

CORRESPONDENCE

Dipstrips for urine screening

The letter by McGowan *et al* is a reminder that no wholly effective way of screening urines before culture exists. Because dipstrips give a very high rate of false positivity, if the criterion for choosing urine for culture is that of one or more of leucocyte esterase, nitrite, blood or protein tests being positive, the effect of modifying this interpretation and considering dipstrip testing to indicate the need for subsequent culture only if either one or both tests for leucocyte esterase or nitrite are positive was examined. The presence of a positive test for blood or protein, if not accompanied by a positive test for leucocyte esterase or nitrite, was ignored. Bacterial counts lower than those used by McGowan *et al* were accepted as positive cultures—that is, $\geq 10^2$ cfu/ml and $\geq 10^3$ cfu/ml in women and men, respectively, along with > 10 leucocytes/ μ l of unspun urine. If pyuria was absent a count of $\geq 10^5$ cfu/ml was used if the growth was pure. Mixed growth of 10^5 cfu/ml was regarded as positive only in the presence of a history of urinary catheterisation.

One thousand six hundred urines were screened from a mixed adult population of whom 70% were hospital inpatients. Despite the different criteria, the results show close similarity to those of McGowan *et al*, with a sensitivity of 95.8%, specificity of 45.2%, positive predictive value of 31.7%, and a negative predictive value of 97.6%. Thus the positive predictive value remained low, the different criteria producing an insignificant improvement. What is evident, though, is the consistently high negative predictive value. If this figure is acceptable, and I consider that it is, 29% of the urines in this study would not have needed to be cultured.

Whether this is cost effective remains debatable, because to apply figures only to consumables is not valid. Where this screening procedure could best be used is in the GP's surgery or at the ward level. I am sure that most microbiologists would welcome the significant reduction in urine bacteriology the widespread use of dipstrips would bring.

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16.4% in Greenwich (table), and 7.1% at Southmead hospital. This would lead to a reduction in the total expenditure on consumables and labour in all four laboratories.

The introduction of Welcan has given us a tool to investigate complex laboratory estimates. Different clinical mixes of patients, speed of transport and quality of sample will influence the relative cost and efficiency of different techniques. My calculations suggest that the time has come to reappraise the overall usefulness and efficiency of routine urine microscopy.

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- 1 MacGowan AP, Cowling P, Marshall RJ, Reeves DS. Screening of urines with dipstrips: Does it reduce workload and consumable costs? *J Clin Pathol* 1990;43:875-8.
- 2 Barker BA, Ratcliffe JG, Turner GC. Urine screening for leucocytes and bacteria by dipstick and reflectance spectrophotometry. *Med Lab Sci* 1989;46:97-100.
- 3 Doran HM, Kensit JG. Screening for bacteriuria with Clinitec-200. *J Clin Pathol* 1988;41:1127-9.
- 4 Flanagan PG, Davies EA, Rooney PG, Stout RW. Evaluation of four screening tests for bacteriuria in elderly people. *Lancet* 1989;333:1117-19.

Screening of urines with dipstrips

We were interested to read about the experience of MacGowan and colleagues in the use of dipstrips for screening urine samples.¹ Their conclusion, that the use of dipstrips in microbiology laboratories is not cost effective, seems to overlook the possibility of performing the screening test at ward or surgery level. We started screening urines by dipstrip testing in 1989. The dipstrips are ordered by the wards and clinics directly from the supplies department. Only samples producing a positive dipstrip result (one or more of the leucocyte esterase, nitrite, blood or protein tests as positive) are referred to the laboratory for conventional examination. We documented a reduction in the flow of urine specimens received in the laboratory to 71% of its former level.

This approach has relieved the laboratory of the task of the administration, processing, interpretation and report production for some 1000 specimens each month. Telephone enquiries have also decreased in proportion to the reduced workload. The clinicians are able to use the dipstrip test to begin specific treatment directed by the hospital's antibiotic policy, or consider an alternative diagnosis, depending on the urine screening results. Negative samples are not sent to the laboratory, eliminating the need to write out forms, label specimens, and use portering services.

Our approach is subject to continuing audit but clearly illustrates the need to consider factors beyond the laboratory testing procedures when assessing the value of microbiological methods.

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- 1 MacGowan AP, Cowling P, Marshall RJ, Reeves DS. Screening of urines with dipstrips: does it reduce workload and consumable costs? *J Clin Pathol* 1990;43:875.

Screening of urines with dipstrips: Could it replace microscopy?

MacGowan and colleagues reported the results of an evaluation of Nephur plus leucocyte dipstrips and concluded that they were not cost effective in microbiology laboratories.¹ I have recalculated the specificity and predictive values of a positive and negative result using their raw data and believe the correct values to be 22.3%, 26.6%, and 96.4%, respectively, and not the figures stated by them. The figures given in the table for the number of positive dipstrips is also at variance with the text. It is unlikely, however, that these differences affect their calculation relating to Welcan units and consumable costs in their laboratory.

It does not necessarily follow, however, that their conclusions apply to all units, because the additional costs are influenced by the number of false positive results (dipstrip positive but culture negative samples). The rate of false positivity in my own department among 1360 consecutive urine samples from children was only 27% compared with 60.3% in MacGowan's study. In two other recent studies the rate was 34.8%² and 50%.³ I have applied estimated Welcan values and the Bristol costs for consumables to these other

studies and my own to determine the effect of selective microscopy and culture combined with routine dipstrips. The increase in workload would be only 1.3% and 2.1% in the other units compared with a reduction of 20.7% in my own department. The increase in cost of consumables would be 13% and 16% in the other units, with a potential reduction of 13.8% in my own laboratory.

The Bristol group did not, however, consider the economics of dipstrips as a replacement for microscopy. The sensitivity of the Nephur plus leucocyte strip (if any one test is positive) was 86.0% at Birmingham Children's Hospital and using a similar multistix manufactured by Ames was 94.8%² and 97.0%.⁴ This compares with the sensitivity of microscopy of 80.5%, 75.9%, and 85.6%, respectively. If microscopy was replaced by dipstrip testing for leucocyte esterase, nitrite, protein and haemoglobin, but all samples were cultured, there would be no overall change in Welcan values. The increase in consumable costs would be partially offset by a reduction in consumables for microscopy. If, however, only samples with one or more positive tests were cultured, but not microscoped, there would be an overall reduction in Welcan values of 32.3% in my laboratory, 16.5% in the Liverpool study,

Comparative workload of microscopy and culture on all specimens, dipstrip screening and selective microscopy and culture, and dipstrip screening and selective culture

	Liverpool (n = 1000)	Greenwich (n = 669)	Birmingham Children's Hospital (n = 1360)
No of dipstrip positive urines	642	450	509
Estimated Welcan values:			
(A) If all urines microscoped and cultured	7265	4875	8745
(B) Strip screening and selective culture + microscopy	7356	4975	6937
Potential change in workload using method B*	1.3%	+2.1%	-20.7%
(C) Dipstrip and selective culture	6072	4075	5919
Potential change in workload using method C*	-16.5%	-16.4%	-32.3%

*Compared with method A.