activity and dietary habits of their children.[8] The obesity epidemic is a "perfect storm" caused by a variety of obesogenic factors. It will take an organized effort of prevention to lessen the impact of this storm. Certainly, the decreased consumption of fast foods, sweetened drinks, and other high-calorie–dense foods will help. Children also need to be more physically active, and, as a society, we must decrease the opportunities for children to be sedentary. Television viewing is one of the most common forms of sedentary activity practiced by our children. This practice has led the Academy of Pediatrics to recommend that no more than 1 to 2 hours of quality television programming be viewed per day.[8] This study, in this month's *Journal*, supports the recommendation that parents need to limit and control the amount of television that they and their children view. This appropriately transfers some of this responsibility to the parents because most television that is viewed occurs in the home. Certainly the limitation of television viewing in and of itself will not solve the obesity epidemic. This is true of any other risk factor that is contributing to this perfect storm. For example, the total elimination of fast foods in the diet also will not solve this issue, but it will help.

Society, as a whole, must realize that to effectively control and prevent this obesity epidemic, all risk factors must simultaneously be reduced. If television viewing is going to be effectively decreased, parents must assume an appropriate role and set an example.

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# TO BAG OR NOT TO BAG

Urinary tract infection (UTI) is the most common serious bacterial infection in infants and young children. In an era in which there is universal immunization of infants to protect against infection caused by *Haemophilus influenzae* type b and *Streptococcus pneumoniae*, UTIs are more common than bacterial meningitis, occult bacteremia, and bacterial pneumonia. It is especially common as a cause of infection in white infant girls in whom it may explain episodes of fever nearly 20% of the time.[1]

The diagnosis of UTI is confirmed when an appropriately obtained specimen of urine is documented to have both significant bacteriuria and pyuria. Definitions of significant bacteriuria are based, in part, on the method used to collect the urine specimen. When urine is collected by suprapubic aspiration, a method that bypasses the urethra, any colony count is considered to represent significant bacteriuria. All other methods of urine collection, (mid-stream clean catch, catheterization, and bag collections) require passage of urine through the urethra. Although obtaining a urine specimen by bag is easy and noninvasive, transurethral collections of urine will invariably be contaminated with both bacteria and white blood cells (WBCs) that originate from outside of the urinary tract. Accordingly, urine specimens obtained by bag are never recommended for culture.

Because the results of urine cultures are not available for at least 24 hours, there has been considerable interest in evaluating tests that may predict the results of the urine culture so that appropriate therapy can be initiated at the first encounter with the symptomatic patient. The tests that have received the most attention are urine microscopy for leukocytes and bacteria, and biochemical analyses for leukocyte esterase and nitrite that can be assessed rapidly by dipstick.

Recent studies to evaluate the best predictors of UTI have shown conflicting results. In 1999, Gorelick and Shaw[2] concluded that both the presence of any bacteria on a Gram stain of an uncentrifuged urine specimen and

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| UTI | Urinary tract infection |
| WBC | White blood cell |

See related article, p 451.

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the result of dipstick analysis (for leukocyte esterase and nitrite) perform similarly in children from birth through 12 years of age and are superior to microscopic detection of pyuria. In contrast, Huicho et al,[3] who performed a metaanalysis of urine screening tests to determine the risk of UTI in children, concluded that pyuria of at least 10 WBC/hpf or at least 10 WBC/mm$^3$ and bacteriuria (any) are best suited for assessing the risk of UTI in children.[3] Other recent studies in both young infants (<2 months of age) and older infants and children (<2 months and 1 to 24 months of age) have shown that hemocytometer WBC counts (cell counts ≥10 WBC/mm$^3$) provide the most valuable cutoff point for identifying infants for whom urine culture is warranted.[4,5]

In this issue of *The Journal*, McGillivray et al[6] have done a head-to-head comparison of urinalysis performed on specimens of urine obtained by bag versus those collected by catheterization as predictors of UTI (defined by culture of the specimen obtained by catheterization) in nontoilet-trained children <3 years of age. They showed that for all age groups (<90 days, ≥90 days) the bag dipstick was more sensitive than the catheter dipstick for the entire study sample: 0.85 (95% CI, 0.78-0.93) vs 0.71 (0.61-0.81), respectively. These results were both unexpected and unexplained. The authors concluded that urine collection methods alter the diagnostic validity of urinalysis and that these differences have important implications for diagnostic and therapeutic management of children with suspected UTI. Specifically, they suggest (in accord with the guidelines from the American Academy of Pediatrics),[7] that urine collected by bag (the most convenient specimen to obtain) can be used to determine whether it is necessary to obtain a catheterized urine specimen for culture in a child in whom the diagnosis of UTI is being considered. If the urinalysis result is positive, a specimen should be obtained for culture by catheterization of the urethra. If the urinalysis is negative, the child can be spared the performance of the catheterization. The authors endorse this "selective catheterization" strategy to obviate the need for performance of catheterization in some children at low risk for the development of UTI. Their concern is that performance of catheterization to obtain specimens of urine is unacceptable to both physicians and parents. The unacceptability is based on presumed pain and risk of introducing infection at the time of catheterization. Furthermore, they note that many physicians are unable to perform urinary catheterization in the office setting and are therefore required to send the child to the emergency department.

