

Urinary tract symptomatology in general practice

D. H. LAWSON, M.R.C.P.E.*
Senior medical registrar.

ALISON CLARKE, F.R.C.G.P., D.Obst.R.C.O.G.
General practitioner.

D. B. MCFARLANE, M.R.C.G.P., D.Obst.R.C.O.G.
General practitioner.

T. A. MCALLISTER, M.B., Ch.B.
Consultant bacteriologist.

A. L. LINTON, F.R.C.P.E., F.R.C.P.G.†
Consultant physician in renal diseases.

CONSIDERABLE controversy exists as to the nature and the outcome of the lesion in patients with urinary tract symptomatology. Several clinical studies have been undertaken to elucidate this problem, notably those of Fry *et al.* (1962), Mond *et al.* (1965) and Steensberg *et al.* (1969). Waters (1969a) has advocated an epidemiological approach, but despite this, considerable confusion still remains.

Angell *et al.* (1968) observed that many patients found at autopsy to have "active non-obstructive chronic pyelonephritis" had denied a past history of recurrent urinary tract infection. It may be, therefore, that the current fashion to consider all cases of acute urinary tract infection as potentially serious conditions which might become established and later present as chronic pyelonephritis (*The Lancet*, 1968) is wrong. In an attempt to clarify the situation it was decided to conduct a prospective survey of female patients presenting to two general practices in Glasgow and to follow up such patients for a prolonged period. We report the findings on presentation and after initial follow-up.

Patients and methods

Non-pregnant and non-diabetic female patients between the ages of 15 and 55 were accepted for the survey from both practices and a separate group of patients aged over 55 was included from one. Where possible, all patients presenting to their general practitioners in the 18-month admission period, who complained primarily, or on questioning, of urinary tract symptoms which would normally have led a general practitioner to consider a diagnosis of 'urinary tract infection' were investigated.

After questioning by the practitioners, the patients were seen by a nurse, who collected a mid-stream sample of urine and thereafter divided this into two before placing it in a refrigerated container in which it was transported to the laboratory within four hours. Patients were prepared in a standard fashion by the nurse, who cleaned the vulva with sterile water before collecting the mid-stream specimen in a sterile honey-pot. Initially, an additional sample was collected at the onset of micturition for further examination but this was subsequently stopped. Bacterial counts and drug sensitivities

*Present address: Senior Investigator, Boston Collaborative Drug Surveillance Program, Boston University, Mass., U.S.A.

†Present address: Professor of Medicine, Victoria Hospital, London, Ontario, Canada.

were performed on one sample and a modified Addis count was performed on the other sample using the methods described by McGeachie and Kennedy (1963). Drug sensitivities were determined using a standard 'U2 oxoid multodisc.'

After the urine sample was obtained, each patient was randomly allocated to one of three treatment groups:

- (1) Sulphadimidine, one gram six-hourly for seven days.
- (2) Ampicillin, 500 mg six-hourly for seven days.
- (3) Sulphadimidine in the above dose for the first four days, after which the therapy was changed to the drug indicated by the bacterial sensitivities.

The full course of treatment was given even if the urine culture was sterile and irrespective of the sensitivity pattern of the organisms discovered.

All patients were seen again at 14 days and a repeat sample of urine obtained. The patients were instructed to return if symptoms recurred and were reviewed annually after treatment began. All patients who failed to respond or who developed more than two recurrences were referred to hospital for detailed investigation.

The patients were allocated to four groups on the basis of the laboratory findings on presentation:

1. Patients whose urine examination showed more than 100,000 organisms per ml of urine as well as an abnormal Addis count.
2. Patients whose urine culture showed more than 100,000 organisms per ml of urine with a normal Addis count.
3. Patients whose urine culture showed less than 100,000 organisms per ml with an abnormal Addis count.
4. Patients with no abnormality detected in the urine.

No attempt was made either to check blood urea or serum creatinine levels, or to perform an intravenous pyelogram, as such procedures could lead to a substantial number of patients failing to return for follow-up examination.

Results

Three hundred and forty-three patients were admitted to the survey. The findings in the initial urine sample are shown in table 1, with the treatment group to which the patients were allocated. There were no significant differences between the two practices in the findings on initial urine examination.

