COST BENEFIT OF THE ROUTINE URINALYSIS

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Abstract- In the present health care environment, cost-benefit analysis is extremely important. In this screening program, the minimal cost of screening dipstick urinalysis in 1601 asymptomatic school children was determined. The process of screening was similar to all the studies. The minimal cost utilizing 3 general physicians was calculated. Costs were determined by using current charge for supplies ordered to perform tests, charges for tests performed by a commercial laboratory, and the cost of a final evaluation by a pediatric nephrologist. Initial abnormal urinalysis was found in 4.7% (76/1601) of patients. Upon retesting 1.37% (22/1601) of patients were calculated to have a persistent abnormality. The calculated cost was 1/530/000 Rials (164.5 $) to initially screen all 1601 patients with a dipstick urinalysis or 850 Rials (0.09 $) per patient. The calculated cost to evaluate the 22 patients with any persistent abnormality on repeat dipstick urinalysis was 246/840 Rials (26.5 $) or 11.220 Rials (1.2 $) per patient. This is the calculated cost for a single screening of 1601 asymptomatic pediatric patients. Multiple screening dipstick urinalysis in asymptomatic pediatric are costly and should be discontinued. We purpose that a single screening dipstick urinalysis be obtained at school entry age, between 6 and 7 years old , in all asymptomatic children.

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INTRODUCTION

The American Academy of Pediatrics recommends 1 screening dipstick urinalysis at age 5 (1). The Institute for Clinical Systems Improvement recommends that consideration be given to eliminating routine urinalysis in asymptomatic children (2). The utility of screening urinalysis in asymptomatic pediatric patients has come into question based on data from multiple different studies (3-11).

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Several studies have been made using reagents strips, documenting their effectiveness in detecting urinary abnormalities at relatively low cost (4-6, 8).

In the present health care environment, cost-benefit analysis is extremely important. Thus, we determined the cost of routine screening dipstick urinalysis for a hypothetical cohort of 1601 asymptomatic pediatric patients.

MATERIALS AND METHODS

We calculated the cost of screening dipstick urinalysis, by reviewing the literature for the prevalence of asymptomatic proteinuria, hematuria, bacteriuria, and glucosuria determined by an initial dipstick urinalysis, the false positive/ transient abnormality rates for dipstick urinalysis, and the

prevalence rates of renal disease. A false positive/ transient abnormality is defined as an individual with an abnormal initial urinalysis with a normal repeat urinalysis. The lowest published prevalence rates of renal disease available were used. We used the least expensive laboratory studies available by utilizing the appropriate panel of tests offered by the commercial laboratory regularly used by the general physician.

All general physicians would refer the patient to a pediatric nephrologists. The cost to the general physician in terms of his/her time and the staff time was included. The fee for referral to a pediatric nephrologists was not calculated. Costs of any renal imaging or function studies ordered by the pediatric nephrologists were included. In this way, only the minimal costs were calculated for those patients identified as having a persistent abnormality.

In a 3 month follow up, mass urine screening tests was conducted in four educational areas of Shiraz, Iran, randomly in 1601 (809 boys; 792 girls) public elementary school children (6-7 years of age). The process of screening was similar to all studies (3-6, 10, 11). We obtained informed consent from parents of all participants.

Urine samples were collected at home with participants being instructed to empty their bladder on the preceding night and collect a mid-stream sample on first urination the following morning.

Urine samples were then transported in refrigerated containers to the test center for analysis. The mean period between urine collection and analysis was 4-6h. Urinalysis was performed using the dip and read reagent strips. All asymptomatic children were assumed to have a screening. Dipstick urinalysis was performed by the pediatrician on a second sample brought in by a parent.

Two sequential abnormal urinalysis were assumed to be evaluated as further investigations (microscopic urinalysis, urine culture, sonography, VCUG, isotope scan). Urinalysis were considered abnormal as follows: 1) 1+ or greater proteinuria, 2)1+ or greater hematuria, 3) positive leukocyte esterase, 4) 1+ or greater glucosuria using an uri LAB reagent strips (DFICO; Ltd, republic of Korea).

