

Economic Appraisal of Urine Opiates Screening Test: A Study in Kerman, Iran

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Abstract

Background: Cost effectiveness, the ratio of relative costs of a program to its desired outcomes, is one of the basic issues in various screening programs performed to detect opium abuse. This study aimed to find the cost-effectiveness of opiates abuse screening through urine analysis.

Methods: A total number of 64698 individuals were selected and divided into five distinct groups based on the reason for which they were tested. Cost-effectiveness of opiates abuse screening in each group was calculated by dividing the total cost, including personnel and overhead costs, to the number of detected cases. Finally, the results were compared.

Findings: The total number of positive cases based on rapid screening assay (RSA) and thin layer chromatography (TLC) was 3460 (5.3%). According to incremental cost-effectiveness analysis, screening program of the group referred by the police was the most cost-effective program with the breakeven point at 2%.

Conclusion: According to the obtained results, continuation of drug abuse screening programs is recommended.

Keywords: Cost effectiveness, Substance abuse, Urine, Opiates.

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Introduction

The high number of drug abusers in Iran has caused a worrisome condition for people and authorities. According to recent studies, opium and its derivatives continue to be the most frequent used drugs in Iran.¹ Likewise, official statistics indicated Iran as one of the countries with the highest number of opium consumers throughout the world.² In 1997, 2.4% of 960000 individuals screened for drug abuse in pre-marriage and pre-employment formalities tested positive for opiates abuse.¹ Urine analysis is a common practice in all countries to detect drug abuse among various groups.³ Screening is performed in two major types of routine and individualized screening. While in routine screening, a large number of individuals are screened based on a scheduled program regardless of having any symptoms (for example during pre-marriage formalities), individualized screening only involves testing suspected individuals based on some evidences (like screening of police detainees). However, screening programs of any type should be assessed economically in specific intervals.⁴ In developed countries, economic evaluation of drug abuse screening programs has been conducted recently, even though they are limited.^{5,6} Since as far as the authors know, there are not such published studies in Iran, the present study was performed to investigate the cost-effectiveness of opiates abuse screening through urine analysis in five groups of male marriage applicants, governmental job applicants, private job applicants, and employees referred by *Harasat* (security department) of various offices.

Methods

This study was an economic evaluation of the abovementioned opiates screening programs through cost-effectiveness analysis. It consisted of two major parts, namely calculation of costs and determination of efficacy.

Calculation of costs:

Costs were determined using the documents of accounting, procurement and stockroom sections of the service provider (the Central Laboratory of Kerman University of Medical Sciences).

The personnel (technical, non-technical and administrative) and supervisors were interviewed and their costs were calculated based on the

percent of allotted time to the analysis of opiates compounds in urine and also their mean salary.⁷

Overhead costs (water, electricity, telephone service, gas, and cleansing) were estimated based on the occupied space by opiates or morphine sections of urine analysis department. Capital costs (building, equipments, and transportation) were not considered due to the lack of documents. At the time of the study, 10000 Iranian Rials equaled one U.S. dollar.

Calculation of effectiveness:

In order to detect opiates abuse in individuals, first, urine samples were collected under direct supervision. Then, primary screening [rapid screening assay (RSA)] designed for qualitative detection of opiates in urine was performed. This test is capable of identifying 300 ng/ml of opiate compounds in urine using monoclonal anti-morphine antibody. Positive samples detected in primary screening are tested by thin layer chromatography (TLC) which identifies the type of opioid consumed (opium, heroine or morphine). However, TLC can only detect opiates if they had been used 17-35 hours prior to the test.³ Finally, the results of the mentioned tests are classified by documents and computer files.

In the present study, the results of TLC were considered as the measure of effectiveness. Therefore, each case that tested positive in RSA and TLC was considered as one effectiveness unit.

Calculation of cost-effectiveness:

In order to calculate the cost-effectiveness ratio of urine opiates analysis in each screening program, the total cost was divided by the total number of positive TLC cases.⁸ Since all the programs used a common framework for screening, incremental cost-effectiveness analysis was used to compare different programs. For this purpose, cost of the program with less effectiveness was subtracted from the cost of the alternative program with more effectiveness and the result was divided by the difference of cost-effectiveness of the two programs (Figure 1).

