Effectiveness of an Outpatient Urine Screening Program

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We evaluated the effectiveness of a routine outpatient urinalysis screening program on a sample population of 2600 patients. The 189 abnormal urine results found in 182 patients were followed up by study of any new clinical and laboratory investigations or therapeutic modifications initiated on the basis of any abnormal test result. The urinalysis screening program appeared to have significant bearing on diagnosis or treatment in only 13 patients. Abnormalities found in 150 of the 182 patients were either not noted or no further positive action was taken. Thus we concluded that under the conditions of this study the urine screening program added to hospital costs without significant benefit to the patient.

Additional Keyphrases: economics of laboratory operation • diagnostic aids • screening

Setting up a satisfactory program to screen for disease poses many problems (1). A major problem is the selection of tests that are rapid, cheap, easy to perform, and easy to interpret (2).

The apparent fulfillment of the above conditions undoubtably has led to the very general use of commercially available methods for testing urine specimens, using the dipstick reagent principle. It should be emphasized, however, that ease of performance and relatively inexpensiveness are not necessarily paralleled by reliability or ease of interpretation, particularly with simple semi-quantitative urine tests (3–5).

It was therefore of interest to investigate whether such widely used tests, with known problems regarding interpretation of results, did indeed confer real benefits to patient care by, for example, detecting new pathological processes or indicating a necessary modification of therapeutic regime.

In the present study, we evaluated the effectiveness of a urinalysis screening program carried out on patients attending hospital consulting clinics.

Methods

This study was performed at the Flinders Medical Centre, a general community teaching hospital. On admission, all new outpatients and all patients attending certain clinics, notably medical and obstetric clinics, passed a random sample of urine into a disposable container and this was tested by a member of the nursing staff using "N-Multistix" (Ames Co., Division Miles Laboratories, Elkhart, Ind. 46514). The results of this routine urinalysis were handed as a sealed report to the patient before clinical consultation. These results were then usually recorded in the problem-oriented medical records and were therefore available to the clinician before any clinical contact.

The urine samples of the above patients who attended consulting clinics during one calendar month, a total of 22 working days, were selected for further study. These urines were also tested with N-Multistix and the resulting data were collected regarding urinary pH, protein, glucose, ketones, bilirubin, blood, nitrite, and urobilinogen.

All abnormal urines—that is, pH 7–9 and/or any other positive findings—were referred to the Department of Clinical Biochemistry. The urines were re-analyzed within 3 h by a trained medical scientist. Neither clinicians nor patients were informed that this study was being conducted, and all data except that presented as a sealed report to the patient were withheld.

The case records of all patients in this study were monitored, to assess action taken on the basis of abnormalities found on routine urine screening.

Results

During this study, 5688 patients attended consulting clinics and 2600 patients were subjected to routine screening urinalysis. Abnormalities were detected in urines from 182 of these patients; seven patients with abnormalities presented twice to the clinics during this period and therefore 189 urine samples were selected for further study. The abnormal patient group was made up of 38 males (mean age 48 years, range 4–81 years) and 144 females (mean age 33 years, range 13–85 years).

It was found that the results obtained by the nursing staff and by the Department of Clinical Biochemistry agreed within the total experimental error of one color block on the N-Multistix strip.
The action taken on the basis of the reported urinary abnormalities was analyzed and five discrete broad groups were found. In 11 patients (group A) no report of the results of routine urinalysis was recorded in the medical records. In 33 patients (group B) an abnormal result was obtained, but this was recorded as “no abnormality detected” in the medical records. In 106 patients (group C) abnormal results were obtained and documented in the medical records, but these unexpected and unexplained abnormalities were not commented on, and neither further laboratory tests nor other investigational procedures were initiated or embarked upon. Nineteen patients (group D) had abnormalities that, in all probability, were related to the primary problem and no new clinical or laboratory procedures appear to have been initiated as a direct consequence of the routine urinalysis results. In 13 patients (group E) a new clinical decision was made or new laboratory investigation ordered, in part or directly owing to the results of the urinalysis. The abnormalities found in each group are detailed in Table 1.

Of the urines selected for further study, 82% were in groups A to C, inclusive. The abnormal results were either not noted, reported as normal, or not commented on. Many of the abnormalities found in the groups were of pH, protein in trace-positive concentration, and ketones. As the range of pH values observed in patients with abnormalities in which urinary pH measurement may aid in diagnosis is not different to that encountered in healthy individuals (6), as it has been stated that clinical judgment must determine the significance of trace-protein results (7), and as ketonuria may occur in healthy individuals with decreased intake of carbohydrate (8), such abnormalities might be considered to be of little real clinical significance. Such findings comprised 57% of the total number of abnormalities detected in groups A through C, but the remaining test results were regarded as being of considerable potential diagnostic significance.

The abnormalities detected in the 22 urines in group D might have been expected, in view of the known clinical history of the patient. This group is considered to be equivalent to the “confirmatory” group of the Metropolitan Life Insurance Company of America, as discussed by Wilson (9). It is difficult to assess whether the screening urinalysis result played any role in the continuing monitoring of such patients.

The 13 abnormal results in group E which led, in whole or in part, to a new decision being made regarding treatment or laboratory investigation were mainly findings of trace proteinuria or glycosuria. It was of interest that, in this small group, a result of trace proteinuria led to a strong suspicion of urinary-tract infection. This finding bears out the statement that clinical judgment plays a significant part in the interpretation of trace-protein results when comparison is made with the findings in group C. In five of the seven cases of glycosuria found, the patients were known to be diabetic and had a plasma glucose performed simultaneously and available to the clinician. It may be
therefore considered that the urinalysis result played a minor role in the decision-making process.

**Discussion**

The costs of providing this routine urinalysis screening program in excess of normal hospital expenditure may be estimated by addition (in $ Aust.) of the salary of the nurse required to perform testing ($6000 per annum), the cost of reagent strips (9c each), and the cost of consumables such as disposable urine-collection containers and report forms (9c per patient). Therefore, at the present outpatient attendance rate, the urinalysis screening programme now costs $11,500 per annum. However, urinalysis is a very widely used procedure and, in Australia, total reagent dipstick costs are of the order of $1,250,000 annually.

It has been stated that clinical chemists have, with rare exception, failed to accept the responsibility as to whether the programs in which they are engaged are of benefit to the patient (10). The main issue in screening programs is whether there is irrefutable evidence that the results of laboratory tests have led to the prevention or postponement of disease or early death. This issue is often clouded by subjective anecdotal evidence. In this study, we attempted objectively to assess the effect of reporting an abnormal urinalysis result in terms of positive action taken on the basis of such a result, and we conclude that, under the conditions of the present study, outpatient urinalysis screening did not, in general, affect the laboratory or clinical investigations ordered or the therapeutic regime. The urinalysis screening program therefore added to hospital costs without significant patient benefit.

Plausible explanations for this conclusion are: firstly, that this screening is considered to be merely an unsolicited “routine” battery of tests, and consequently attention paid to such reports has substantially diminished over a period of time; or, secondly, that those tests (including urinalysis) that might be of diagnostic or therapeutic use would normally be requested by the clinician as a matter of course.

We advocate that all laboratory tests, including traditional investigative procedures, be continually re-assessed in an objective manner. We believe that tests should be firmly rejected if shown to be increasing health-care costs without associated patient benefit.

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**References**