THE USAGE OF URISTIX IN SCREENING BACTERIURIA IN ELDERLY CHINESE IN-PATIENTS

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Summary

Bacteriuria is a common problem that occurs in the aged. In developing countries and in countries where the health budget is tight, an effective and efficient screening test for bacteriuria may be a cost-saver, reducing the demand for mid-stream urine (MSU). It may also enhance early treatment (in cases suspected of urinary tract infections), thus reducing morbidity and mortality. In our hospital, where the average length of stay is extremely short, 38% of patients have been discharged when their MSU results returned. With this background, a study was carried out to evaluate the usefulness of Uristix in screening bacteriuria in clinical settings and to survey the frequency of asymptomatic bacteriuria as against urinary tract infections (UTI) in hospitalised elderly patients. In 100 elderly Chinese patients admitted, it was found that Uristix was both highly sensitive (95.8%) and specific (100%) if the recommended disjunctive pairing method was used (Uristix positive if nitrite, leucocyte esterase or both were positive). It must however be stressed that the interpretation of results should always be in the larger clinical context. In the setting of low clinical suspicion of UTI, a negative Uristix test can reasonably negate the necessity of a MSU. Conversely, high clinical suspicion of UTI, coupled with positive Uristix, should prompt early treatment while awaiting for sensitivity. For those where Uristix disputes with clinical suspicion, a MSU should be ordered.

If Uristix is being introduced wisely as a screening test, some unnecessary MSU investigations can be avoided, hence saving money (a MSU is 28 times more expensive). Meanwhile, in patients with clinical suspicion of UTI being tested Uristix positive, early treatment may mean earlier discharge if situation permits before MSU returns, hence saving bed-cost and the inconvenience of being called back when MSU returned positive after patients are discharged.

Introduction

Bacteriuria is a common problem that occurs in the aged. At least 20% of women and 10% of men over 65 years of age have bacteriuria1. Similar findings were made by Sourander2 while Choudhury3 detected a high rate of bacteriuria in non-catheterised elderly during their hospital stay. The issue of whether asymptomatic bacteriuria decreases survival is still contentious4,5,6 and hence its management. In contrast, it is generally agreed that urinary tract infection (UTI) needs treatment and represents a common problem causing increased morbidity and mortality in elderly people.

In the developing countries and in countries such as Hong Kong where the health budget is tight, the issue of screening for bacteriuria and treating it according to clinical necessity becomes an important one. An effective and efficient screening procedure can potentially reduce demand on mid-stream urine (MSU) and enhance early treatment. Therefore, it may substantially save money as well as reduce morbidity and mortality.

In our hospital, the average length of stay in a general medical ward and geriatric ward is 3 and 7 days respectively. The average time taken for a MSU result to return is 3 days. In a survey done amongst both the general and geriatric wards, it was found that out of 81 patients who have MSU, 31 (about 38%) have been discharged when their MSU results returned. Out of these 31 discharged patients, a further 8 patients showed bacteriuria (i.e., 26% of 31 patients), some have not been treated and required calling back, hence causing inconvenience. There is as yet no screening system for bacteriuria, not just in our hospital, but in most others in Hong Kong. Therefore it is with this background that a prospective study was carried out to assess the potential of using Uristix* as an effective and cost-saving screening test for bacteriuria in elderly people. Uristix tests for glucose, albumin, leucocyte esterase and nitrite in urine. The key interest in our study is the latter two components. Previous studies have described the usage of esterase and nitrite in the detection of UTI7,8. The hypothesis this study is setting out to prove is that disjunctive pairing (dipstick positive if nitrite, leucocyte esterase or both are positive) is...
the most accurate index test over (1) leucocyte esterase or (2) nitrite alone or (3) conjunctive pairing (dipstick positive if both nitrite and leucocyte esterase are positive).

**Method**

One hundred consecutive elderly patients admitted to our hospital who fulfilled the following criteria included in our study:

1. all who could co-operate to give MSU;
2. if they could not co-operate (e.g., dementia) and were suspected to have active urinary tract infection or sepsis, a fresh catheter specimen was then obtained and the catheter removed straight after;
3. for patients with long-term indwelling catheters, fresh specimens were collected if patients were thought to be septic.

