

REGULAR ARTICLE

Strategy for increasing detection rates of drug and alcohol abuse in paediatric emergency departments

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Keywords

Adolescents, Emergency medicine, Substance abuse

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Received

6 March 2009; revised 27 April 2009; accepted 28 May 2009.

DOI:10.1111/j.1651-2227.2009.01392.x

Abstract

Aim: To determine whether implementation of criteria for performing a toxicology screen and increasing staff awareness improve detection of substance abuse among adolescents presenting to the emergency department.

Methods: Patients 12 to 18 years of age presenting to one of three emergency departments in Israel were included in a prospective cohort study. In the 'study' hospital, a set of criteria for urine toxicology screen and measurements of ethanol serum level were implemented. No specific interventions were implemented in the two other hospitals. The main outcome measure was the rate of substance abuse detection.

Results: The number of adolescents seen in the participating centres was 3200 at the study hospital, and 3493 and 2792 at the two other hospitals. High blood ethanol concentrations were found in 49 patients at the study hospital compared with 30 and 19 patients at the two other hospitals ($p < 0.001$).

Illicit drugs were detected in 13, 4 and 1 patients, respectively ($p = 0.002$).

Conclusions: Introducing structured guidelines for ordering toxicological screening increases the detection of alcohol and drug of abuse among adolescents presenting to paediatric emergency departments.

INTRODUCTION

Substance abuse among adolescents is a major public health concern. Many studies (1–6) have shown that a large percentage of adolescents use alcohol and drugs. Almost all students aged 15 and 16 years in the UK (5) reported drinking alcohol in the previous month and 42.3% had at some time used illicit drugs. Similar numbers have been reported from Australia (4). In a study preformed for the Anti-Drug Agency among adolescents in Israel, more than half reported drinking alcohol (7).

A significant number of patients admitted to hospital for trauma-related injuries (8), self-inflicted injuries (9,10) and psychiatric emergencies (11) have a positive toxicology screen for alcohol or drugs of abuse. Other conditions, such as seizures (12) and decreased level of consciousness (13), may also be related to substance abuse.

We recently found that the likelihood of substance abuse in adolescents presenting to the paediatric emergency department (ED) is higher when patients present with obtunded consciousness (14). We also showed that paediatricians could accurately assess the likelihood of substance abuse in many of these patients. However, a previous study (15) indicated that clinicians' impression of adolescents'

alcohol or drug involvement may underestimate substance-related pathology.

Our objective was to determine whether implementation of defined criteria for ordering a toxicology screen, together with increased staff awareness, improves detection of substance abuse among adolescents presenting to the ED.

METHODS

Design

Prospective cohort study.

Setting

The paediatric ED of three university-affiliated general hospitals in Israel.

The institutional review board approved the study protocol in all participating institutions.

Patients

Patients 12 to 18 years of age presenting to the ED at one of the participating hospitals, Assaf Harofeh Medical Center (AHMC), The Edith Wolfson Medical Center (EWMC) and

Meir Medical Center (MMC), between September 1, 2006 and August 31, 2007 were included.

Study group

Physicians at AHMC were instructed to send blood for ethanol levels and urine for toxicological screening for any patient with one or more of the following symptoms or signs:

- Decreased level of consciousness
- Acute confusional state
- New onset of psychiatric symptoms (psychosis, depression)
- Panic attack
- Attempted suicide
- Known substance abuse

Patients were excluded if they suffered from a known psychiatric disorder or moderate/severe mental retardation.

Intervention

Before the study commenced, physicians and nurses working in the ED were instructed regarding the study hypothesis and protocol. Monthly reminders were sent to all the senior physicians working in the ED.

The paediatrician in the ED (senior resident, fellow or attending physician) evaluated all the patients who met the inclusion criteria. Based on the above criteria, the physician ordered a toxicology screen of the urine and ethanol level of the blood.

The prevalence of substance abuse in the paediatric ED at AHMC was compared with the prevalence of substance abuse detected in two other paediatric EDs – MMC and EWMC. Similar to AHMC, these two hospitals are university-affiliated general hospitals located in central Israel. The annual paediatric census is around 18 000 patients in both hospitals. Paediatricians working in these EDs did not receive any specific instructions. Urine and blood for toxicological screening were sent based on the senior physician's decision.

The prevalence of positive screens in patients aged 12 to 14 years was compared with the prevalence among patients aged 15–18 years.

