Urinary Problems in Children

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Topic Reviewers: Editorial committee

Rationale for changes to CARPA STM 3rd edition

Summary

Minimal changes include: heading; reallocation of the symptom section by age to avoid repetition and to emphasise that one or more symptom may be present; highlighting of the STI/sexual assault section.

The 'Using a dipstick to look for UTI' section was removed. Amplification of the diagnosis protocol /flow chart and insertion of a 'follow-up' protocol/flow chart to strengthen surveillance for UTI in children at risk. Changes to follow-up section include omission of 'Children less than five years old' section and 'Children over five years' section as covered in flow chart. Also, summary box deleted for same reason. Replaced by prophylaxis box.

1. Heading change:
   'Urine Problems in infants and children (3 months to 12 years)
   (Sick babies less than 3 months see page 86)'
   Sick neonates may have multiple sites of infection and need urgent treatment and different antibiotics and should be considered to have 'neonatal sepsis' rather than a UTI.
2 Paragraph headed: 'Urine problems in children include: . . .' and 'urinary system' removed, as 'kidney disease' is enough.
3. Paragraph headed 'Urinary Tract Infection'. Symptom lists by age were rationalised to avoid repetition and to emphasise that infant/child may only have one of the symptoms. STD/sexual assault sentence highlighted due to increased importance.
4. Paragraph headed 'When you use the dipstick to look for a UTI, take care'. This paragraph deleted as the issues are dealt with in the protocol. Also to wait for the result of the M,C&S is potentially harmful.
5. Diagnosis-treatment flow chart/protocol. Amplified to show steps more clearly and to emphasise not sending M,C&S sample if dipstick test is normal. Also, the changes recommend treating immediately for UTI if nitrites and leucocytes are present as there is evidence that delay in treatment increases the risk of renal damage. The treatment for UTI is also changed based on NT urine pathogen sensitivities, Australian and international evidence based recommendations. The current single daily dose of Augmentin for three days is likely to be inadequate and increase the failure/recurrence, and hence renal damage rate. Augmentin still best first-line drug, with Co-trimoxazole recommended as second-line in infants older than six months who are not sick. The protocol also emphasises that infants less than six months, those with D+V or not improving should be given IM gentamicin and referred immediately. The old protocol does not make this emphasis.
6. Insertion of a follow-up flow chart/protocol. This is needed to emphasise the need for surveillance (rechecking dipstick) in children who

have had a definite or possible UTI and the importance of arranging renal investigations and checking that they have been done. Also, the importance of considering prophylactic antibiotic for all children with renal abnormalities below five years of age and some above five years.

[Editor: The previous table of 'normal BP in children' has been replaced with a guide for what should be thought of as high BP in children, as this is what it is to be used for. The table is derived from a chart used in the Adelaide Women's and Children's Hospital. (Blood pressure in school children measured under standard conditions. Jureidini, et al. Med J Aust 1988; 149:132–34.]

Current understanding of UTIs in Aboriginal children

- Renal tract structural abnormalities predispose to UTI e.g., pelvo-ureteric junction (PUJ) obstruction, vesico-ureteric reflux, urethral valves, bladder diverticulum
- Stone formation within the renal tract also predisposes to infection, and renal stones are common in Aboriginal children
- UTI is common in young Aboriginal children
- Chronic renal disease is common in adult Aboriginals, and it is likely that renal damage begins in childhood
- Surgical correction of vesico-ureteric reflux is no more effective than prophylactic antibiotics in preventing recurrent UTIs and long-term outcome
- Renal scarring occurs most frequently in young children and infants
- Some children have chronic UTIs which are asymptomatic and not diagnosed
- Asymptomatic haematuria is common in Aboriginal children
- Micturating cysto-urethrogram (MCUG) is a distressing invasive procedure for most children. It detects vesico-ureteric reflux and bladder abnormalities
- Renal ultrasound is a non-invasive well-tolerated investigation which can detect most cases of renal scarring, but not all. It can also detect severe vesico-ureteric reflux when dilatation of the ureter is present.
- DMSA renal scan detects renal scarring more reliably than ultrasound. It is semi-invasive as IV access is required
- Compliance is poor with prophylactic antibiotics in Aboriginal children
- Third edition CARPA antibiotic regimen for UTIs is likely to result in inadequate treatment of UTIs, particularly in young infants. Single 'double dose' oral treatment with Augmentin for three days only may have these problems:
  - Young infant more likely to spit/vomit dose
  - 29% of infections in children under five in NT have complete or partial resistance to Augmentin
  - Improved outcome five to 21% with seven- to 10-day course

- 'Clean' urine specimen collection problematic at the community health centre level (only 'bag' specimen possible, delay in obtaining M,C & S result)

Changes recommended

In view of the potential poor renal prognosis in Aboriginal children, diagnosis and treatment for possible UTIs needs to be improved. In view of the initial uncertainty in diagnosis whilst awaiting M,C&S results the trend should be to over treat rather than miss episodes of UTI. In addition, those children who have had a proven UTI should be investigated properly and kept on prophylactic antibiotics if indicated. Children who have had a UTI should always have urinalysis checked when they are sick.

Evidence reviews: What are the effects of treatment of acute UTI in children?

