

How well do general practitioners manage urinary problems in children?

SOUTH BEDFORDSHIRE PRACTITIONERS' GROUP

SUMMARY. Thirteen general practitioners examined the notes of 1072 patients born in 1974 for evidence of enuresis, suspected urinary tract infection, and renal tract imaging. Of these children 63 (5.9%) had presented with enuresis — 6.7% of the boys and 5.0% of the girls. Of the 63 children 65.1% had had midstream urinalysis. One hundred and ninety five children (18.2%, 64 boys and 131 girls) had experienced 303 episodes of possible urinary infections. Midstream urine samples were obtained in 80.2% of episodes and 17.7% of samples were positive. Ten boys (1.9% of the total) and 28 girls (5.2%) had proven infections. Only 14 of these 38 children (36.8%) had undergone renal tract imaging, 30.9% of the boys and 39.3% of the girls. All imaging was normal except in the case of one girl whose micturating cystourethrogram showed reflux. Fifteen other children were investigated; two further abnormalities were detected, one renal scar with reflux and one duplex system.

This study demonstrates deficiencies in the investigation and follow up of children with urinary problems by general practitioners. Possible means of improvement are discussed.

Introduction

THE management of urinary problems in children makes up a very small part of the work of a general practitioner, yet it is an area where failure to investigate and treat appropriately can have serious consequences. The development of renal scarring, with its attendant complications of hypertension and renal failure, ought to be preventable with optimal medical care, and it does seem that its prevalence is decreasing.¹ There can be few of us, however, who have not found a brief entry such as 'cystitis — amoxicillin' in a child's notes.

The available research on urinary problems in children presenting in general practice consists mainly of studies from single practices, covering small populations.²⁻⁷ The classic population studies on urinary tract infections in children are those of Winberg; a Swedish paper, published in 1974, summarizes his work.⁸ He examined the hospital records of all children seen at the Goteborg childrens' hospital over a six year period. It is likely that the majority of children with urinary tract infections would have been taken directly to the outpatient department of the hospital at that time, and so it is possible to estimate the incidence of infections in the population. He calculated that the risk of a child developing a urinary tract infection in the first 11 years of life was 1.1% in a boy and 3.3% in a girl; these figures are widely quoted. The decision whether to examine the children radiographically was based on different criteria for boys and

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girls, and thus the results are not strictly comparable, but he found evidence of renal scarring in 13% of boys and 4.5% of girls with urinary tract infection, and duplication of the upper urinary tract in 5% of boys and 12% of girls. More recent publications have tended to favour investigation of the renal tract in all children after a urinary tract infection has been proven,^{3,5,9,10} although this is still a matter for debate.^{11,12}

Further population data on urinary problems in children seem to be largely confined to horizontal studies, for example examining the urine of schoolgirls for bacteriuria¹³ or screening for bacteriuria in small general practices.^{14,15} We felt therefore that it would be useful to look retrospectively at general practice records, which should document all problems throughout childhood. The present study aimed to see how well urinary problems are managed in general practice and to identify areas in need of improvement. We also hoped to collect some useful statistics on the prevalence of such problems in the community. In an attempt to reduce the effects of early sexual activity on the results, it was decided to examine the records of children born in 1974, who were 14 years old at the time of the study. Because the advice on criteria for investigating the two sexes is conflicting, the figures for boys and girls were examined separately in order to compare the general practitioners' management of urinary problems in the two sexes.

Method

Thirteen general practitioners with a combined list size of 91 400 patients, working from 10 different practices in Luton, Dunstable, Harpenden and surrounding villages, obtained the names of all children who were born in 1974 from their age-sex registers (manual or computerized). They then retrieved the medical record envelopes of these children, and discarded those names for whom the records were missing (eight children) or did not cover the period under study (17 children). There remained 1072 children (534 boys and 538 girls) for whom full information was available.

The notes of these children were then examined by the doctors for a record of: (1) enuresis or daytime wetting, presenting in a child aged five years or more; (2) suspected urinary tract infection, defined in a child aged two years or more as a note of cystitis, dysuria or urinary tract infection and in a child aged less than two years as a collection of symptoms which prompted the examination of a mid-stream urine specimen; (3) renal tract imaging.

For children with enuresis, and for each episode of suspected urinary tract infection, the doctors noted whether a mid-stream specimen of urine had been obtained when the child was symptomatic and whether the result was positive (>10 pus cells and a pure growth of >10⁵ bacteria per ml), negative (<10 pus cells and no bacterial growth) or doubtful (any other result). If the result was doubtful they noted whether the test had been repeated and if so the result. The age of the child at the time of the first positive specimen was recorded for children who had a positive mid-stream urine result.

In the case of children receiving renal tract imaging, the investigations performed and any abnormalities detected were noted.

Statistical analysis was performed using the chi-square test with Yates' continuity correction.

