

States, where Workers' Compensation Insurance and other protective laws are not the same as in California. Sixty-five prints of the slide show have been distributed to health clinics, legal assistance programs, educators, and farm-worker agencies throughout the United States.\*

\*Pesticides: A Guide for Farm Workers. Available from the California Institute for Rural Studies, PO Box 530, Davis, CA 95617, for \$75 plus \$5 handling charge; California residents add 6 percent state sales tax.

### Acknowledgments

This study was supported by a grant from the Division of Family and Community Medicine, University of California, San Francisco. Distribution of the slide presentation was supported by a grant from the Shalan Foundation.

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# Urinary Tract Infection With Sepsis

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Children with urinary tract infection (UTI) are seen frequently by the family physician.<sup>1,2</sup> Hospitalization is rarely considered unless the patient is very young, appears unusually toxic, or has complicating clinical conditions.<sup>2</sup> A recent review points out that bacteremia, although commonly found in young infants with UTI, is rare in those aged three months or older.<sup>3</sup> Since concomitant sepsis may alter the physician's management of a UTI, it is important to recognize that this association also exists in the older child. Two such recent encounters by faculty and residents of a family medicine residency program are presented to introduce practitioners to this seldom reported entity.

## Case Reports

### Case 1

A 6-year-old white girl was admitted for evaluation of possible sepsis associated with a urinary tract infection. Her illness began one day prior to hospitalization, when she was seen in the office for headache, fever, stomachache, and nocturia, but results of her physical examination were normal. Clean-catch urinalysis showed numerous red blood cells (RBC) per high-power field, and a

culture was plated. Symptomatic measures were recommended, and a repeat visit was scheduled in 24 hours. The following day the urine culture was growing more than 100,000 colony-forming units per milliliter of a gram-negative organism, and the child appeared toxic. Pertinent admission findings included lethargy, nuchal resistance, and slightly reddened vulvae. She responded appropriately to all questions and was awake but obviously uncomfortable during the physical examination. Temperature was 40°C, pulse rate 140 beats/min, respirations 36/min, and blood pressure 106/60 mmHg. Laboratory data included a white blood cell (WBC) count of  $38.3 \times 10^3/\mu\text{L}$ , with 43 percent polymorphonuclear leukocytes, 36 percent band forms, 4 percent lymphocytes, 7 percent monocytes, and 10 percent metamyelocytes; a hemoglobin level of 14.9 g/dL; and a platelet count of  $98 \times 10^3/\mu\text{L}$ . Urinalysis was omitted, and the office culture was transferred to the bacteriology laboratory for positive identification of the gram-negative organism. Aerobic and anaerobic blood cultures were obtained. Cerebrospinal fluid (CSF) obtained by lumbar puncture had a WBC count of  $16/\mu\text{L}$  with 50 percent polymorphonuclear leukocytes and 50 percent lymphocytes; a RBC count of  $3/\mu\text{L}$ ; protein 23 mg/dL, and glucose 55 mg/dL. Simultaneous blood glucose was 131 mg/dL. Gram stain of the CSF showed no organisms. She was afebrile and her condition improved within 48 hours of beginning intravenous ampicillin therapy. Both urine and blood cultures grew *Escherichia coli*. Intravenous tobramycin was begun because

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of intermediate sensitivity of the bacteria to ampicillin. On hospital day 12, the child was sent home doing well. Subsequent intravenous pyelogram and voiding cystourethrogram were normal.

### Case 2

A 4-month-old white girl was admitted for evaluation of an undifferentiated febrile illness. Her symptoms began one day prior to hospitalization, when she was seen in the office for fever. She had a temperature of 39°C but appeared well. Physical examination was normal and a peripheral WBC count was  $11.7 \times 10^3/\mu\text{L}$ . A repeat office visit the following day revealed no change except for increasing irritability, which prompted hospitalization. On admission the child was crying and not consolable.

She again had a normal physical examination. Temperature was 40°C, pulse rate 148 beats/min, and respirations 52/min. Laboratory data included a WBC count of  $19.8 \times 10^3/\mu\text{L}$  with 77 percent polymorphonuclear leukocytes, 10 percent band forms, 9 percent lymphocytes, 5 percent monocytes, and a hemoglobin level of 10 g/dL. A centrifuged urine revealed 10 WBC per high-power field and trace bacteria; Gram stain of the urine sediment was not done. Lumbar puncture obtained CSF that had a WBC count of  $6/\mu\text{L}$  with 50 percent polymorphonuclear leukocytes and 50 percent lymphocytes; a RBC count of  $34/\mu\text{L}$ ; protein 20 mg/dL, and glucose 51 mg/dL. Simultaneous blood glucose was not obtained. She was afebrile and clinically improved within 24 hours of initiating intramuscular ampicillin and gentamicin. Urine and blood cultures both grew *E coli*, sensitive to gentamicin but only intermediately sensitive to ampicillin. The urine culture grew more than 100,000 colony-forming units per milliliter. The ampicillin was discontinued and the gentamicin was given intramuscularly for ten days. The child was discharged doing well, and subsequent intravenous pyelogram and voiding cystourethrogram were normal.

### Discussion

Urinary tract infection in otherwise healthy children aged 3 months or older is almost always uncomplicated and managed appropriately in the ambulatory setting.<sup>3</sup> Recent texts do not emphasize bacteremia as a complicating feature of urinary tract infection beyond the first three months of life.<sup>4,5</sup> Since family physicians encounter urinary tract infection in children not infrequently, they must be aware of the potential for concomitant sepsis.

There are no studies to indicate which previous-

ly healthy older infants and children with urinary tract infection are at risk for bacteremia. Some suggest that a young child with temperature of 38.9°C or higher and a WBC count of greater than  $15.0 \times 10^3/\mu\text{L}$  is at increased risk of bacteremia, and these were features in both children reported here.<sup>6,7</sup> None of these studies, however, mention urinary tract infection as associated with bacteremia. Other reports delineate history and observation variables that suggest severe infection, but likewise these do not mention specifically urinary tract infection with bacteremia.<sup>8,9</sup> Both children reported here had either increasing irritability, lethargy, or toxic appearance. Also, as seen in one of these patients, pyuria can be minimal in the presence of significant urinary tract infection.<sup>3</sup> Gram stain of the urinary sediment helps distinguish urinary tract infection from sterile pyuria, but is not helpful in determining which patients are septic.<sup>3</sup> In addition, urinary tract roentgenograms of most children with urinary tract infection and bacteremia appear normal.

The family physician who encounters a child aged 3 months or older with clinical or urinalysis evidence of urinary tract infection must consider the possibility of concomitant bacteremia. A patient who is irritable, appears toxic, has a temperature of 38.9°C or higher, has a WBC count of greater than  $15.0 \times 10^3/\mu\text{L}$ , or is not alert or consolable should be considered at risk for accompanying sepsis. Hospitalization or frequent outpatient observation is appropriate pending blood culture report. Lumbar puncture is probably not necessary in children with suspected urinary tract infection and bacteremia unless meningitis is suspected.<sup>3</sup> If bacteremia is found, parenteral antibiotics should probably be used for seven to ten days.

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