The assessment of two consulting room tests for bacteriuria

A report from the East Scotland Faculty, Royal College of General Practitioners

D. W. W. HENDRY, M.R.C.G.P. (Recorder)

THIS paper describes an evaluation in general practice of two simple methods of detecting ' significant bacteriuria ' (Kass, 1955) using the laboratory poured-plate technique as a standard for comparison.

On average, each family doctor treats 50 patients with symptoms of urinary infection each year, and at any one time there are, in each practice, 100 patients with significant but asymptomatic bacteriuria. (Royal College of General Practitioners, 1970).

Most general practitioners will treat symptoms of urinary infection ' blindly ', often with sulphonamides, after testing the urine for albumen and sugar, and possibly after microscopic examination for pus cells. A few culture a fresh specimen of urine (MacNaughtan, Laurence and Knox, 1967). Some avoid the use of antibacterial drugs until the results of a mid-stream urine culture complete with a range of sensitivities to antibacterial agents are obtained, using a citrate and hyoscyamus mixture as a temporary measure.

Some patients with symptoms have no demonstrable infection (Gallagher, Montgomery and North, 1965). Because of the poor correlation between bacterial infection and abnormal findings on microscopy (Finch and Finch, 1970) and because of the special problems facing general practitioners in obtaining laboratory assistance in diagnosis, patients with asymptomatic bacteriuria often go unrecognised.

There is, therefore, a need for a simple, valid, rapid and reliable method of detecting significant bacteriuria in general practice.

Arneil, McAlister and Kay (1970) claimed that a dip slide could be used by the general practitioner to solve the problem of delay in transport of urine specimens vitiating the result of viable counts, while MacLean, McCallum and Davies (1971) went further and demonstrated that a dip slide left at room temperature in the surgery premises for 24 hours could be read by a nursing sister as accurately as a laboratory technician.

Emmerson and Mond (1973), using an ion-exchange paper strip containing a glucose-specific enzyme system and colour reagent (' Uriglox ') claimed that the method could, with certain safeguards, be used to detect bacteriuria in general-practice patients. The method had previously been shown to be useful in detecting the presence of *asymptomatic* bacteriuria in pregnancy (Emmerson, 1972).

I tested the feasibility of applying these two tests to specimens of urine obtained from patients in general practice in a preliminary trial in July 1970. Fresh, ' clean catch ', mid-stream specimens of urine were obtained without vulvar or penile toilet from patients presenting with frequent, burning micturition. Specimens were tested in the consulting room and then transmitted as rapidly as possible to the bacteriology laboratory. Preliminary results were encouraging and in June 1971, 46 members and associates of the East Scotland Faculty agreed to take part in a survey with the co-operation of three area bacteriologists.

Method

From consecutive patients with appropriate symptoms a mid-stream urine was collected into a sterile disposable foil gallipot. Two ' Uricult ' dip slides (Bristol Laboratories, Stamford House, Langley, Bucks, SL3 6EB) were dipped in the specimen according to the manufacturer's instructions, and the glucose content of the specimen determined using the ' Uriglox ' strip test* (Wm. R. Warner and Co. Ltd., Eastleigh, Hampshire). The urine was then used to fill a sterile universal bottle containing 0·5 grams of boric acid (Porter and Brodie, 1969).

The sample preserved in boric acid was sent, with one dip slide, to the laboratory and the second dip slide left at room temperature for 24 hours before being read by the general practitioner. In the laboratory the bacterial count in the preserved specimen was estimated by a standard poured-plate technique, and the dip slide read after incubation at 37°C for 24 hours.

Results

The trial ended after nine months and 300 completed records. The results of the dip-slide tests are shown in tables 1, 2 and 3. Positive cultures were defined as those showing 100,000 or more bacteria per ml.

TABLE 1

GENERAL-PRACTITIONER ' URICULT ' COMPARED WITH LABORATORY POURED-PLATE

General-practitioner ' Uricult '	*Laboratory poured-plate* +	—	*Totals*
+	94	42	136
—	21	143	164
Totals	115	185	300

After Yates correction: χ_2=97·4 with one degree of freedom
p=less than 0·001
C=0·5 (max. 0·7)

TABLE 2

GENERAL-PRACTITIONER ' URICULT ' COMPARED WITH LABORATORY ' URICULT '

General-practitioner ' Uricult '	*Laboratory ' Uricult '* +	—	*Totals*
+	112	24	136
—	20	144	164
Totals	132	168	300

After Yates correction: χ^2=145·7 with one degree of freedom
p=less than 0·001
C=0·5 (max 0·71)

The three χ^2 tests indicate that the results of ' Uricult ' and poured-plate tests are similar and that the agreement is closer than would be expected by chance. There were fewer important discrepant results (i.e. ' false negatives ') from the laboratory

*It should be noted that the manufacturers of ' Uriglox ' insist that only morning specimens of urine should be used, but this was found to be impossible when patients presented with urgent symptoms.

