

Should GPs have direct access to imaging for children with urinary tract infections? An observational study

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SUMMARY

Background. All children with urinary tract infections (UTIs) should undergo imaging of the urinary tract. The Royal College of Radiologists currently recommends that such children should be referred to a paediatric specialist prior to imaging.

Aim. To investigate whether direct referral of such children by general practitioners (GPs) for imaging offers advantages over the traditional approach.

Method. Information on 100 children with UTIs, who were referred direct for imaging by GPs according to an agreed protocol, was compared with information on 100 children with UTIs referred initially to paediatric specialists.

Results. Protocol-guided direct referral resulted in less delay prior to imaging, no evidence of inappropriate referral (as judged by urinalysis and yield from imaging), greater consistency of follow-up arrangements, and a considerable saving in outpatient department (OPD) appointments. There was no increase in the overall number of referrals for imaging.

Conclusion. Given agreed protocols, there is no basis for current recommendations that GPs should not refer children with UTIs for imaging without a prior paediatric opinion.

Keywords: UTIs; children; referrals; paediatrics; imaging.

Introduction

It is widely accepted in the United Kingdom (UK) that all children with urinary tract infections (UTI) should undergo imaging of the urinary tract¹ to detect structural or functional abnormalities that could predispose to urinary infection, and to detect those children who have already suffered renal damage from such infection. The Royal College of Radiologists recommends that a paediatric specialist assess the child first,² presumably for fear of inappropriate referrals by general practitioners (GPs). The few studies available, however, suggest that referrals from GPs for ultrasound scan (US) of the abdomen,^{3,4} and magnetic resonance imaging of the lumbar spine,⁵ have as high a rate of positive findings as those from hospital specialists. Furthermore, delay in the treatment of renal tract abnormality may be associat-

ed with an increased risk of renal scarring, and the interval between referral and imaging is a major part of that delay.⁶ We have carried out a study to examine whether GPs in the Brighton area were able to use a direct referral system appropriately, and the extent to which it reduced delay.

Method

From 1 September 1996, all local GPs were allowed direct access to urinary tract US at the Royal Alexandra Hospital for Sick Children, Brighton, for children aged 1–13 years old with suspected urinary tract infections, according to a protocol agreed between a group of GPs and the consultant paediatric radiologist.

The protocol specified that children aged 1–13, in whom the GP suspected a UTI, could be referred direct for US, provided a mid-stream urine specimen (MSU) had been taken. GPs were asked to include the results of MSU examination with their referral even if it was negative. Referrals were rejected if children were outside the agreed age range or if no details of the MSU result were enclosed.

If the US result was normal, a standard letter was sent to the GP and to the parents reminding both of the advice to perform three-monthly MSUs for one year. The Radiology Department supplied the parents with four MSU forms and the first urine specimen bottle. If the US result was abnormal or equivocal, the radiologist would perform further investigations or refer to a paediatrician or surgeon as appropriate.

General practitioners were asked to refer the following children direct to a paediatric specialist:

- those under one year old,
- those with known structural abnormality of the urinary tract, and
- those who had already been investigated because of a UTI.

From the first 100 direct referrals for imaging, the following information was recorded: the age and sex of the child, the time from GP referral to US, the MSU result that prompted referral, the US result, and the arrangements made for follow-up MSUs. A comparison group was obtained from the records of the imaging department prior to the start of the direct access service. This consisted of the last 100 children aged 1–13 referred (before the start of the direct access service) by GPs to the OPD department and from there for imaging because of UTI, and the children whose clinical records were available.

Results

Matching of the two groups

Children referred from OPD and direct from general practice were similar in age (mean age of 5.6 against a mean age of 6.2). There was an unexpected sex difference: the ratio of females to males referred from OPD was 3:1 against a ratio of 6:1 referred by GPs. No formal record was kept of direct access referrals refused because of failure to enclose an MSU result, but we believe it to have occurred on no more than four occasions.

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Time from GP referral to performance of US

Children referred from OPD had waited a mean of 140 days. Most of this delay was waiting for the OPD appointment with the paediatric specialist (mean of 122 days). Children referred by GPs direct to US waited a mean of 32 days ($P < 0.0001$). The mean difference was 108 days (95% confidence interval = 92–125).

Appropriateness of referrals

This was assessed, for the purposes of this study, on the certainty of the diagnosis of UTI from the MSU. Referrals were divided into three categories according to the strictness of the criteria used in judging the result to be positive. The most strict criterion was the presence of a pure growth of an organism at $>10^5$ /ml with white cells (WBC) of >100 /ml of urine. The wider criterion was the presence of a growth of an organism at $>10^5$ /ml regardless of cells. The widest criterion expanded that definition to include a growth of organisms at $<10^5$ or a mixed growth with one organism predominating, or where (in the case of OPD referrals) the GP had asserted that the MSU was positive. On all three criteria, GP referrals were significantly more appropriate than those from OPD (Table 1).

