MANAGING URINARY TRACT INFECTIONS IN YOUNG CHILDREN

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Urinary tract infections (UTIs) are common in infancy and childhood, affecting approximately 6–7% of girls and 2–3% of boys. Fourteen years have passed since the Royal College of Physicians published clinical guidelines for the management of UTI in children. Large numbers of children undergo imaging investigations and receive antibiotic prophylaxis for extended periods. A Cochrane systematic review in 2004¹ found inadequate data from available randomised controlled trials (RCTs) to provide evidence as to whether any intervention (antibiotics or surgery) in children with vesico-ureteric reflux confers worthwhile health benefits.

In 1999 the American Academy of Pediatrics published a guideline on the diagnosis and management of UTI in children under the age of 2 years, based on a rigorous literature search.² However, this did not investigate the evidence for a link between childhood UTIs, renal abnormalities, and long term outcome with or without treatment, and its recommendations are therefore open to question.³ Although the National Institute for Health and Clinical Evidence (NICE) is undertaking an evidence based guideline on the subject, this will not be published until May 2007.

In the meantime, three recent systematic reviews address aspects of the management of UTI, and provide a useful insight into current evidence as a basis for clinical practice.

NHS REVIEW

The first was carried out by the York University Centre for Reviews and Dissemination for the National Health Service R&D Health Technology Assessment Programme.⁴ Its findings are summarised in *Effective Health Care*.⁵ It covers the evidence for the diagnosis and evaluation of UTIs in children under 5 years of age.

Key points

- ▶ UTI is common in children under five. Children who are misdiagnosed can either fail to receive appropriate treatment or receive unnecessary treatment and investigation.

Diagnosis

An algorithm for the diagnosis of UTI, based on current available evidence (fig 1), is accompanied by the following points:

- ▶ A dipstick test which is positive for both nitrite *and* leucocyte esterase (LE) indicates a very high likelihood of a UTI.
- ▶ Dipstick negative for LE *and* nitrite or microscopic analysis negative for pyuria and bacteriuria of a clean voided urine (CVU), bag or nappy/pad specimen can be used to rule out UTI, avoiding the need for further investigation for UTI.
- ▶ It is not possible to define further which clinical signs and symptoms should inform the decision to test for UTI.
- ▶ In the absence of clear evidence, pad/nappy or bag may be used for collecting urine samples from non-toilet trained children.
- ▶ The evidence suggests that CVU samples had similar accuracy to suprapubic aspiration (SPA) samples when cultured, and as CVU is a non-invasive collection method that can be employed in the general practitioner's surgery, this was chosen for the algorithm.

Further imaging investigations

- ▶ Routine imaging for children aged 2 years or more with an initial UTI is not recommended. For children under 2 there is no firm evidence base.
- ▶ All children aged 2–5 with an initial UTI should be monitored and investigated further if they experience a second UTI.
- ▶ A test for the localisation of UTI as an initial step in the investigation of these children would allow the exclusion of all children with a lower UTI from further investigation.
- ▶ Acute Tc-99m-DMSA (dimercaptosuccinic acid) scintigraphy remains the reference standard for the localisation of UTI. These scans are costly, invasive, and incur a radiation load. A non-invasive test would be desirable.

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Figure 1 Algorithm for diagnosis of urinary tract infection (UTI) in primary care. CVU, clean voided urine; GP, general practitioner; LE, leucocyte esterase.

- Further research is required regarding the accuracy of ultrasound in diagnosing underlying abnormalities, and its impact on patient outcome.
- There is insufficient evidence to recommend any further investigation routinely.
- In the absence of any effect on patient outcome, universal imaging (for example, micturating cystourethrography (MCUG) for reflux or DMSA scintigraphy for renal scarring) cannot be justified. The decision on whether or not to perform these examinations should be made on an individual patient basis.
- Current thinking suggests that MCUG should be reserved for those children who have been deemed to require further investigation and the DMSA scan is abnormal or the ultrasound has shown an abnormal bladder.
- Further research regarding the effects of these imaging techniques on long term patient outcome is urgently required.

COCHRANE REVIEWS

Two Cochrane systematic reviews, published in 2003 and 2004, summarised the evidence from randomised controlled trials for the efficacy and safety of different antibiotic regimens for the treatment of acute UTI in children.^{6 7}

The first⁶ reviewed RCTs comparing 2–4 days of antibiotic treatment with 7–14 day courses in children without acute pyelonephritis (diagnosed on the basis of absence of fever of 38°C or above). The authors concluded that a 2–4 day course of oral antibiotics appears to be as effective as 7–14 days in eradicating acute lower UTI.

The second review⁷ identified 18 randomised controlled trials involving over 2600 children with pyelonephritis,

treated either in inpatient or outpatient settings. Outcomes studied included clearance of bacteriuria, resolution of symptoms, abnormalities on DMSA scan, and adverse effects.

Key points: pyelonephritis

- There is no significant difference in efficacy between treatment with an oral third generation cephalosporin (cefixime) given for 14 days and intravenous (iv) therapy given for three days followed by oral therapy for a total duration of 14 days. However, wide confidence intervals indicate residual imprecision.
- Adequate data are not available to determine the efficacies of other widely used oral antibiotics (for example, cephalexin, amoxycillin/clavulanic acid) in children with acute pyelonephritis either as initial treatment or after iv therapy in comparison with iv therapy.
- Single daily dosing of aminoglycosides is safe and effective compared with eight hourly dosing.
- No data are available as to whether aminoglycosides alone or in combination are as effective as other medications including third generation cephalosporins in initial par-enteral treatment.
- There is no significant difference in efficacy between iv antibiotic therapy given for 3–4 days followed by oral therapy with total treatment duration of 10–21 days, and iv antibiotic therapy given for 7–10 days with total treatment duration of 10–21 days. The optimal duration of initial iv antibiotic therapy is unknown.

COMMENTARY

While these systematic reviews cannot serve as a substitute for a full evidence based guideline, they do provide a useful

summary of current evidence for some important aspects of management. There are many unanswered questions, and the absence of evidence does not equate to evidence of lack of benefit or harm. It should be emphasised that the evidence from these systematic reviews relates to otherwise healthy children without pre-existing renal, neurological, or immunological problems.

The evidence that there is appears to support a greater focus on early recognition, diagnosis, and treatment of UTI in both primary and secondary care, with a more selective use of imaging investigations in children in whom infection is confirmed. Most paediatricians would support screening febrile infants presenting to secondary care, where around 5% can be expected to have a UTI.

If some children in primary care are to be treated on the basis of positive dipstick tests for LE and nitrites, then clinicians will need to be aware that when both are positive in the relevant clinical context, they provide strong evidence for UTI. Liaison between paediatricians and primary care teams is important in determining local policies on diagnosis and referral for imaging.

In children over the age of 2 years, it would be reasonable to avoid routine imaging in every child following the first UTI. In children under 2 years of age with a first infection, there is no evidence to justify the routine use of ultrasound imaging or DMSA scans as screening tests. These should be used where clinically indicated—for example, where there is

uncertainty about urinary obstruction or where the findings would influence future management. There is no evidence to justify the routine use of tests for vesico-ureteric reflux in any age group. Decisions about imaging in individual children should be based on careful consultations with families. Well written information for parents reflecting the current uncertainties about imaging would be helpful to support such consultations.

In summary, a number of important recent systematic reviews together provide a basis for reconsidering the approach to UTIs in young children.

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