TABLE 3

LABORATORY ' URICULT ' COMPARED WITH LABORATORY POURED-PLATE

Laboratory ' Uricult '	*Laboratory poured-plate* +	—	*Totals*
+	112	20	132
—	3	165	168
Totals	115	185	300

After Yates correction: $\chi^2=212\cdot3$ with one degree of freedom
p=less than 0·001
C=0·64 (max 0·71)

(The danger of obtaining too exaggerated an χ^2 value due to a cell value below five is recognised, but not considered to be of any consequence here.)

where ' Uricult ' was incubated at 37°C for 24 hours, than from the family doctors where the dip slide was left at room temperature.

Further analysis of the seven per cent false negative results showed that one per cent derived from laboratory errors, in that three of the 21 general practitioners ' Uricult ' negative results in table 1 should have been classed by the laboratory as poured-plate negative and consequently six per cent of the errors came from the general practitioners. Over half the latter were due to a failure to detect a film of swarming growth of *Proteus* strains, and the remainder of the dip slides showed growths of 10^{3-4} organisms per ml, or just below the ' significant ' value. A number of dip slides showing doubtful growth at 24 hours gave a significant reading when retained at room temperature and read again at 48 hours. No false negative results were received from the few practitioners who were supplied with incubators and incubated the dip slide at 37°C for 24 hours.

The results of the ' Uriglox ' tests are shown in table 4.

TABLE 4

' URIGLOX ' COMPARED WITH LABORATORY POURED-PLATE

General-practitioner ' Uriglox '	*Laboratory poured-plate* +	—	*Totals*
+	52	60	112
—	53	101	154
Totals	105	161	266

In this trial, the ' Uriglox ' test gave an unacceptable number of false negatives (30 per cent and false positives 54 per cent). We believe, therefore, that general practitioners should not use ' Uriglox ' to assess patients with urinary symptoms.

Conclusions

The dip slide (' Uricult ') will give reliable results if incubated at 37°C for 24 hours. If no incubator is available false negative results can be reduced in number if the dip slide is held at room temperature and read at 48 instead of 24 hours. Where dip slides show a growth below the significant value the test should be repeated.

The enzyme test (' Uriglox ') when used under the conditions prevailing in this trial, was unreliable and gave many false negative and false positive results. This confirms the maker's insistence that strict conditions must be observed in the test. We feel that

perhaps these conditions are too strict for general practice. Our experience is that patients with acute urinary symptoms cannot retain urine in the bladder for the required six hours.

It is interesting to note that of the 300 patients presenting with symptoms of urinary infection, only 115 (38 per cent) had significant bacteriuria.

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REFERENCES

Arneil, G. C., McAllister, T. A. & Kay, P. (1970). *Lancet*, **1**, 119.
Emmerson, A. M. (1972). *Journal of Obstetrics and Gynaecology of the British Commonwealth*, **79**, 828.
Emmerson, A. M. & Mond, N. C. (1973). *Journal of the Royal College of General Practitioners* (in press).
Finch, R. M. & Finch, J. (1970). *Journal of the Royal College of General Practitioners*, **19**, 201.
Gallagher, D. J. A., Montgomery, J. Z. & North, J. D. K. (1965). *British Medical Journal*, **1**, 622.
Kass, E. H. (1955). *American Journal of Medicine*, **18**, 764.
MacLean, D. W., McCallum, F. M. & Davies, B. (1971). *Journal of the Royal College of General Practitioners*, **113**, 710.
MacNaughtan, G., Laurence, A. R. & Knox, J. D. E. (1967). *Practitioner*, **198**, 416.
Porter, I. A. & Brodie, J. (1969). *British Medical Journal*, **2**, 353.
Royal College of General Practitioners (1970). *Present State and Future Needs of General Practice*. Second edition. Reports from General Practice No. 13. London: *Journal of the Royal College of General Practitioners*.

THE ACTION OF FENFLURAMINE ('PONDERAX')

The 'glycoliptic' action of fenfluramine was investigated after intravenous administration to one normal subject, and by a six-week metabolic-balance study on four obese patients. Fenfluramine in combination with a reducing diet did not cause a greater weight-loss than the same reducing diet given with identical placebo tablets.

A double-blind assessment of the mental state of the patients on fenfluramine indicated that it caused loss of appetite and often depression. It is postulated that the glycoliptic effect may in fact be a reflection of storage of glucose as glycogen. If this explanation is correct, the useful action of fenfluramine in the treatment of obesity is that it reduces appetite. No evidence has been found of any other mechanism by which fenfluramine can promote weight-loss.

GARROW, J. S., BELTON, E. A. and DANIELS, A. (1972). *Lancet*, **2**, 559. (Authors' summary).