

TECHNICAL NOTE

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Urine Drug Testing for Social Service Agencies in Nova Scotia, Canada

REFERENCE: Fraser AD. Urine drug testing for social service agencies in Nova Scotia, Canada. *J Forensic Sci* 1998;43(1): 194–196.

ABSTRACT: In Nova Scotia Canada, governmental authorities expressed concern in the late 1980s about the adverse effects of drug use by parents on the welfare of their children. Since 1991, parents with a history of drug abuse may be required to submit to urine drug and alcohol testing when ordered by the Family Courts of this province. The objective of this paper is to present this drug testing program and the results of drug testing on 125 clients from 1994–1996. Urine specimens were collected in the parents' residence by a nurse and transferred directly to the laboratory by the collector or a courier. Specimens were screened by immunoassay and TLC followed by GC-MS confirmation. Results were sent directly to the social worker. In the 3,613 urine specimens analyzed, 50.2% of specimens were negative, 45.6% were positive for one or more drug/metabolite and 4.2% of specimens were dilute (creatinine <25 mg/dL). The distribution of positive results were: cannabinoids (11.5%), cocaine metabolite (5.0%), benzodiazepines (14.5%), codeine/morphine (7.1%), codeine (6.6%), diphenhydramine (2.2%) and ethyl alcohol (1.6%). Drug testing has been considered a success by these agencies since testing provides an objective indication of recent drug use and the overall prevalence of drug use in this drug abusing population has reduced from 100% to <50%.

KEYWORDS: forensic science, forensic toxicology, urine drug testing, substance abuse, drugs of abuse, social services

The use of illicit drugs and overuse of prescription drugs has been a major public health concern at various times over the past century. A Commission of Inquiry into the Non-Medical Use of Drugs was appointed by the Government of Canada in 1969 (1). The final report of this Commission (released in 1973) included many recommendations concerning legislation, enforcement, scheduling of drugs, control of the user, and the treatment/rehabilitation of the drug dependent individual. Since 1973, concerns about drug use in society overall has resulted in specific concerns about drug use in the workplace. A report (2) of the Standing Committee on National Health and Welfare on drug use in Canadian society was released in 1987. This report "Booze, Dope and Pills" reviewed many aspects of drug abuse in Canadian

society including the use of drugs in the workplace. In 1988, the Federal Minister of Health released the government response to the earlier report "Booze, Dope and Pills" (3). The federal government recognized that in exceptional circumstances where public safety was a concern that urine drug testing should be considered. The federal government of Canada, however, never legislated mandatory guidelines for workplace drug testing as were legislated in the United States (4–5) in the late 1980's. Currently, there is no federal or provincial legislation in Canada on standards or guidelines for forensic urine drug testing.

In the province of Nova Scotia, Canada concerns were raised in 1991 by legal council of the Ministries of Justice and Community Services about the adverse effects of parental drug abuse on children. These children were living with one or both parents (who had a chronic history of drug and/or alcohol abuse). The families were being followed on an ongoing basis by social services/child welfare agencies throughout the province. It was felt in 1990 that enrollment of these adults in drug treatment programs (and the results thereof) was not providing objective information for the Family Courts when reviewing child custody cases. An agreement was made between legal council for the Ministry of Community Services, a commercial collection agency and the Toxicology Laboratory, Victoria General Hospital for forensic urine drug testing on these clients. The Family Courts may order urine drug testing on either one or both parents for a term up to 12 months. A procedure was established for observed urine collection on a random basis by an agency using male and female nurses as collectors. After sealing the urine specimen containers with tamper evident tape and reading the temperature, specimens are maintained in the possession of the collector until delivery to the Toxicology Laboratory receiving area or shipment by a courier. After analysis is complete, a written report is sent directly to the client's case worker. Periodic summary/interpretative reports are provided by the forensic toxicologist.

