Should Infants Presenting with an Apparent Life-Threatening Event Undergo Evaluation for Serious Bacterial Infections and Respiratory Pathogens?

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We sought to identify which patients with an apparent life-threatening event require infectious evaluation through an analysis of infants aged ≤12 months brought to an emergency department with an apparent life-threatening event. Among the 533 children evaluated, there were no cases of meningitis, 1 case of bacteremia, 17 cases of urinary tract infection, 22 cases of bacterial pneumonia, 22 cases of respiratory syncytial virus, and 2 cases of influenza virus identified in respiratory specimens. *(J Pediatr 2014;164:1231-3).*

The evaluation of infants brought to the emergency department (ED) with an apparent life-threatening event (ALTE) can be difficult. Serious bacterial infections are among the possible causes of an ALTE. Single-center studies including between 65 and 243 infants have investigated the utility of testing infants with ALTE for serious bacterial infections.[1-6]

Testing for serious bacterial infections can be invasive and time-consuming. Currently, 2.7%-38% of patients evaluated for an ALTE undergo lumbar puncture, 19%-62% undergo blood culture, 18%-52% undergo urine culture, approximately one-half undergo chest radiography,[1,2,7] and 25%-33% are tested for respiratory syncytial virus (RSV).[8,9] Appropriate omission of these tests could streamline the ED workup of infants with ALTE. We sought to determine whether testing is warranted in well-appearing infants evaluated for an ALTE in the ED, and whether certain characteristics indicate a need for testing.

Methods

This was a secondary analysis of data from an Institutional Review Board approved 3-center prospective observational study performed between August 2009 and February 2012.[10] All patients were aged ≤12 months and were brought to an ED with an ALTE, as defined by the National Institutes of Health's 1986 consensus statement.[11] Tests were ordered at the discretion of the treating physician. Symptoms, assessment of appearance, and test results were recorded prospectively on a standardized data sheet. Patients were followed until discharge if hospitalized or to 1 week if discharged to home from the ED.

A urine culture was considered positive if ≥10 000 colony-forming units (CFU)/mL of a typical pathogenic bacteria were isolated and the patient was treated with antibiotics and "possible" if <10 000 CFU of a single organism were isolated and the patient was treated or if >10 000 CFU/mL were isolated but the patient improved without antibiotic therapy. Chest radiography was considered positive if the findings were reported by the radiologist as consistent with bacterial pneumonia or as possible bacterial pneumonia and the patient was treated. RSV and influenza testing modalities included enzyme immunoassay and polymerase chain reaction. Descriptive statistics were performed.

ALTE	Apparent life-threatening event
CFU	Colony-forming unit
ED	Emergency department
RSV	Respiratory syncytial virus
URI	Upper respiratory infection
UTI	Urinary tract infection

Results

A total of 533 patients were included (**Table I**; available at www.jpeds.com). Follow-up was successful in 527 (98.9%). Cerebrospinal fluid testing was performed in 65 patients (12.2%). The rate of meningitis was 0% (95% CI, 0-5.5% for tested patients and 0-0.69% for total patients). A blood culture was obtained in 187 patients (35.1%), with 16 contaminants and 1 true positive (0.53% of tested patients [95% CI, 0.01%-2.9%] and 0.2% of total patients [95% CI, 0-1.04%]). A urine culture was obtained in 182 patients (34.1%); 15 patients had contaminants isolated, 13 were positive (2.4%), and 4 were possible (0.75%). Certain or possible positive urine cultures were found in 19.3% of tested patients (95% CI, 5.5%-14.5%) and in 3.2% of total patients (95% CI, 1.9%-5.1%). Of these, 8 patients were febrile, and 3 of the afebrile patients were ill-appearing. Of the 6 remaining patients, 3 had a certain urinary tract infection (UTI) and 3 had a possible UTI by culture isolation (**Table II**).