TABLE 1
PRESENTING FINDINGS AND TREATMENT GROUPS

Group	1	2	3	4	Total
Practice A	45	22	29	105	201
Practice B	26	25	15	76	142
Both practices	71	47	44	181	343
Per cent of total	20.7	13.7	12.8	52.8	100
Treatment A	27	13	14	61	115
Treatment B	24	15	15	60	114
Treatment C	20	19	15	60	114

Group one=Positive Addis, over 10^5 organisms per ml urine
 Group two=Negative Addis, over 10^5 organisms per ml urine
 Group three=Positive Addis, under 10^5 organisms per ml urine
 Group four=Negative Addis, under 10^5 organisms per ml urine

Symptoms

Presenting symptoms are shown in table 2. There were no significant differences between any of the groups with respect to the presenting symptoms. In particular, patients in

TABLE 2
PRESENTING SYMPTOMS AND PREVIOUS HISTORY*

<i>Presenting complaints</i>	<i>Group 1</i>	<i>Group 2</i>	<i>Group 3</i>	<i>Group 4</i>	<i>All groups</i>
Pyrexia	4.2	4.3	13.6	10.4	9
Loin pain	38.0	57.0	38.6	39.2	42
Frequency	88.7	74.4	79.5	72.4	77
Dysuria	67.6	55.3	63.6	51.9	57
Nocturia	70.4	61.7	61.4	50.3	58
Stress incontinence	22.5	42.5	29.5	24.3	27
Previous symptoms	49.3	57.5	47.7	43.1	48

*Results expressed as percentage of total number in each group.

group one could not be differentiated from the others by consideration of symptoms alone.

Social and past histories

Social status and parity did not influence the findings in the urine on the first examination.

Bacteriological findings

The bacteria isolated in concentrations of over 10^5 organisms per ml of urine are recorded in table 3. A comparison between the bacteria isolated from the two practices is also shown. There were no statistically significant differences between the practices in the numbers and types of bacteria isolated.

TABLE 3
COMPARISON OF BACTERIA ISOLATED FROM TWO PRACTICES

<i>Organism</i>	<i>Practice A</i>		<i>Practice B</i>		<i>Overall</i>	
	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>
<i>Escherichia coli</i>	47	70	29	57	76	64
<i>Staphylococcus albus</i>	8	12	12	23.4	20	17
Micrococcus species	6	9	8	15.7	14	12
<i>Proteus mirabilis</i>	5	7.5	2	3.9	7	6
<i>Pseudomonas aeruginosa</i>	1	1.5	0	0	1	1

Effect of treatment

Sulphadimidine and ampicillin appeared equally effective in treating the presenting episode of urinary tract symptomatology. In 10.8 per cent of cases the urine showed persistent abnormalities on review at 14 days. None of these patients had received a drug to which the causative organism was resistant. This circumstance did however arise in 18 patients (eight in treatment-group one; two in treatment-group two, and eight in treatment-group three).

All individuals with persistent abnormalities detected in the urine were given a course of the drug appropriate to the findings, and in all cases this rendered the urine sterile on examination two weeks later. In the patients allocated to treatment-group three, only 15 per cent of cases were changed to another drug after four days. This was a much lower rate of change of therapy than had been expected and emphasises the apparent clinical success of sulphadimidine in this study.

Recurrences reported to general practitioners

Thirty-three of the original patients withdrew or defaulted. The remaining 310 patients

were available for follow-up. The overall recurrence rate of cases reported to their general practitioners was 11.3 per cent during the first 18 months of the survey (table 4). Recurrences were reported significantly more often from patients in group one than from those in any of the other groups ($\chi^2=8.459$; $p<0.01$). There were no significant differences between groups two, three, and four in this respect, nor was there a difference between the patients in the two practices.