Results

Enuresis

Enuresis presenting after the fifth birthday was found in 63 of the 1072 children (5.9%) — 36 of the 534 boys (6.7%) and 27 of the 538 girls (5.0%). This sex difference was not significant. Mid-stream specimens of urine had been obtained from 41 of the enuretic children (65.1%), slightly more often for girls (77.8%) than boys (55.6%) (difference not significant). Two of the 41 samples were culture positive.

Suspected urinary tract infection

Evidence of suspected urinary tract infection was found in the notes of 195 children (Table 1). It occurred significantly more often in girls than in boys ($\chi^2 = 26.7, P < 0.001$). Many of these children had more than one episode and a total of 303 episodes were recorded. Mid-stream urine samples were obtained when the children were symptomatic for 243 of these episodes. An episode of suspected urinary tract infection in a boy was slightly more likely to result in the examination of a mid-stream urine sample than an episode in a girl (Table 1) but this difference was not significant.

Table 1. Suspected urinary tract infection (UTI): sex distribution, management and results of mid-stream urine (MSU) sample.

	All children	Boys	Girls
Total no. of children in group	1072	534	538
No. (%) of children with suspected UTI	195 (18.2)	64 (12.0)	131 (24.3)
No. of episodes of suspected UTI	303	84	219
No. (%) of episodes in which MSU sample obtained	243 (80.2)	70 (83.3)	173 (79.0)
No. of MSU samples with initial result:			
Positive	40	11	29
Doubtful	30	7	23
No. of doubtful samples repeated	12	6	6
No. of repeated samples positive	3	1	2
Total no. of positive results (% of all samples)	43 (17.7)	12 (17.1)	31 (17.9)

Of the 243 mid-stream urine samples, the result was positive for 40 initially. Thirty samples gave doubtful results; 12 of these were repeated and three repeats were positive. There were therefore 43 positive results in total (Table 1). Boys and girls were almost equally likely to have a positive mid-stream urine result.

Proven urinary tract infections were shown in 38 of the 1072 children (3.5%) — 10 boys (1.9%) and 28 girls (5.2%). This sex difference is significant ($\chi^2 = 7.75, P < 0.01$). Of these 38 children 14 (36.8%) were investigated, three of the boys (30.0%) and 11 of the girls (39.3%). The median age at which a positive mid-stream urine result was obtained was nine years in boys and seven years in girls. No proven urine infections were recorded in children aged under two years.

Of the 24 children who were not investigated, 15 (four boys and 11 girls) were not asked to return to the general practitioner after treatment, six (one boy and five girls) returned for follow up but were not referred, and three (two boys and one girl) were referred to hospital but not investigated. Of these three, one boy was referred to a surgeon for phimosis and subsequently cir-

cumcised, another boy was apparently not investigated because of mental retardation, and the girl was seen by a paediatrician who decided that she did not require investigation unless she had a further attack.

Investigations

A total of 29 children (eight boys and 21 girls) had some form of renal tract imaging (Table 2). Of the 14 children with proven urinary infections who underwent investigation, all imaging was normal except in the case of one girl whose micturating cystourethrogram showed reflux. Another girl underwent cystoscopy and was found to have a stenosed urethra. It is notable that micturating cystourethrograms were requested for six of the girls but for none of the boys.

Table 2. Results of renal tract investigations among the 29 children.

Investigation	Children with proven UTI		Children with no proven UTI	
	Boys (n = 3)	Girls (n = 11)	Boys (n = 5)	Girls (n = 10)
Intravenous urogram	3 normal	11 normal	3 normal 1 duplex	9 normal 1 scarring
DMSA	1 normal	4 normal	1 normal	3 normal
Micturating cystourethrogram	—	2 normal 1 reflux	—	2 normal 1 reflux
Ultrasound	—	—	1 normal	—

UTI = urinary tract infection. *n* = total number of children in group. DMSA = ^{99m}Tc dimercaptosuccinic acid imaging. Some children had more than one investigation.

The indications for investigating the 15 children who had not had a proven urinary tract infection were as follows. Of the five boys, one was enuretic, one had a clinical infection but a negative mid-stream urinalysis result, one had persisting dysuria despite five negative mid-stream urine samples, one had a family history of renal disease, and one had hypospadias. All of these investigations were normal except for the boy with persistent dysuria who was found to have a duplex system (Table 2). Of the 10 girls, three had had doubtful mid-stream urine results, five were enuretic (though one 'enuretic' was only four years old), one had loin pain, and one a pyrexia of unknown origin. All tests were normal except for those of one girl; these showed renal scarring and reflux.

Discussion

Practitioners' groups such as ours provide a unique opportunity for research in general practice, because we have access to such a large number of patients' records. The widespread adoption of age-sex registers has made light work of the task of identifying a cohort of patients born in a particular year.

Studying children's case notes retrospectively has limitations, notably the necessity for excluding incomplete records. It is possible that these records may show a different profile of illness to those examined; this group of children may be more mobile and it may therefore be difficult for general practitioners to offer them ideal care.