Number of abnormalities found

The incidence of abnormal and equivocal findings on US was similar for the two groups of children (Table 2), although this study is not large enough to say that a small difference does not exist.

Arrangements made for follow-up MSU

The guidelines from the Royal College of Physicians Working Group¹ recommend follow-up MSUs every three months for two years, although a minority of the members of the Group did not favour routine follow-up urine tests. Our protocol for children referred by GPs recommended that every child referred for US for UTI should have three-monthly MSUs for one year. This was organized from the radiology department in every one of the 100 cases. Follow-up MSUs were recommended from OPD in only 23 cases out of the 87 who had been discharged by the time the notes were assessed (Table 3).

Outpatient appointments in the comparison group

At the time that the retrospective analysis of the notes was carried out, 13 children had not been discharged from follow-up. Of the 87 who had been discharged, 52 had had a single OPD appointment, 30 had two, four had three, and one had four appointments.

Overall numbers referred

Despite giving GPs direct access to US for UTIs, there was no overall increase in the number of urinary tract USs performed. From January to July 1996, 274 USs were performed. In the same six months of 1997, the total was 279.

Table 2. Results of US in patients referred from OPD and from general practice.

Result of US	Referrals from OPD (total = 100)	Referrals from GPs (total = 100)
Abnormal US	10	8
Equivocal US	9	14
Normal US	81	78

Table 3. Follow-up MSUs performed or recommended on children referred for imaging from OPD.

MSUs recommended or performed	No. of children
Three MSUs at three-monthly intervals	20
Three MSUs at monthly intervals	3
Not discharged from OPD	13
No follow-up MSU unless UTI recurs	64
Total	100

Discussion

Our study provides evidence to support the recommendation that GPs be allowed direct access to imaging for children with urinary infections. Some aspects of diagnosis and follow-up are contentious, but we believe that they do not detract from our conclusions.

We have chosen to include the widest possible definition of a positive MSU, in line with recent reports that any degree of pyuria and bacterial counts below 10^5 /ml may be associated with abnormalities of the urinary tract on imaging.^{7,8} The results in Table 1 show that protocol-guided referrals direct from general practice are more likely to be associated with a positive MSU result than referrals from OPD, whatever criteria are used to diagnose infection.

We are aware that there is debate about the appropriateness of urinary tract US as the initial screening test for children with UTIs. At the Royal Alexandra Hospital for Sick Children, Brighton, it is the screening test used regardless of whether children are referred by GPs or specialists. Whether it is appropriate is therefore not relevant to the question we are addressing.

We are also aware that there is debate about the value of routine follow-up in children with a normal urinary tract on imaging. Our study shows that, whatever follow-up arrangements are agreed locally, a direct access system is capable of initiating those arrangements.

This study should not be interpreted as showing that GPs are better than specialists at referring children with UTIs for imaging. The two groups of children differ in several ways:

- The information about referrals from OPD was obtained retrospectively, and the information about referrals from GPs prospectively. Medical records are not as reliable a source of information as prospective data collected for a specific pur-

Table 1. The number of positive MSUs in referrals from OPD and from general practice.

Status of MSU	Referrals from OPD meeting the criterion (total = 100)	Referrals from GPs meeting the criterion (total = 100)	Relative risk of GP referrals meeting the criterion compared with OPD referrals (95% confidence intervals)
Strict criterion	31	54	1.74 (1.24–2.46)
Wider criterion	65	80	1.23 (1.03–1.46)
Widest criterion	78	89	1.14 (1.01–1.29)
Normal or no record	22	11	

pose. Some of the patients for whom there was no record of a positive MSU, for instance, may have had such evidence but it may have been lost.

- The GPs were working to a protocol. It is not surprising that their performance was more consistent than that of hospital doctors who had not received the protocol.
- Children referred by GPs direct for US may have been the more straightforward cases.
- Children referred without MSU results were excluded from the general practice group but not from the group referred from OPD.

Despite these differences, the comparison remains valid, because our interest is in the comparison of two procedures not of two groups of doctors.

Conclusion

Direct access for GPs to imaging for the investigation of childhood UTI can lead to a major reduction in the delay between referral and scan, and to considerable saving of outpatient appointments, with no evidence that GPs refer inappropriately or have a lower yield of abnormal scans. Arrangements for follow-up MSUs are much more likely to be made under a protocol-guided GP referral system than from a traditional paediatric outpatient department. We suggest that current recommendations that GPs should not refer children directly for urinary tract imaging be revised.

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