The urine collected were tested with uristix by student nurses or nurses and also sent for routine culture. The degree of leucocyte present as tested by uristix was also noted (viz, trace, small, moderate, large). Contaminated specimens (where mixed growth occurred) and specimens where antibiotics were commenced before urine collection were discounted. The numbers of such specimens discounted were relatively small and consecutive patients’ urine specimens were collected to replace them. The definition of significant bacteriuria was taken as a single dominant strain of bacteriuria >10⁵ organisms/ml grown on culture (except for a long-term foley catheter patient where two equally dominant strains were grown and clinically patient had a catheter-related UTI).

**Results**

A total of 100 patients were studied: 27 male and 73 female; age ranging from 73 to 101 years old with a mean age of 83.4 years. Bacteriuria was detected in 24 patients (20 females and 4 males). The organisms cultured in urine were: *E. Coli*(12), *Enterobacter*(3), *Klebsiella*(3), *Pro-

### Table 1. Numbers of true positives (TP), false positives (FP), false negatives (FN), and true negatives (TN) for different sets of criteria for Uristix positivity in screening for bacteriuria.

<table>
<thead>
<tr>
<th>Criteria for Uristix positivity</th>
<th>Bacteriuria on culture</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>(a) “Disjunctive pairing” criteria (Uristix positive if nitrite, leucocyte esterase or both were positive)</td>
<td>TP=23 FP=0</td>
<td>FN=1 TN=76</td>
<td></td>
</tr>
<tr>
<td>Uristix “positive”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uristix “negative”</td>
<td></td>
<td></td>
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<tr>
<td>(b) “Nitrite only” criteria (Uristix positive if nitrite only was positive)</td>
<td>TP=16 FP=0</td>
<td>FN=8 TN=76</td>
<td></td>
</tr>
<tr>
<td>Uristix “positive”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uristix “negative”</td>
<td></td>
<td></td>
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<tr>
<td>(c) “Leucocyte esterase” criteria (Uristix positive if leucocyte esterase was positive)</td>
<td>TP=20 FP=2</td>
<td>FN=4 TN=74</td>
<td></td>
</tr>
<tr>
<td>Uristix “positive”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uristix “negative”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(d) “Conjunctive pairing” criteria (Uristix positive if both nitrite and leucocyte esterase were positive)</td>
<td>TP=13 FP=0</td>
<td>FN=11 TN=76</td>
<td></td>
</tr>
<tr>
<td>Uristix “positive”</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Uristix “negative”</td>
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</table>

### Table 2. Sensitivities and specificities for different sets of criteria for Uristix positivity in screening for bacteriuria.

<table>
<thead>
<tr>
<th>Criteria for Uristix positivity</th>
<th>Sensitivity</th>
<th>Specificity</th>
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</thead>
<tbody>
<tr>
<td>Disjunctive pairing</td>
<td>95.8%</td>
<td>100%</td>
</tr>
<tr>
<td>Nitrite only</td>
<td>66.7%</td>
<td>100%</td>
</tr>
<tr>
<td>Leucocyte esterase</td>
<td>83.3%</td>
<td>54.2%</td>
</tr>
<tr>
<td>Conjunctive pairing</td>
<td>54.2%</td>
<td>100%</td>
</tr>
</tbody>
</table>
One specimen grew both E Coli and Staph aureus and this was thought to be long-term foley related UTI.

The results of using 4 different sets of criteria for Uristix positivity as a screening instrument for bacteriuria were shown in Tables 1 and 2.

It was found that uristix correlates best with MSU result if the following disjunctive criteria was used, namely: at least small amount of leucocytes, or nitrite, or both being present. (Sensitivity 95.8%, specificity 100%, positive predictive value 100%, negative predictive value 98.7%). In contrast, if nitrite alone was used as criteria, the result was less sensitive (66.7%) although it was highly specific (100%). Using the presence of leucocyte esterase alone as criteria, the sensitivity was 83.3% and specificity was 97.4%. Finally using the presence of both leucocyte esterase and nitrite (conjunctive pairing) as criteria, the sensitivity was 52.4% although specificity was 100%.