TABLE 4
RECURRENCE PATTERNS

Group	1	2	3	4	Total number	%
Numbered reviewed at 18 months	65	41	38	166	310	
Reported recurrences to general practitioner	15	4	3	13	35	11.3
Number reviewed at 12 months	29	17	12	79	137	
Reported recurrences to general practitioner	6	1	0	11	18	12.4
Recurrences on questioning	10	3	6	19	38	27.7

Recurrences on questioning

A group of 137 patients was reviewed and analysed one year after their admission to the trial. At the time 18 patients (12.4 per cent) had reported recurrences of symptoms to their practitioners. However, on questioning 38 patients (27.7 per cent) admitted recurrences—a significantly greater number than those spontaneously reported ($\chi^2=6.705$; $p<0.05$).

Further analysis of this group of 137 patients showed that patients between the ages of 15 and 55 years reported about one third of the recurrences (eight out of 25=32 per cent), whereas those over the age of 55 reported about two thirds of the recurrences (nine out of 13=69 per cent). Of these 38 patients who had recurrences of symptoms, 21 (55 per cent) had a past history of urinary tract symptomatology compared to 19 per cent (19 out of 99 patients) with no recurrences ($\chi^2=17.3$; $p<0.001$).

Analgesic abuse

This was equally common in both practices and in all ages. The prevalence of analgesic abuse was 15.3 per cent of 137 patients when this was defined as the regular consumption of at least ten tablets per week of analgesic. The percentage of patients who admitted taking analgesics in quantities exceeding one kilogram in their life-time was 8.7. The drugs most often involved were aspirin, 'Askit' powders, codeine and paracetamol. Two thirds of those admitting analgesic abuse were found to have no abnormality in the urine on presentation (group four), the remainder having frank infection (group one).

Referral to hospital

Only eight of the 343 patients in the study were referred to hospital. Of these, three had evidence of persisting urinary tract infection, in one case associated with clubbing of the minor calyces on intravenous pyelography (IVP). Two patients had persistently normal urine cultures, normal IVP and had evidence of marked psychosocial maladjustment.

Of the remaining three one had chronic cystitis on cystoscopy, one had a mal-absorption syndrome with severe leucopenia and megaloblastic erythropoiesis, and one had disseminated lupus erythematosus which rapidly progressed to the anuric stage, when regular dialysis therapy was started.

Urethrovessical count

Moore *et al.* (1965) claimed that they could differentiate patients with lower urethral disease from those with infection starting at the bladder or above by means of a differ-

ential urethrovesical count. We attempted to repeat this observation by comparing the results of the Addis count performed on the first part of the stream of urine with a similar test on a true mid-stream specimen. This was performed on 75 patients before being stopped. Apart from noting a larger number of squames in the first sample, no significant differences were detected between the two specimens.

Comparison of practices

The number of patients attending their practitioners for symptoms referable to their urinary tract per 1,000 patients at risk was over twice as great in practice B as in practice A—a finding which was noted at all age groups investigated apart from the 20–29 year-old group where the differences were not so marked (table 5).

TABLE 5
INCIDENCE RATES OF URINARY TRACT SYMPTOMS IN TWO GENERAL PRACTICES

Age range years	Practice A			Practice B			Significance		Incidence per 1,000 patients per annum*	
	Number	Total	%	Number	Total	%	χ^2	<i>p</i>	Practice A	Practice B
15–19	15	265	5.7	13	104	12.5	4.15	0.05	37.4	82.5
20–29	34	707	4.8	42	485	8.3	6.24	0.05	31.7	54.4
30–39	34	563	6.2	38	298	12.8	9.50	0.005	41.0	84.2
40–49	37	630	5.9	32	196	15.8	17.19	0.001	38.8	104.4
50–59†	31	583	5.5	17	112	14.3	—	—	36.2	94.3
60–69	37	670	5.7	—	—	—	—	—	37.4	—
70+	14	441	3.2	—	—	—	—	—	20.9	—
All ages	202	3859	5.3	142	1195	11.6	49.2	0.0001	35.1	76.2

*Derived from observed frequency during 18-month period.

†Range 50–55 years in Practice B.

Discussion

Pyelonephritis is a term which has come to be applied loosely to a wide variety of apparently distinct conditions (Jackson *et al.*, 1962) and much confusion has been caused by a failure to define the exact terms used when describing patients with abnormalities of the urinary tract (*The Lancet*, 1968).