Laboratory

Urine samples were tested by an immunoassay (SureStep®; Applied Biotech, Inc, San-Diego, CA, USA). The urine was tested for the following substances: tetrahydrocannabinol (THC), morphine, methadone, cocaine, tricyclic antidepressants, PCP, barbiturates, benzodiazepines, amphetamines and metamphetamines. A concentration of 5 mL of blood was obtained from each patient. Ethanol was measured in whole blood by an enzymatic assay on an automated Hitachi 917 analyser (Roche Diagnostics, Mannheim, Germany).

Statistics

The ANOVA test was used to compare continuous variables between the three hospitals. The Fisher Exact test was used

to compare categorical variables. The level of statistical significance was set at $p < 0.05$.

RESULTS

During the study period, there were 19 762 ED visits at the AHMC, 18 208 at the MMC and 18 372 at the EWMC. The demographic features of the study population are presented in Table 1.

Table 2 presents the number of urine toxicology screens and serum ethanol levels ordered at the different hospitals. The table also presents the number of positive findings. Ethanol concentration in the blood was higher than 10 mg/dL in 49 patients at AHMC, 30 patients at MMC and 19 patients at EWMC ($p < 0.001$).

Urine drug screen was ordered for 138 patients from AHMC, 48 patients from MMC and 22 patients from EWMC ($p < 0.001$). Illicit drugs were detected in 13, 4 and 1 patients, respectively ($p = 0.002$). The most common drug of abuse found in the urine was THC (9/18). Findings of positive drug screens from the participating hospitals are presented in Table 3.

Table 1 Demographic characteristics of the study population

Hospital	EWMC	MMC	AHMC	p
Number of ED visits	18 372	18 208	19 762	
Number (%) of adolescents 12–18 years	2792 (15.2)	3493 (19.2)	3200 (16.1)	<0.001
Mean age	13.5 ± 1.2	15.2 ± 1.7	14.9 ± 1.7	<0.001
Percentage of males	57.8	46.8	51.3	<0.001

EWMC = The Edith Wolfson Medical Center; MMC = Meir Medical Center; AHMC = Assaf Harofeh Medical Center; ED = Emergency department.

Table 2 Number of tests and number of positive drug and ethanol screens in the participating hospitals

Hospital	EWMC (n = 2792)	MMC (n = 3493)	AHMC (n = 3200)	p
Number (%) of urine drug screen preformed	22 (0.7)	48 (1.4)	138 (4.3)	>0.001
Number (%) of positive urine drug screen	1 (0.04)	4 (0.11)	13 (0.4)	0.002
Number (%) of tests for ethanol in the blood	33 (1.2)	31 (0.9)	75 (2.3)	<0.001
Number (%) of positive tests for ethanol in the blood (ethanol > 10 mg/dL)	19 (0.7)	30 (0.9)	49 (1.5)	0.002*

EWMC = The Edith Wolfson Medical Center; MMC = Meir Medical Center; AHMC = Assaf Harofeh Medical Center.

*For the proportion of high ethanol serum concentrations among adolescents seen in the ED.

Among all screened patients ($n = 208$), 57 (27%) were younger than 15 years. A total of 27 patients (47%) in the younger age group and 56 (37%) patients in the older age group tested positive for ethanol ($p = 0.15$). Six (10%) patients in the younger age group and 12 (8%) patients in the older age had a positive urine drug screen ($p = 0.55$).

DISCUSSION

In a large prospective study, introducing structured guidelines for ordering toxicological screening and increasing staff awareness were associated with increased detection rates of alcohol and drugs of abuse among adolescents presenting to paediatric emergency departments. The number of urine drug screens performed at the study hospital was approximately three and six times higher than that in the two other hospitals, respectively. Not surprisingly, drugs of abuse were detected in 13 cases in the study hospital as opposed to only four and one cases in the two other hospitals. The same was true for ethanol in the blood. The test was more often ordered in the study hospital and more patients were diagnosed with high ethanol levels.

The study was conducted in three general hospitals, located in cities near Tel Aviv, Israel. All these hospitals are affiliated with the same university and the demographics of the population treated in these hospitals are similar. Therefore, the differences we found in this study are most likely due to the intervention and are unlikely to reflect differences in substance abuse rates.