Sensitivity Analysis:

Since statistical tests are not completely certain,⁹ the impact of relative frequency of positive responses on costs was estimated and break-even point or the least prevalence at which consumed costs by service provider was equal to the received price was determined.⁸

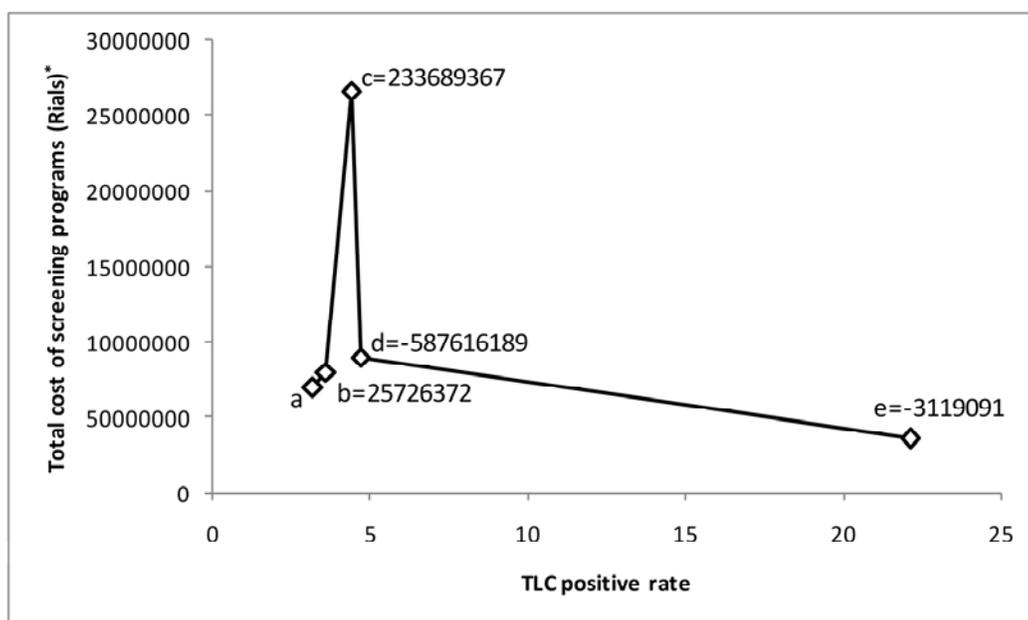


Figure 1. Incremental cost-effectiveness ratios of urine opiates screening programs (a: Harasat referrals, b: governmental job applicants, c: marriage applicants, d: private job applicants, e: police detainees). *: 10000 Iranian Rials equals one U.S. dollar.

Table 1. Number and total costs (Iranian Rial^{''}) of RSA and TLC tests performed and cost-effectiveness ratio in the five studied groups

Group	Number of performed RSAs	Positive cases Number (%)		Total costs (Rial)	Cost-effectiveness ratio (Rial)
		RSA	TLC		
Harasat*referrals	8279	651 (7.9)	266 (3.2)	6924597.7	260393
Governmental job applicants	9509	834 (8.8)	342 (3.6)	79555146.7	232617
Male marriage applicants	31853	3397 (10.7)	1393 (4.4)	266346640.5	191204
Private job applicants	10772	1244 (11.5)	510 (4.7)	90121783.6	176709
Police detainees	4285	2314 (54)	949 (22.1)	35849595.5	37776
Total	64698	8840 (13)	3460 (5.3)	541137764	156398

*: Security sections of governmental offices.

** : 10000 Iranian Rials equals one U.S. dollar.

Results

Overall, 64698 cases of RSA (primary screening) were performed of which 8440 (13%) were positive. Most positive cases in the consequent TLC were observed in police detainees (22.1%) while the least positive cases (3.2%) were seen in the group referred by security sections of different offices. Totally, 41% of positive cases of RSA were confirmed by TLC. The total cost of performed tests was estimated 541137764 Rials of which the main part was for marriage applicants (Table 1).

RSA and TLC per case prices were 18500 and 31800 Rials, respectively. Therefore, 14655305000

Rials was received from the subjects for screening tests. In incremental cost-effectiveness analysis, the most cost-effective programs were those for police detainees and judiciary referrals with the break-even point at 2%.