Prevalence

In British general practice about 12–13 consultations per 1,000 concern patients who have urinary tract symptoms and bacteriuria (Fry *et al.*, 1962; Milne *et al.*, 1969) and in Denmark about 34 consultations per 1,000 concern patients with urinary tract symptoms alone, irrespective of the presence or absence of bacteriuria (Steensberg *et al.*, 1969).

In this survey, 33 patients per 1,000 consulted their general practitioner for urinary tract symptoms from one practice (A) and 82 per 1,000 from the other (B). This difference between the two practices was highly significant ($p < 0.001$) and could be due either to (i) a failure to report about half of the cases in practice A, which is unlikely, or (ii) to a falsely high number being reported from practice B. This is equally unlikely since under these circumstances a preference for certain symptoms should have been observed from this group yet the presenting symptoms were similar in both practices; or (iii) a true difference between the two practices.

Since one practice (A) serves an area of higher social class than the other (B), it could be that this was important, particularly since the social grading of patients with urinary tract symptoms from the two practices was similar, suggesting either that there is a higher prevalence of urinary tract symptomatology in the lower social classes or a

greater tendency on the part of these groups to report such symptoms to their practitioners. Finally, and perhaps most important, (iv) the physicians in practice A were male and those in practice B female—a possible source of variability in the proportion of patients with symptoms who were willing to discuss these with their practitioners.

Although the prevalence of urinary tract symptomatology is higher than that previously reported in Britain, Waters *et al.* (1970) recorded an incidence of previous dysuria in 48 per cent of an asymptomatic group of females drawn randomly from the population. In his study about 22 per cent of these interviewed had experienced dysuria in the year preceding the survey (Waters, 1969b). Other workers have suggested that only about 40 per cent of patients with urinary tract symptoms actually consult their practitioners about these (Danish National Morbidity Survey, 1960).

Previous general-practitioner surveys have probably under-estimated the size of the problem, usually by excluding from analysis (or analysing separately) the 30–50 per cent of patients who have no abnormality noted on urine examination at the time of the symptoms (Fry *et al.*, 1962; Gallacher *et al.*, 1965).

Presenting symptoms

We confirm the findings of Mond *et al.* (1965) and Steensberg *et al.* (1969) that an analysis of presenting symptoms does not help to select the patients with bacteriuria from those with sterile urine. However, the use of a modified Addis count (McGeachie and Kennedy, 1963), as well as a bacterial count has proved of value since patients with both a positive Addis count and over 10^5 organisms per ml of urine have a reported recurrence rate significantly higher than those with neither or only one of these features and the recurrence rate on questioning is similarly higher in this group.

Little and de Wardener (1966) suggested that all patients with a history of acute loin pain, pyrexia and infected urine should be re-examined at short (undefined) intervals, so that any recurrences would be detected early and treated energetically. However, the majority of patients with recurrent symptoms and bacteriuria described in this series did not have pyrexia on presentation and several patients who were pyrexial did not have recurrences during the course of the trial.

It is reasonable to perform routine bacteriology and Addis counts on all patients with symptoms of urinary tract infection presenting to their practitioner in order to select a group of about 20 per cent of patients who are most likely to have recurrences following treatment. This, however, is the only indication to check these findings since about 90 per cent of patients responded adequately to the initial therapy. Of the ten per cent who did not, the majority remained symptom-free while having continuing urinary abnormalities. The taking of an initial mid-stream specimen of urine and Addis count from a patient with urinary tract symptomatology has value mainly in predicting likely recurrence rates and will not materially affect the outcome of the presenting episode.

It is now well recognised that organisms other than *Escherichia coli* can cause urinary tract infection (Mitchell, 1964; Stamey *et al.*, 1965; Kincaid-Smith, 1965; McGeachie, 1966; McFadyen and Eykyn, 1968; Mabeck, 1969; McAllister *et al.*, 1971). In this series only 64 per cent of the bacteria isolated were *E. coli* species, the remainder being *Staph. albus*, *Proteus mirabilis* and micrococci. There were no significant differences between the two practices in this respect. The high prevalence of urinary tract infection due to *Staph. albus* noted previously by Mabeck (1969) is confirmed.