In all the participating hospitals, as in most other hospitals in Israel, children suffering from major trauma are treated in a separate area of the ED. As in some of those cases injury may be due to substance abuse (8), the true incidence of substance abuse may be higher than we found.

Structured interviews (16–18) can serve as a clinical tool to identify problem drinking or drug use in the ED. However, self-reporting of substance use may not be reliable even when a structured interview is used. Perrone et al. (19) compared history obtained by structured interview with the results of urine drug screen. Only 57% of cases could be identified by history alone. In another study, Hepler et al. (20) found that the ability of clinicians to predict accurately which, if any, of a large number of intoxicants were present in a given patient is minimal. Such interviews are also time consuming and are not used routinely in most EDs.

The role of laboratory toxicology screening in the ED is controversial (21,22). Although toxicology drug screen may identify substance abuse in unsuspected cases, the effect of such screening on patient management is limited (23,24).

The toxicological screening results rarely necessitate a change in medical management. Nevertheless, identifying adolescents using drugs and alcohol may have other beneficial effects. In a case control study (25) of adolescents in the ED, it was shown that compared with alcohol-negative adolescents, those tested positive for alcohol were more likely to suffer from drinking problems, prior alcohol-related injuries and episodes of driving after drinking. They were also more likely to report depressed mood, reckless behaviour, poor grades in school and daily smoking.

Identifying adolescents using alcohol and drugs offers an opportunity for intervention. The impact of effective intervention may be substantial, as problem drinking during adolescence is also associated with problem drinking in adulthood (26).

Studies on the effect of short, focused intervention in the ED are conflicting. In a study of more than 1000 adult patients, a brief intervention, viz. the 'Brief Negotiated Interview', was effective in reducing unhealthy drinking at three months (27).

Contrary to these findings, a randomized control study of 494 adult harmful drinkers found no difference in efficacy at 6 and 12 months between those assigned to emergency practitioner-performed Brief Negotiation Interview and those who received written discharge instructions (28).

In a randomized controlled study of 152 adolescents treated in the ED after alcohol-related events, a brief motivational interview was associated with improvement in several alcohol use outcomes after 12 months (29).

One of the study limitations was that the immunoassay we used for urine drug screen may yield false positive results (11), and it tests for only 10 drugs. Many other drugs (e.g. glue sniffing), which are popular among adolescents, may be undetected by this assay. The possibility of false negative results is not a significant problem, as adding a broad-spectrum, high-performance liquid chromatography drug screening to the history, physical examination and a limited drug screen resulted only in additional 3% detection rate (30). It is also possible that in some cases ethanol serum concentrations were drawn many hours after the child became sick, resulting in false negative results. The overall number of patients identified with substance abuse even in the study hospital was not high and it is possible that some patients who should have been included were missed.

In the current study, we did not find a difference between older and younger adolescents in substance abuse detection rates. However, the study was not designed to answer this specific question and the number of screened patients was too small to allow a definite conclusion.

The current study shows that clinicians will screen more patients if screening criteria are explicit and if they know the criteria. The study does not show that these are the best criteria to use. Therefore, one cannot conclude that these criteria provide an evidence-based screening instrument. We also could not determine what level of abuse severity should trigger a positive screen. These key questions should be addressed in future studies.

Table 3 Positive results of urine drug screen among adolescents in the ED

Hospital	Benzodiazepines	THC	Opioids	Amphetamines	Total
AHMC	1	7	3	2	13
MMC	2	2	–	–	4
EWMC	1	–	–	–	1

AHMC = Assaf Harofeh Medical Center; MMC = Meir Medical Center; EWMC = The Edith Wolfson Medical Center; THC = Tetrahydrocannabinol.

It is also important to note that our study did not use a public health screening model. Therefore, it is impossible to draw conclusions about the incidence of substance abuse among adolescents in Israel based on these results.

In conclusion, in a large prospective study, we showed that having structured guidelines for ordering toxicological screening increases the detection of alcohol and drugs of abuse among adolescents presenting to paediatric emergency departments. The intervention we used was based on two elements – defined criteria for ordering toxicological screening and increasing staff awareness. Further studies may focus on screening the whole population, or a random sample of the population, to identify a set of specific, sensitive and operational criteria for substance abuse among adolescents in the ED.

ACKNOWLEDGEMENTS

The authors wish to thank Lisa Cochavy and Sivan Dil for their secretarial assistance, and the Emergency department nurses and physicians in all the participating hospitals for their assistance.

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