What are the risks of adverse outcome associated with catheterization? The theoretic risks of catheterization include the introduction of bacteria into the urethra and bladder and possible injury. Although data on the risk of nosocomial UTI in children and adults with indwelling catheters shows substantial rates of infection, this situation is entirely different than an in-and-out catheterization performed in the ambulatory setting. There are few data to address this question in the pediatric literature and none gathered in exactly the same clinical situation. In a recent study of children undergoing catheterization of the urethra for the performance of investigative studies, most children did not report substantial discomfort; infection was documented in 3%.[8] These studies differ from catheterization performed for diagnostic purposes, in which the dwell time for the catheter is usually less than 1 minute. If a well-lubricated, appropriately-sized catheter is used by an experienced individual, the risk of infection or injury is probably well less than 3%. The tolerance of clean intermittent catheterization in many children with normal genital sensation for the management of urinary retention and voiding dysfunction suggests that the procedure is not inherently painful.[9,10] Appropriate discussion with parents (and the child if of a certain age) plus confidence and skill among pediatric providers and nurses can allay anxiety and reduce or eliminate discomfort associated with catheter insertion. Local anesthetic to the urethral orifice can be used if desired. Instructional videos detailing precise methods to safely perform urethral catheterization are available.

The key question in the implementation of the recommendations of McGillivray et al[6] is to decide which patients are at low risk. The clinician's threshold to obtain a culture has been documented by Roberts et al.[11] In their study, only 10% of clinicians believe that a urine culture is indicated if the probability of UTI is less than 1%, whereas 80% to 90% would obtain a culture with a probability of disease of 3% to 5%, and all would do so if the probability exceeds 5%. The overall prevalence of UTI in infants and children <3 years of age with temperature >38.3°C is approximately 5%.[1] Girls are much more commonly infected than boys. White girls are more commonly infected than black girls. Uncircumcised boys are at considerably higher risk than circumcised boys. Accordingly, the only really low-risk category of febrile children are those with a well-defined other focus of infection (ie, varicella, meningitis, osteomyelitis, pneumonia) and circumcised boys >12 months of age. In these children, the strategy recommended by McGillivray seems reasonable. On the other hand, it is worth emphasizing that a catheterized specimen for urinalysis (with pyuria expressed as the number of WBC/mm$^3$) and urine culture should be obtained on all febrile children (1) with a previous history of UTI, (2) with known abnormalities of the urinary tract, (3) with a family history of urinary tract disease, (4) who are uncircumcised boys, (5) who are less than 3 months of age, (6) who appear ill, and (7) who are female with fever and without a well-defined focus of infection. In addition, a catheterized specimen should be obtained in nontoilet-trained children with symptoms of UTI (frequency, urgency, dysuria, suprapubic discomfort).

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# EARLY AMINO ACID ADMINISTRATION FOR PREMATURE NEONATES

In this issue of *The Journal*, te Braake et al[1] report the results of a randomized open-label trial evaluating the short-term safety and efficacy of amino acid administration to premature infants initiated immediately after birth. Very low birth weight infants (n = 135) were randomized to 2 different parenteral amino acid regimens. Infants in the intervention group received 2.4 g/kg/day of amino acids within 2 hours of birth; this level of amino acid intake was then maintained for the first 4 days of life. Infants in the control group received glucose alone on the first day of life, with a stepwise increase in amino acid intake thereafter (1.2 g/kg on day 2 and 2.4 g/kg on days 3 and 4). The investigators demonstrated positive nitrogen balance at 2 and 4 days of life in the group of infants who received early amino acids without any major adverse effects, whereas infants in the control group were in negative nitrogen balance on day 2.

The findings of this study are in agreement with previous studies that overwhelmingly demonstrated that negative nitrogen balance can be reversed in early postnatal life with amino acid intake of 1.1 to 2.5 g/kg/day and energy intake as low as 30 kcal/kg/day.[2-6] The acute reversal of protein catabolism in response to varying amino acid intake is a consistent finding in all of these studies, despite differences in the composition of amino acid solutions used. Recently, Thureen et al[7] prospectively evaluated the effect of a higher level of amino acid intake (3 g/kg) in extremely low birth weight infants to more closely duplicate fetal amino acid delivery rates. This study demonstrated the efficacy of 3 g/kg/day versus 1 g/kg/day in improving protein balance and increasing protein accretion, primarily through increased protein synthesis. Other studies using stable isotope techniques have also demonstrated that net protein accretion is accomplished by an increase in protein synthesis, rather than a reduction in proteolysis in premature neonates.[8,9]

Recent studies of early amino acid administration, including the current study, have not demonstrated any short-term adverse metabolic effects.[7,10,11] In addition, the study design used by te Braake et al demonstrates that the common practice of a stepwise increase in amino acid intake is unnecessary. Although an elevated blood urea nitrogen level is often cited as a reason to decrease amino acid administration, a recent study found no correlation between blood urea nitrogen level and amino acid intake in parenterally fed preterm neonates.[10] Furthermore, elevated blood urea nitrogen may in fact reflect higher rates of amino acid oxidation, which more closely resembles the in utero situation whereby the fetus uses amino acids as a significant source of energy.

In the current study, concentrations of most plasma amino acids from infants in the intervention group were found to be normalized compared with those from healthy breast-fed term infants. Other investigators have evaluated amino acid concentrations in preterm infants receiving parenteral nutrition and have used other reference standards, such as concentrations obtained from fetal cordocentesis, cord blood, and plasma from premature infants receiving parenteral nutrition.[7,12] The choice of an appropriate reference standard has important research implications as the compositions of amino acid solutions are further refined to better meet the needs of preterm neonates.

Postnatal growth failure is nearly universal and is associated with an increased risk of poor neurodevelopmental outcome in extremely low birth weight infants.[13] Wilson et al,[11] in a randomized clinical trial of aggressive nutritional support, demonstrated that early parenteral nutrition (combined with early enteral feeding) resulted in better growth in the early neonatal period and at hospital discharge. Observational

See related article, p 457.

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