

# Urinary tract infections in children

— J E Carter



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## Curriculum vitae

J E Carter studied at UCT and obtained the MB ChB in 1962. After some hospital experiences in the RSA, he went to further his studies in Canada and has been a staff-member of the University of British Columbia since 1970. He is currently Associate Professor, Division of Paediatric Nephrology in Vancouver BC. He has published numerous scientific papers in his two main fields of interest: paediatric nephrology and child abuse, and serves on a long list of professional societies. Jimmy is married to Lynn, and they have four lovely, lively boys.

**KEYWORDS:** Urinary tract infections; Child; Diagnosis; After care

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## Summary

*Urinary tract infections are common in children, and to avoid renal damage, the GP is in a unique position to be keenly suspicious (even at birth), to arrange the necessary consultation, to make an accurate diagnosis, to effect an appropriate treatment and thereafter provide good follow-up care. Guidelines to all these are provided.*

**U**rinary Tract Infections are common in children.

The incidence is approximately 1,5%<sup>1</sup>. After the first infection, a pattern of recurrence or possibly renal damage may be established, which makes it extremely important for the primary care physician to make an accurate diagnosis and participate in a properly formulated follow-up programme to ensure optimal care for the patient.

The age and sex distribution of UTI dictates the necessary investigation for a properly diagnosed child. In the first month of life, UTI is more common in boys and usually associated with an underlying congenital genito-urinary abnormality. Thereafter the incidence increases substantially in females so that at 1 year, females outstrip males 4:1, and at 6 years 10:1<sup>2</sup>.

From this one can see that an early awareness for diagnosis is imperative since damage to kidneys can occur very early.

## Clinical presentation

In the neonate the picture may vary from occult bacteriuria to life threatening septicemia. Probably the most common cause of severe gram negative sepsis is UTI.

In the infant it is vital to recognise that symptoms of UTI are so non-specific, the clinician may be completely misled. A high index of suspicion is needed. The commonest presentations are:

1. poor weight gain
2. unexplained fever
3. gastro-intestinal symptoms - poor feeding, screaming spells, diarrhoea, vomiting
4. lethargy, irritability
5. pallor, cyanosis
6. jaundice or convulsions.

In the older child, symptoms referable to the genito-urinary system like lower abdominal pain, dysuria, frequency, urgency nocturia, loin pain, cause one to suspect UTI<sup>2</sup>.

The implication for the primary care physician is then quite clear. His surveillance must begin at birth. In fact, with increasing use of ultrasound in pregnancy when incidental malformation of the genito-urinary tract of the foetus may be detected, this involvement may start before birth.

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## *All children < 2-3 years with proven UTI must be investigated radiologically*

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### Diagnosis

The diagnosis of UTI is dependent on demonstrating proliferating organisms in urine usually in the order of >100 000 colonies of a single organism per ml of urine collected by midstream, or clean catch or catheter samples. If supra pubic aspiration is used, a much lower colony count is accepted. Bag urine samples should never be used where a UTI is suspected, since the false positive rate is so high as to confuse both the diagnosis and the appropriate treatment. As a negative screening procedure, the bag sample may be employed.

Pyuria is considered a poor marker of UTI, since in a number of studies the correlation rate with true UTI is only about 50%.

Again, the implication for the primary care physician is not to rely solely on urinalysis to diagnose UTI. Recognising the difficulties of collecting urine samples in neonates, infants and young children, he must be prepared to spend some time to set up an appropriate collection system which can involve his nurse or utilise parent education. He must also pay attention to the

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## *Recurrence rates for infection in girls are high (35-65%) in the year after first infection*

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method of collection, the proper handling of the sample and utilise an appropriate laboratory for satisfactory results. For physicians attached to hospitals, this entails establishing a close liaison with the laboratory.

### Management

Management of a child with UTI starts with an accurate diagnosis. It also includes adequate R., appropriate investigation and detailed follow up.

Thus diagnosis based on sound clinical principles is necessary. Lax diagnostic criteria leads to poor management.

The acute UTI, properly diagnosed, is usually treated with ampicillin or sulphatrimethoprim. Recent articles have suggested that single or double, one day or two day R. courses, can be used in children. While this may be adequate R. for the older adolescent or young adult with cystitis, the difficulty of isolating the infection to the lower urinary tract in children, dictates that a full 7-10 day course of antibiotic is required. Urine culture should be repeated when the child is off the antibiotic.

Because of the high incidence of congenital abnormalities, frequently surgically correctable in young children, it is strongly recommended that all children younger than 2-3 years of age with a stringently and properly diagnosed UTI, be investigated radiologically with a minimum of a reliable ultrasound of the genito-urinary system and also a voiding cystourethrogram (VCU) to rule out vesico ureteric reflux which is so frequently associated with renal damage, scarring and subsequent loss of renal functions. Also, because of the low incidence

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## *Pyuria is a poor marker of UTI*

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of UTI in older boys, it is recommended that boys of any age with a stringently and properly diagnosed UTI, be similarly investigated.

While the ultrasound may be helpful at the time of the infection to exclude an obstruction which may require immediate treatment, it is advised that the VCU be delayed for four weeks after the acute attack to avoid confusion with transient secondary reflux associated with infection.

If found, a congenital abnormality may be treated surgically<sup>4</sup> and this is best determined in consultation with a paediatrician and an urologist.

Because of the high incidence of UTI in girls, and the much lower incidence of abnormality, this extensive investigation can be deferred in girls older than 2-3 years - till the 2nd or even 3rd definitely proven infection occurs. Again, if a radiological abnormality is found, this must be dealt with in consultation.

The most vexing problem for the primary care physician is the child with recurrent urinary tract infection. Recurrence rates in girls are high (35-65% one year after first infection). After the 2nd and 3rd infection, an anatomical abnormality will have been excluded. Several factors may be involved which could suggest a line of management in those with no radiological abnormality<sup>5</sup>.

1. Infrequent voiding - ie in one study of university female students, 61% of those with UTI have a

history of voluntarily deferring urination for 1-3 hours, whereas only 11% of students without UTI have a similar history.

2. Constipation.
3. Incomplete bladder emptying (possibly due to a neurogenic component).
4. Large bladder capacity (probably related to infrequent voiding).
5. Poor perineal hygiene (damp underwear, poorly aerated underclothing, wiping from back to front, using bubble baths, etc.)

With guidance regarding perineal hygiene, encouraging frequent micturition, even double or triple voiding patterns and eliminating constipation, the problem may be solved. A course of long term low dose prophylactic antibiotics may be indicated. Two such antibiotics are sulphatrimethoprim and furantoin (when renal function is known to be normal). Doses at  $\frac{1}{3}$ - $\frac{1}{4}$  of regular therapeutic doses given once a day (at night) are found to be satisfactory. The course may be for 6-12 months, with adequate surveillance for side effects, usually gastrointestinal or haematopoietic. Any child with a demonstrable genito-urinary abnormality not treated surgically should similarly be treated on a long term basis<sup>6</sup>.

### Follow-up

Because of the risk of recurrence, sometimes manifesting as asymptomatic bacteriuria<sup>7</sup>, follow-up by the primary care physician is advised. Urine should be checked at 3-6 month intervals for a period of 2 years after the initial infection.

The primary care physician is in the unique position of suspecting, diagnosing, treating, organising investigations and arranging appropriate consultation, and thereafter providing good follow-up, so that the child is well treated and the morbidity associated with renal damage, avoided.

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