The bacteriuria was further classified on clinical grounds into 3 categories. It was found that 4 were asymptomatic (without symptoms or signs of fever, leucocytosis, dysuria, delirium, etc.). 12 were clinically thought to have urinary tract infections (3 were foley related UTI). The other 8 were classified as possible UTI because 4 were having concomitant chest infection (which could explain their fever or leucocytosis) and 4 were too demented to provide any information. Using the recommended disjunctive criteria, uristix picks up all possible UTI and clinical UTI. The only false negative result was an asymptomatic bacteriuria.

**Discussion**

The reported accuracy of dipstick urine screening tests has varied considerably in different populations, but this may be in large part caused by 'spectrum bias' because subjects in different studies have had varied manifestations of UTI, and the sensitivity and specificity of the tests may vary in these different populations. Despite these differences, the result of our uristix study is shared by other investigators. In a meta-analysis, Hurlbut et al, also found that disjunctive pairing (dipstick positive if nitrite, leucocyte esterase or both were positive) is the most accurate index test over leucocyte esterase or nitrite alone or conjunctive pairing (dipstick positive if both nitrite and leucocyte esterase were positive). Therefore, our uristix study, using the recommended disconjunctive pairing method, can be a useful screening tool for bacteriuria. It must however be stressed that the interpretation of results must always be in the larger context of the whole clinical picture. In the setting of low clinical suspicion of UTI, a negative uristix test can be accepted reasonably confidently, hence negating the necessity of a MSU. Conversely, clinical suspicion of UTI coupled with positive uristix should prompt early action for treatment, while awaiting for sensitivity. For those where uristix result disagrees with clinical suspicion, a MSU should be ordered.

It is our belief that if uristix is being introduced as a screening test, some unnecessary MSU investigations can be avoided, hence saving time and money (the ratio of the cost of uristix to MSU is 1:28). Meanwhile, in patients with clinical suspicion of UTI, being tested Uristix positive, they can be treated early and discharged if situation permits before MSU returns, hence saving bed-cost and the potential inconvenience of being called back. Therefore, this useful screening tool, which has been widely used in developed countries, can substantially be a cost-saver in the developing countries or in countries where health budget is tight.

**References**


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THROUGH THE LOOKING GLASS

Ophthalmic zoster with dissemination

An 85-year-old man was admitted for severe bilateral swollen eyelids. He sought advice from a general practitioner previously for 1-day history of redness of left eye (attributing this to minor injury after bumping forehead against a washing basin), and 5-day history of painful skin lesions over the left side of his forehead (attributing this to the sequelae of an insect bite while asleep). His practitioner prescribed eye drops, ampicilox, diphenhydramine (piriton), paracetamol and local neomycin ointment to be applied over his forehead. But after applying the eye drops over his left eye twice, he developed grossly swollen eyelids. The swollen eyelids may give an initial impression of allergy. Careful examination of his face (Figure 1), however, revealed crusted lesions over the left side of his forehead (becoming more obvious when his scalp was exposed by spreading his hair apart); erythema of the upper part of his face affecting the left side more; and bilateral periorbital oedema and blepharitis also more intense over the left side.

Pitting oedema was elicited over the forehead in the midline. While the crusted lesions were restricted to the left side (unilateral lesion over a dermatome being characteristic of zoster lesion), the inflammatory reaction (oedema, redness) has spread from the left to the right. Examination of his trunk (Figure 2) revealed chickenpox-like eruptions. Thus this man had ophthalmic zoster with dissemination. The eye drops he used were later identified to contain steroid. A similar case of herpes zoster with dissemination after use of 1% hydrocortisone cream has also been reported in the literature. After hospitalization, he was treated with intravenous acyclovir with rapid improvement.

Reference


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