Placebo controlled trials of antibiotics for symptomatic acute UTI in children are considered unethical. We found little evidence on the effects of giving early empirical treatment versus awaiting the results of microscopy or culture. Five retrospective studies found that delayed treatment may be associated with increased rates of renal scarring, but we found inconclusive evidence on the effects of shorter delays. Two randomised controlled trials (RCTs) have found higher cure rate (eradication of causative organism) with antibiotic treatment for seven days or longer versus shorter courses. One RCT found no significant evidence of a difference between oral and intravenous antibiotics for acute treatment in children under the age of two years with an uncomplicated first UTI.

Benefits versus placebo

We found no RCTs.

Immediate empirical versus delayed treatment

We found no RCTs comparing immediate empirical treatment versus treatment delayed while microscopy or culture results are awaited. Five retrospective observational studies found increased rates of scarring in children in whom diagnosis was delayed between four days (in acute UTI) to seven years (when a child presented with chronic non-specific symptoms).[1]

We found one RCT that compared oral cefixime for 14 days (double dose on day one) versus intravenous cefotaxime for three days plus oral cefixime for 11 days for UTI in children under two years (see below). It found no evidence that children treated 24 hours after the onset of fever were at greater risk of renal scarring than children presenting within 24 hours (9/99 [9%] of children presenting before 24 hours developed scarring vs 19/159 [12%] of children presenting later; RR 1.3, 95% CI 0.6 to 2.7; P = 0.29). However, this incidental analysis was done retrospectively.[2]

Long versus short courses

We found one systematic review (search date not stated, 14 RCTs) comparing short course (single dose to four days) versus longer courses (seven to 10 days) of a range of antibiotics.[3] It found two RCTs that were adequately powered to find an effect. One RCT (49 children) compared amoxicillin single dose versus 10 day regimen, and the other RCT compared cefadroxil one day versus 10 day regimen.[4,5] Both RCTs found that longer courses cured (eradication of causative organism on four days' follow-up culture) significantly more children (results from the higher quality RCT[4]: AR of failure to cure 14/38 (37%) with short course vs 2/27 (8%) with long course; ARI short vs long course 29%; RR 4.6; no 95% CI provided; P <0.01).

The remaining 12 RCTs found no significant difference between long versus short courses but were too small to rule out a clinically important difference (see comment below). We found no RCTs comparing five day courses of antibiotics with other regimens.

Oral versus intravenous antibiotics

We found one RCT (309 children, age under two years, fever >38.2?C, first UTI confirmed from catheter specimen), which compared oral cefixime for 14 days (double dose on day one) versus intravenous cefotaxime for three days plus 11 days of oral cefixime.[2] It found no significant difference between treatments in mean duration of fever (24.7 h with oral treatment vs 23.9 h with IV; P = 0.76), re-infection rate (132/153 (86.3%) with oral treatment vs 134/153 (87.6%) with IV treatment; P = 0.28), incidence of renal scarring (intention to treat analysis: 15/153 (10%) with oral treatment (21 children not scanned and counted as having no scarring) vs 11/153 (7%) with IV treatment (13 children not scanned); P = 0.21), and mean extent of scarring (8% of renal parenchyma with oral treatment vs 9% with IV treatment).

Harms

Long versus short courses: The studies did not report comparative harms for long versus short courses of antibiotics nor for immediate versus delayed treatment.

Oral versus intravenous antibiotics: One RCT found weak evidence from a post hoc subgroup analysis in children with grade III–IV reflux that renal scarring at six months may be more common with oral versus intravenous treatment (new renal scarring within six months: 8/24 (33%) after oral antibiotics vs 1/22 (5%) after IV antibiotics; ARI 29%, 95% CI 8% to 49%; NNH 3, 95% CI 2 to 13).[2]

Comment

Versus placebo: Placebo controlled trials would be considered unethical because there is a strong consensus that antibiotics are likely to be beneficial. The improved response seen with longer versus shorter courses of antibiotics is indirect evidence that antibiotics are likely to be more effective than no treatment.

Long versus short courses: The systematic review comparing long versus short courses of antibiotics rigorously evaluated the methods of the included studies. It found that few studies accounted for confounding factors such as age, sex, and previous UTI. Those that considered these did so by selecting one subgroup only and not by stratifying children according to these factors. This limits the ability to generalise about the results. The 12 trials that found no evidence of a difference between long and short courses were too small to exclude a clinically important effect.

Oral versus intravenous antibiotics: The trial comparing oral versus intravenous antibiotics excluded three of 309 children because investigators considered that the severity of symptoms in these children warranted intravenous treatment.[2]

Which children benefit from diagnostic imaging?

We found no evidence of benefit from routine diagnostic imaging of all children with a first UTI. We found indirect evidence suggesting that subgroups at increased risk of morbidity may benefit from investigation.

Benefits

We found no RCTs. One systematic review (search date 1994, 63 descriptive studies) found no direct evidence that routine diagnostic imaging in children with UTI was effective.[1] The quality of studies was generally poor, and none included clinically important long-term outcome measures.

Harms

The studies reported no evidence of harms. Potential harms include those relating to radiation, invasive procedures and allergic reactions to contrast media.

Comment

Subgroups of children at high risk of morbidity, including those with vesicoureteric reflux, may benefit from early investigation.[1] However, it may be difficult to identify such children clinically.[6] One prospective study found that the highest rates of renal scarring after pyelonephritis occurred between one and five years of age.[7] A further study found that presentation with pyelonephritic symptoms in children of all ages is associated with high rates of renal abnormalities (abnormal initial scans in 34/65 (52%) children).[8]

References

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