Original Article

Benefits of Urinalysis

Ahmad Shajari[1], Hamideh Shajari[2], Mohammad Hossein Fallah Zade[3], Karmella Kamali[4], Mohammad Rahim Kadivar[5] and Forough Nourani[6]

[1]Department of Pediatric Nephrology, Shahid Sadoughi Hospital, School of Medicine, Yazd, Iran [2]Department of Neonatology, Shariati Hospital, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran, [3]Department of Pediatric Nephrology, Namazi Hospital, School of Medicine, Shiraz University of Medical Sciences, Shiarz, Iran, [4]Department of Radiology, Namazi Hospital, School of Medicine, Shiraz University of Medical Sciences, Shiarz, Iran, [5]Department of Pediatric Infectious Disease, Namazi Hospital, School of Medicine, Shiraz University of Medical Sciences, Shiarz, Iran and [6]General Practitioner, Shahid Sadoughi Hospital, School of Medicine, Yazd, Iran

ABSTRACT

Objective. In the pilot Iran school screening programme, the minimal cost of screening dipstick urinalysis in 1601 asymptomatic school children was determined.

Methods. The cost of screening dipstick urinalysis was calculated by reviewing the literature for the prevalence of asymptomatic proteinuria, hematuria, bacteriuria, and glucosuria determined by an initial dipstick urinalysis.The minimal cost utilizing data of 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.

Results. 4.7% (76/1601) of patients were calculated to have an initial abnormal urinalysis. Upon retesting 1.37% (22/1601) of patients were calculated to have a persistent abnormality. The calculated cost was 167$ to initially screen all 1601pateints with a dipstick urinalysis or 0.092$ per patient. The calculated cost to evaluates the 22 patients with any persistent abnormality on repeat dipstick urinalysis was 0.02$ or 0.001$ per patient. This is the calculated cost for a single screening of 1601 asymptomatic pediatric patients.

Conclusion. Multiple screening dipstick urinalysis in asymptomatic pediatric is costly and should be discontinued. We propose that a single screening dipstick urinalysis be obtained at school entry age, between 6 and 7 years, in all asymptomatic children. **[Indian J Pediatr 2009; 76 (6) : 639-641]** *E-mail: a_shajari@yahoo.com*

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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] 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.

Correspondence and Reprint requests : Dr. Ahmad Shajari, Shahid Sadoughi Hospital, University of Medical Sciences, Yazd, Iran. Tel: +98(351)8224000; Fax: +98(351)8224100. Mobile : +989131511813.

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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 nephrologist. 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 nephrologist 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 were 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, 4, 5, 6, 10, 11] 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 also 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 was 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). The data were analyzed using the SPSS 10 software. Differences between the groups were evaluated by the chi-square and student t-test. Pearson correlation coefficient and Fisher's exact test were used to determine the correlation between quantitative data.P value < 0.05 was considered significant.

RESULTS

Costs included the following

1. Uri LAB reagent strips (DFICO; Ltd, Republic of Korea), 167$ per 1800 or 0.09$ each.
2. Urine collector bag, 1076$ per 1800 or 0.06$ each.
3. Instruments (Manometer 156$ per 4, scale 32.6$ per 3 and so forth).
4. Urinalysis (Complete) and urine culture, 8.5$ per 76.
5. Health profile III, .01$ 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, 295$ per 78 patient.
7. Fee for initial evaluation by 3 general physicians and further evaluation by a pediatric nephrologist, 816$.

4.7% (76/1601) of patients were calculated to have an initial abnormal urinalysis. Upon retesting 1.3% (22/1601) of patients were calculated to have a persistent abnormality. (Fig. 1). The calculated minimal cost for the outpatient evaluation of 1601 asymptomatic pediatric patients by dipstick urinalysis ranged between 0.18$ to 1848$.

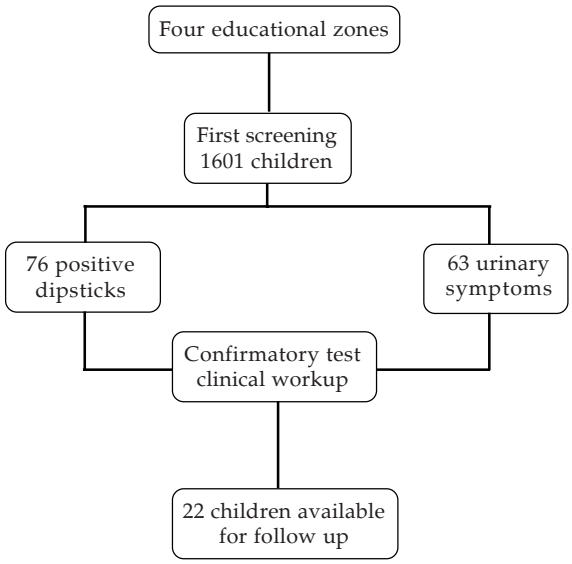

Fig. 1. Illustration of the subsequent phases of the study

The range depends on whether 50% *vs* 100% of patients with a repeat abnormal dipstick urinalysis were referred to a pediatric nephrologist for further evaluation. The calculated cost was 166$ to initially screen all 1601patients with a dipstick urinalysis or 0.09$ per patient. This is the calculated cost for a single screening of 1601 asymptomatic pediatric patients. The prevalence of initial asymptomatic proteinuria, hematuria, nitrite, leukocyte esterase and glucosuria was 3.6%, 1%, 0.6%, 0.4%, 0.2% respectively. The calculated cost evaluated for 22 patients with any persistent abnormality on repeat dipstick urinalysis was 0.02 $or 0.001$ per patient. Additionally, there are only minimal initial calculated costs. Costs of any renal imaging or function studies ordered by the pediatric nephroloist were. 0295$.

DISCUSSION

The main objective of mass urinary screening

programmes 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, 79, 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 1889$. In the present 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 who 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 program is not only the cost, but also the anxiety that will be created in parents and children in whom the proteinuria or hematuria 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 accordance with the guidelines of the American academy of pediatrics far outweigh 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]

This study showed that through an extended information campaign, mass screening of the population for renal ailments is feasible in adeveloping country, and can provide useful information on the frequency of renal diseases. However, the difficulties of such a large- scale study emerged when we tried to test for a second time those patients who had a positive dipstick at the first check. This study helped define for the first time the frequency of asymptomatic renal diseases in Shiraz(Iran). It shows that it is possible to screen a large population of patients at relatively low cost, providing the framework for further action that may help in the prevention and timely diagnosis of renal diseases

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, in all asymptomatic children. The sample should be a first morning void.

Contributions: Ahmad Shajari and Hamideh Shajari, management of the study. Mohammad Hossein Fallah Zade and Mohammad Rahim Kadivar, clinical help at their health center. Karmalla Kamali, Radiological Investigation. Ferough Nourani, Analysis of data.

Conflict of Interest: Nil

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