Discussion

During the last two decades, the rate of substance abuse has been growing more than three times as much as the rate of population growth. Due to the young population of our community and lack of sufficient cultural, entertaining and occupational facilities for them, the number of drug abusers is predicted to increase more dramatically in the

following years.¹⁰ Therefore, there should be more serious measures for drug abuse control. One of the prevention levels is secondary prevention or screening. Opiates abuse screening in various populations has been performed in our country for many years and considering insufficient facilities these tests should be analyzed economically.^{11,12}

According to the results of the present study, the highest cost-effectiveness ratio, in other words the highest cost of each detected positive case, was in referrals of security sections of offices. That is, the cost of each detected positive case was found to be 260000 Rials. Part of this might be due to the prescheduled screening in this group. In the most cost-effective screening program, i.e. police detainees and judiciary referrals, the cost of each detected positive case was 38000 Rials. The most populated screened group was male marriage applicants group in which the cost of each detected positive case was 19000 Rials. Overall, the average cost of each detected case was 156000 Rials, while the average per case received price was 423000 Rials (resulted from dividing the total price of 14655305000 by the total number of 3460 detected case). Therefore, it can be said that even considering capital costs, these screenings are beneficial for the service provider. At the same time, it should be noted that for individuals referred by security sections of the offices, the price of each case was 653621 Rials and the breakeven point was at 2% which means that if the average of substance abuse prevalence in all groups decreases to 2%, the screening would be still cost-effective. In other words, the least prevalence in which the cost and price are equal is 2% (except for capital costs).

Incremental cost-effectiveness analysis

showed that in the screening programs of private jobs and police detainees, cost-effectiveness has a negative trend in comparison to other screening programs (Figure 1). That is to say, in spite of effectiveness increase in these two programs, there is a cost decrease showing their cost-effectiveness.

A significant point in the cost-effectiveness analysis of these programs is the fact that the final percent of positive cases was more than two fold of the country's prevalence of opiates consumption (i.e. 2.8%) based on United Nations Office on Drugs and Crime (UNODC) report.¹³ It is noteworthy to mention that the figure obtained by our study (i.e. 5.3%) seems to be less than the actual value because of the possibility of false negative results due to urine adulteration.^{10,11}

Some recent studies have found the prevalence rate of opiate abuse, in our community to be 10% during the last 1.5 days that confirms the abovementioned claim.¹⁴

On the other hand, it should be noted that even in normal conditions, 23% of opiates consumers are missed in urine analysis.¹⁵ In spite of this, the experiences in developed countries have showed that screening of urine samples in special groups such as drivers,¹⁶ job applicants, police officers and laborers⁶ has caused significant decrease of substance abuse in these groups. Therefore, considering the cost of substance abuse for these groups and the cost resulted from losing a job, as well as social costs of addiction, it is wise to continue screening programs. According to the results of the present study, the screening program of referrals of security sections of offices needs a thorough revision in regard to the way of referring cases.

Conflict of Interest: The Authors have no conflict of interest.

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ارزیابی اقتصادی غربالگری ادرار برای ترکیبات شبه تریاک: مطالعه‌ای در کرمان

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چکیده

مقدمه: هزینه اثربخشی (به معنای نسبت هزینه‌های صرف شده برای اجرای یک برنامه به پیامدهای مورد نظر آن) یکی از مباحث اصلی در برنامه‌های غربالگری سوء مصرف مواد اپیویدی می‌باشد. هدف از انجام این مطالعه، تعیین هزینه اثربخشی غربالگری مواد اپیویدی از طریق آزمایش ادرار بود.

روش‌ها: ابتدا ۶۴۶۹۸ فرد در ۵ گروه مجزا بر اساس دلیل انجام غربالگری انتخاب و دسته بندی شدند. هزینه اثربخشی غربالگری سوء مصرف مواد اپیویدی در هر گروه با تقسیم هزینه کل (شامل هزینه پرسنلی و هزینه‌های بالاسری) به تعداد موارد مثبت کشف شده محاسبه شد و نتایج ۵ گروه با هم مقایسه گردید.

یافته‌ها: در مجموع، ۳۴۶۰ فرد (۵/۳ درصد) بر اساس آزمایشات (Rapid screening assay) RSA و TLC (Thin layer chromatography) مثبت بودند. طبق تحلیل هزینه اثربخشی افزایشی، گروهی که توسط نیروی انتظامی دستگیر و جهت غربالگری ارجاع داده شده بودند، مقرون به صرفه‌ترین غربالگری را داشتند (نقطه سر به سر = ۲ درصد).

نتیجه‌گیری: بر اساس نتایج به دست آمده، تداوم برنامه‌های غربالگری سوء مصرف مواد اپیویدی در کشور ضروری به نظر می‌رسد.

واژگان کلیدی: هزینه اثربخشی، سوء مصرف مواد، ادرار، شبه تریاک.

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