Enuresis

This study indicates that 6% of children are brought to their general practitioner with enuresis. This is in keeping with the widely quoted figure that 10% of all five year olds are enuretic,¹⁶ since not all parents will regard bedwetting as a problem at that age. It may be unwise to draw conclusions from

a small sample, but in view of the fact that enuresis is said to be more common in boys than girls¹⁶ it is interesting that no significant sex difference was found in children presenting to general practitioners. Perhaps parents refer girls more readily because they consider enuresis in girls to be uncommon.

The evidence that enuresis without urinary tract infection is linked to renal tract abnormalities is not strong.¹⁷ It is good practice to obtain a mid-stream urine sample in all such cases, and therefore the figure of 65% found here was disappointing. It was surprising that one boy and five girls were referred for renal tract imaging solely because of enuresis, especially since one girl was only four years old. The results of all of these investigations were normal.

Suspected urinary tract infection

The definition of suspected urinary tract infection in children aged two years or over did not produce any controversy within this group of general practitioners. However, the greatest difficulty encountered was in reaching agreement on the definition of an episode of suspected urinary tract infection in a child aged less than two years. The definition of a collection of symptoms for which a mid-stream urinalysis was requested will inevitably have improved the overall figures for mid-stream urine results in suspected episodes. However, no proven urine infections were recorded in children aged under two years, and the number of urinalyses requested was small.

It is unlikely that the exclusion of infants with other suspicious symptoms (for whom a mid-stream urine sample was not requested) will have artificially reduced the figures for the total number of children with urinary tract infections. If a child had experienced a urinary infection when aged under two years, which was undiagnosed because a urine sample was not examined, he or she would probably have been included in the study because of episodes of reinfection later in childhood.

Nearly one fifth of the children had been suspected of having a urinary infection at some stage and this is a much higher proportion than we had expected, perhaps because it includes several who were managed entirely in general practice, that is, their suspected urinary tract infections were treated with antibiotics without any investigations being performed. Mid-stream urine samples were examined in 80% of episodes, a figure which gives no cause for complacency. Failure to examine a urine sample may have resulted from patient non-compliance, or perceived problems of laboratory inaccessibility at weekends and bank holidays. However, the sample could have been refrigerated. The local laboratory does not offer the facility to examine dip-slides^{14,18} although it has recently improved its out-of-hours service.

The estimates that 1.9% of boys and 5.2% of girls have suffered a proven urinary tract infection are 73% and 58% higher respectively, than those of Winberg.⁸ This may be because he only considered children up to the age of 11 years, or because his study was based on outpatient referrals and therefore may have underestimated the problem. Alternatively, the discrepancy may be due to the small size of our sample.

Investigations

The most surprising fact to emerge from this study was that only 37% of children with proven urinary tract infections were sent for renal tract imaging. It was first thought that this must be because of the higher threshold for referral in girls,³ but a closer examination of the figures showed that boys were actually less likely to be referred than girls (30% versus 39%), although the difference was not statistically significant.

This is particularly worrying in view of Winberg's finding that there is a significant risk of finding scarring in such children.⁸

His figures for girls are not helpful because of his policy of selective investigation, but he found that 13% of the boys with urinary tract infection had renal scarring.

There were a variety of reasons for the general practitioner's failure to investigate such children. In the majority of cases the general practitioner failed to ask the parents to bring the child back for follow up. In three cases, two of them boys, the hospital consultants were responsible for the decision. This highlights the variety of opinions which still exist among paediatricians on this issue.^{3,12}

Conclusion

The objectives of a general practitioner who is dealing with a child with a suspected urinary infection must first be the relief of distressing symptoms, but secondly the prevention of renal scarring, hypertension and renal failure. It is therefore important that a high index of suspicion is maintained, especially in a very young child; that every effort is made to obtain a mid-stream specimen of urine before instigating treatment; and that it is impressed on the parents that they must bring the child back for a follow-up appointment, in order to arrange a repeat urine sample in the case of a positive or doubtful result, and further investigation where appropriate. Even if the parents do not return with the child as requested, it must be the doctor's responsibility to ensure that a child who has had a documented urinary tract infection is referred to a paediatrician or independently investigated. Although there is still some uncertainty as to whether a girl should be investigated after her first infection, the advent of non-invasive ultrasound techniques is lowering the threshold for referral.

How else can we improve our performance? Perhaps we should talk to our local microbiologists about the best method of analysing the urine of a child who presents on a weekend or bank holiday. Perhaps we should improve our practice filing systems so that a positive or doubtful mid-stream urine result in a child is placed in a prominent position until some action has been taken. It might also be helpful to write a clear management plan in the child's notes at presentation.

The results presented here relate mainly to the medical practice of several years ago, and the increasing prominence being given to such problems in general practitioners' education will hopefully result in more careful investigation and referral of children presenting today. Certainly this research has heightened our own awareness of the importance of urinary tract infections in children.

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