RESULTS

Costs included the following:

1. Uri LAB reagent strips (DFICO; Ltd, republic of Korea), 1/530/000 Rials (164.5 $) per 1800 or 850 Rials (0.09 $) each.
2. Urine collector bag, 990/000 Rials (106.5 $) per 1800 or 550 Rials (0.05 $) each.
3. Instruments (Manometer 1/440/000 Rials [154.8 $] per 4, scale 300/000 Rials [32.2 $] per 3 and so forth).
4. Urinalysis (complete) and urine culture, 788/120 Rials (84.7 $) per 76 or 10/370 Rials (11.1 $) per each.
5. Health profile III, 93/960 Rials (10.1 $) per 6 (includes complete blood count with differential, electrolyte screen, blood urea nitrogen, creatinine, albumin, total protein and so forth).
6. Sonography, imaging or function studies, 2/717/894 Rials (292.2 $) per 78 patients.
7. Fee for initial evaluation by 3 general physicians and further evaluation by a pediatric nephrologists, 7/505/000 Rials (806.9 $).

Initial abnormal urinalysis was found in 4.7% (76/1601) of patients. Upon retesting 1.3% (22/1601) of patients were calculated to have a persistent abnormality.

The calculated minimal cost for the outpatient evaluation of 1601 asymptomatic pediatric patients by dipstick urinalysis ranged between 17/375/934 Rials (1868.3 $) to 17/000/000 Rials (1827.9 $). The range depends on whether 50% versus 100% of patients with a repeat abnormal dipstick urinalysis were referred to a pediatric nephrologist for further evaluation.

The calculated cost was 1/530/000 Rials (164.5 $) to initially screen all 1601 patients with a dipstick urinalysis or 850 Rials (0.09 $) per patient. This is the calculated cost for a single screening of 1601 asymptomatic pediatric patients.

The calculated cost evaluated the 22 patients with any persistent abnormality on repeat dipstick urinalysis was 246/840 Rials (26.5$) or 11/220 Rials (1.2 $)per patient. Additionally, there are only minimal initial calculated costs. Costs of any renal imaging or function studies ordered by the pediatric nephrologist were 2/717/894 Rials.

DISCUSSION

The main objective of mass urinary screening programs in school children is to detect renal disease in its early stages, allowing treatment so as to delay or even prevent the onset of renal insufficiency (1, 2, 7, 9, 12, 13).

The cost of screening is significant (5, 6, 14, 15). The calculated minimal cost to screen 1601 asymptomatic pediatric patients by dipstick urinalysis is 17/375/934 Rials (1868 $). In our study, 75% (57/76) of patients were calculated to have an initial dipstick urinalysis which was normal upon repeat dipstick urinalysis. This agrees quite well with Kaplan and Gutgesell which found that 84% and 88.5% of asymptomatic patients with an abnormal finding on initial urinalysis had a normal follow –up urinalysis (4, 15).

The major disadvantage of such programs is not only the cost, but also the anxiety that will be created in parents and children. When the proteinuria or haematuria is intermittent, the likelihood of significant renal disease is low, and that simple tests are adequate to resolve most questions, then the potential benefit of screening urinalysis in accord with the guidelines of the American academy of pediatrics for out weigh the risks.

Since the onset of urinary mass screening, many cases of otherwise asymptomatic cases of glomerulonephritis have been detected in the Asian pediatric population (10, 11, 14, 16, 17). A decrease in the incidence of new dialysis cases annually in children aged 6 to 15 years from 19 per million in 1992 to 8 per million in 1997 had been observed, and was associated with a decrease in the percentage of children requiring dialysis due to glomerulonephritis from 63.2% to 47%. There is no doubt that urinary screening programmers in school children will allow earlier detection of disease, but the cost benefit ratio for specific populations should be determined before the institution of such programs.

In conclusion, interval screening dipstick urinalysis in asymptomatic pediatric patients is a costly ritual which should be discontinued. In its place, we propose that a single screening dipstick urinalysis be obtained at school entry age, between 6 and 7 years old, in all asymptomatic children. The sample should be a first morning void.

Conflict of interests

The authors declare that they have no competing interests.

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