The proportion of patients with urine cultures showing micrococci in concentrations of over 10^5 organisms per ml of urine (12 per cent), is an index of the inherent error in accepting the result of one single mid-stream specimen of urine. These patients were included in the infected groups (one or two) because of the presence of over 10^5 organisms

in their urines. It was felt that the present study should adhere closely to the standard practice of the two groups under investigation. To require a second specimen of urine (which would presumably be sterile in these patients) prior to treatment would have delayed treatment for an unacceptably long time.

Drugs

The clinical effectiveness of sulphadimidine was striking. This drug was as efficient as ampicillin in rendering the urine sterile and in preventing recurrences of symptoms. Sixteen patients received sulphadimidine despite the later bacteriology report of sulphonamide resistance. Only four of these patients had recurrences on questioning, a rate similar to the overall recurrence rate in the trial. This supports the observations of Harper and Cowston (1945) that sulphonamide sensitivities are of little value unless steps are taken to avoid sulphonamide antagonists in the medium and the true mean inhibitory concentration of drug to the organism is reported.

Patients over 55 years

This survey indicates that the incidence of reported urinary tract symptoms is approximately constant in the over 55-year age group. This condition did not appear to be more difficult to treat than in the younger age groups. Similar observations have been made by Brocklehurst *et al.* (1968) and McMillan and Linton (1968).

Analgesic abuse

The prevalence of analgesic abuse in our investigation is considerable. McMillan *et al.* (1968) have previously recorded a high incidence of analgesic abuse (14.2 per cent) in patients attending a renal clinic with the diagnosis of chronic pyelonephritis. Murray *et al.* (1970) noted an incidence of analgesic abuse of 8.8 per cent in inmates of a psychiatric hospital and this incidence rose to 23.2 per cent when patients who consumed analgesics daily for periods of at least six months were considered.

A considerable proportion of patients with urinary tract symptomatology, patients with chronic pyelonephritis and patients attending psychiatric hospitals abuse analgesics. This aspect of social behaviour has not yet been fully evaluated. Here the majority of patients abusing analgesics did not have any major abnormality in the urine, but were prone to recurrences of symptoms. We would, therefore, recommend that all patients with urinary tract symptomatology should be questioned about their habits of ingesting analgesics, since there is evidence to suggest that these drugs may be associated with impairment of renal function which is readily halted if the analgesic consumption ceases (Bell *et al.*, 1969; Murray *et al.*, 1971).

In conclusion, the present data indicate that the major reason for routinely culturing the urine of patients who come to their general practitioners with urinary symptoms is to predict likely recurrence rates. The outcome of the presenting episode is not materially affected by the result of the urine culture and microscopy. Sulphadimidine and ampicillin are equally effective as treatment for the presenting episode.

Summary

This study of 343 consecutive patients with urinary tract symptomatology presenting to two separate group practices revealed that the response to treatment was similar whether the patients were treated with sulphadimidine or ampicillin. The prevalence of urinary tract symptoms was significantly greater in one practice where the physicians were female, than in the other where the physicians were male. Possible reasons for this difference are discussed. The results of prolonged follow-up indicate that the major reason for routinely culturing the urine of such patients is to predict likely recurrence rates. The outcome of the presenting episode of symptoms is not materially affected by the result of the urine culture or microscopic examination.

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Requests for reprints should be made to Dr D. H. Lawson, Western Infirmary, Glasgow, G11 6NT, Scotland.

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STAFFING CURRICULUM

Studies of the natural history of diseases and the problems of organising health services should focus on the major diseases and problems of the area. The curriculum of a new medical school need not follow that of traditional schools elsewhere but should be adapted, in the light of the special needs of the country, to the roles its graduates are likely to play. Students should have frequent contacts with the local health facilities—health centres, first-aid posts, and outpatient departments—so that they may become familiar with community health problems outside the hospital.

A particularly effective and economical way of giving students a clear preview of their future work is to assign them. Many practitioners are glad to have students assigned to them, and students can derive great benefit from the experience.

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