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Children: A Paradigm Shift



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In 2011, the American Academy of Pediatrics (AAP) issued [Urinary tract infection: clinical practice guideline for the diagnosis and management of the initial UTI in febrile infants and children 2 to 24 months](#), which updates the Academy's 1999 practice parameter for the diagnosis and treatment of UTI in children ages 2 months to 2 years. (1, 2) The updated 2011 practice guideline consists of a series of recommendations to guide clinicians in identification, diagnostic evaluation, and management of children with febrile UTI. The major differences in this version compared to the 1999 practice parameter are inclusion of criteria for diagnosis of UTI (urinalysis with pyuria or bacteruria and urine culture with pure growth of $\geq 50,000$ CFUs/ml), and Action Statement 6A, which reads as follows:

Voiding cystourethrography (VCUG) should not be performed routinely after the first febrile UTI; VCUG is indicated if renal and bladder ultrasonography (RBUS) reveals hydronephrosis, scarring, or other findings that would suggest either high-grade vesicoureteral reflux (VUR) or obstructive uropathy, as well as in other atypical or complex clinical circumstances (evidence quality B; recommendation).

Without doubt, this statement represents a significant departure from previous guidance in that it fundamentally challenges an established aspect of management of first UTI in the United States, namely, the need for a VCUG, a radiographic examination of the bladder and urethra. The procedure consists of urethral catheterization and instillation of radiologic contrast material under fluoroscopic imaging until the bladder is filled, followed by repeated fluoroscopy as the child urinates. This change in guidance results from emerging literature suggesting that routine VCUG and antibiotic prophylaxis for lower-grade VUR provides little benefit. (3-5)

Section on Urology published a 2012 response in which the authors state that they do not support the new recommendation and described it as a "paradigm shift." (6) This commentary provides an overview of the reasoning behind the decision to change this recommendation in the 2011 update. Readers interested in considering the opposing viewpoint are referred to the AAP's Section on Urology article in *Pediatrics*. (6)

The AAP's 1999 guideline recommends that children ages 2 to 24 months with UTI receive a VCUG or radionuclide cystography at the earliest convenient time. (2) The explanation for this is that it is critical to determine the presence and severity of VUR because children with VUR are at increased risk for renal damage with subsequent infections (i.e., pyelonephritis), and prophylactic antibiotics or surgical intervention can prevent this progressive renal damage. It was believed that early diagnosis of abnormalities by VCUG, the most common by far being VUR, offered a benefit of preventing future renal failure. The practice parameter acknowledged that pyelonephritis and subsequent progressive renal scarring can occur in the absence of VUR.

The 2011 guideline states that VCUG is not indicated routinely for children with a first UTI and suggests not routinely using antibiotic prophylaxis for children with a previous UTI. (1) The subcommittee based the recommendation on data from 6 randomized controlled trials (RCTs) described in the technical report produced for the guideline. (7) They contacted the authors of the RCTs to obtain raw data on 1,090 children 2 to 24 months of age, according to the grade of VUR. A formal meta-analysis of these data did not show a statistically significant benefit of antibiotic prophylaxis in preventing recurrence of febrile UTI/pyelonephritis in children without reflux or those with grades I-IV VUR. There were too few children with grade V VUR (5 children) for analysis. Children with high-grade VUR will still be identified either through abnormalities on RBUS, or on VCUG as recommended after the second UTI. Children with lower-grade VUR are not the focus of identification because the benefit of offering treatment to them is minimal.

The AAP Section on Urology response correctly notes that the recommendation against routine VCUG represents a "paradigm shift" in UTI management. (6) In the old paradigm, the goal of the routine VCUG was to identify children with VUR because it was thought physicians could prevent renal damage from subsequent infections. In the new paradigm, it is still recognized that repeated infections can lead to renal scarring, but routine VCUGs are not recommended because 1) antibiotic prophylaxis has not been shown to prevent further infections in the presence of VUR grades I-IV, and 2) recurrence of UTI occurs without VUR. Since the data on antibiotic prophylaxis did not include children with grade V VUR, the subcommittee erred on the side of caution by recommending a VCUG after the first febrile UTI when RBUS findings suggest a high grade VUR or obstructive uropathy.

radiation exposure and significant patient discomfort. A VCUG can be extremely stressful for children and their parents; the experience of catheterization, bladder distension, and voiding, all while lying on the fluoroscopy table, can be painful, embarrassing, even traumatizing for a young child. (8-10) The subcommittee estimated, from available and current studies, that in a hypothetical cohort of 100 children with febrile UTI, only 1 would have high grade (V) VUR. By adhering to the new guideline, just 10 children rather than all 100 would need to undergo a VCUG to identify this one case of grade V VUR.

The AAP 2011 practice guideline represents a long-awaited, evidence-based update of the 1999 practice parameter. It improves upon the previous version by providing recommendations for clinicians at each step of patient care, from diagnosis to management for infants and children with febrile UTI. In addition, the new recommendation establishes a critical paradigm shift in imaging that, while deviating from the previous practice, is based on sound evidence, as well as thoughtful consideration of the risks and potential benefits of routine VCUG.

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Potential Financial Conflicts of Interest

Dr. Coker notes she is a researcher at the UCLA/RAND Prevention Research Center. She declared no other potential conflicts with respect to this expert commentary.

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