the important points regarding the management of febrile infants that I teach our emergency medicine and pediatric residents. Fever is defined as a rectal temperature greater than 38.0°C (>100.4°F). A recent documented fever at home should be considered the same as a fever in the ED and result in similar management. Fever and vomiting without diarrhea should generally not result in a diagnosis of “gastroenteritis.” Other diagnoses should at least be considered, including central nervous system infections, urinary tract infection, appendicitis, intussusception, and Reye’s syndrome.

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REFERENCES