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Table II. Patients with positive urine cultures

Patient	Description	Pathogen
Certain UTI		
1	2 wk old, ill-appearing, febrile	*E coli*
2	2 wk old, ill-appearing, afebrile	*Enterococcus* spp
3	16 wk old, ill-appearing, febrile	*E coli*
4	2 wk old, well-appearing, afebrile	*Enterobacter* spp
5	10 wk old, well-appearing, afebrile	*E coli*
6	14 wk old, ill-appearing, possibly febrile	*Enterococcus* spp
7	4 wk old, ill-appearing, febrile	*E coli*
8	6 wk old, ill-appearing, afebrile	*Enterobacter* spp
9	<4 wk old, well-appearing, afebrile	*E coli*
10	20 wk old, well-appearing, febrile	*E coli*
11	12 mo old, well-appearing, febrile	*E coli*
12	10 wk old, well-appearing, febrile	*E coli*
13	12 wk old, well-appearing, febrile	*E coli*
Possible UTI		
14	7 m old, well-appearing, febrile	10 000 CFU/mL *E coli*; not treated without complications
15	4 wk old, well-appearing, afebrile	10 000 CFU/mL *Enterococcus* spp; not treated without complications
16	2 wk old, well-appearing, afebrile	1000 CFU/mL *Enterococcus* spp; repeat 10 000 CFU/mL; treated
17	3 wk old, well-looking, afebrile	Mixed growth of likely contaminant; treated

Chest radiography was performed for 318 chest radiographs (59.7%), of which 22 showed probable bacterial pneumonia (6.9% of tested patients [95% CI, 4.4%-10.3%] and 4.1% of total patients [95% CI, 2.6%-6.2%]). Eighteen patients with bacterial pneumonia appeared ill, 16 had symptoms of upper respiratory infection (URI), and 4 were febrile. All patients with a chest radiograph indicating bacterial pneumonia had 1 of these features.

RSV testing was performed in 191 patients (35.8%), producing 22 positive tests (11.5% of tested patients [95% CI, 7.3%-16.9%] and 4.1% of total patients [95% CI, 2.6%-6.1%]) (Table III). Seven patients (5 with URI, 1 with tachycardia, and 1 with a home monitor alarm) who tested positive for RSV were well appearing and lacked classic clinical features of bronchiolitis or a known previous positive RSV test (3.7% of the patients who underwent testing and 1.3% of total patients).

Table III. Description of patients with an RSV-positive test

Clinical presentation	Number of patients
Clinical diagnosis of bronchiolitis in ED	7
ED intubation for apnea or respiratory failure	5
URI symptoms in a well-appearing infant	5
Known positive RSV test from an outside provider	2
Hypoxic, ill-appearing patient requiring supplemental oxygen	1
Increased apnea monitor alarms	1
3-wk-old with no URI symptoms (appeared well, but persistent tachycardia led to evaluation)	1

Influenza testing was performed in 171 patients. Two patients (1.1% of patients tested [95% CI, 0.13%-4%] and 0.4% of total patients [95% CI, 0.04%-1.3%]) tested positive.

Age had no predictive value for positive tests. Infants aged ≤4 weeks represented 32% of the sample, 35% of the serious bacterial infections, and 33% of RSV. Infants 4-12 weeks of age comprised 36% of the sample, 35% of serious bacterial infections, and 38% RSV.

Discussion

In previous studies of ALTE, prevalences ranged from 0% to 1.6% for meningitis, 0 to 2.5% for bacteremia, 0 to 7.6% for UTI, 0-10% for lower respiratory tract infection, and 9%-82% for bronchiolitis.[1-6,9,12] Our data are consistent, demonstrating a low rate of serious bacterial infection in infants with ALTE. We found no episodes of meningitis and only 1 case of bacteremia. Although the overall UTI rate was 3.2%, only 1% of afebrile, well-appearing patients had a proven UTI. Urine culture could have been limited to patients who were either febrile or ill-appearing with a very low risk of missing any cases. Chest radiography could have been reserved for infants with fever, ill appearance, or URI symptoms. RSV testing in the setting of ALTE had positive results with clinical findings at both ends of the spectrum (ie, well-appearing infant with URI symptoms or undifferentiated respiratory failure or hypoxemia). Influenza testing demands further study. ■

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