Laboratory Testing Procedures

The urine specimens are treated as forensic specimens in the laboratory with both specimen and aliquot chain of custody from specimen receipt to final disposal. Each urine specimen was screened for drugs and/or metabolites by EMIT dau assays. The cut-off concentrations used are found in Table 1. In addition, all urine specimens were screened for other drugs by thin layer chro-

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Received 26 March 1997; and in revised form 19 May 1997; accepted 19 May 1997.

TABLE 1—Screening and confirmation cut-off concentrations for drugs and metabolites.

Drug	Screening Cut-Off Concentration (ng/mL)	Confirmation Cut-Off Concentration (ng/mL)
Cannabinoids	50	15
Cocaine Metabolite	300	150
Benzodiazepines	200	1000
Barbiturates	200	200
Opiates	300	300
Methaqualone	300	300
Amphetamines	1000	500
Phencyclidine	25	25

matography (TLC) and for ethyl alcohol by gas chromatography (GC). The confirmation method for immunoassay positive specimens was GC-MS in the SIM mode using deuterated internal standards (7) except for benzodiazepines. Benzodiazepines which screened positive by immunoassay were confirmed by TLC after visualization with the Bratton Marshall spray (8). If the TLC screening assay was positive for another drug or metabolite, all presumptive positives were confirmed by GC-MS in the full scan mode. All ethyl alcohol GC presumptive positives were confirmed by the EMIT enzymatic assay with a confirmation cut-off of 20 mg/dL. Each specimen was also analyzed for creatinine using the modified Jaffé reaction on a Beckman CX7 analyzer. Creatinine results below 25 mg/dL were considered dilute.

Results

Urine specimens were referred from seven social service agencies. A total number of 125 individuals were tested from 1994–1996. Some individuals were tested only 1–5 times whereas three individuals were tested on >100 occasions in 24 months. The total number of specimens analyzed in 1994–1996 was 3,613. The distribution of specimens referred from the agencies is shown in Fig. 1. The majority of specimens were received from agencies in the greater Halifax area (Halifax, Dartmouth, Lower Sackville). Approximately one half of the urine specimens collected (1,813) contained no drugs/metabolites (50.2%). A further 45.2% of urine

Number of Urine Drug Tests by Agency 1994 - 1996

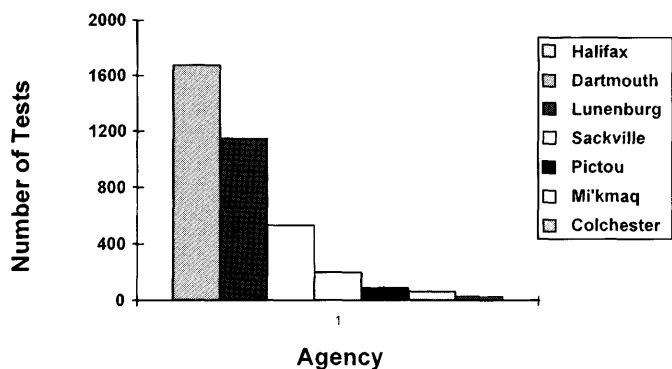


FIG. 1—Distribution of urine drug tests by agency 1994–1996.

Distribution of Positive Urine Drug Tests 1994 - 1996

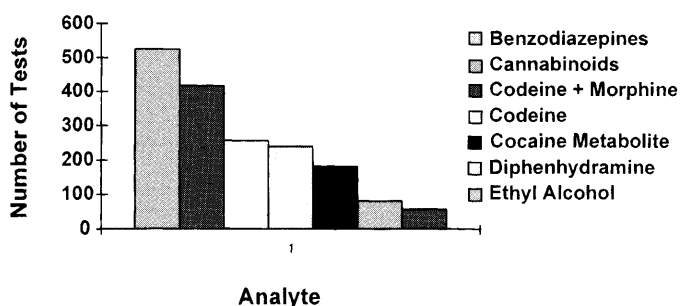


FIG. 2—Distribution of positive urine drug tests 1994–1996.

specimens were found to contain one or more drugs/metabolites, 152 urine specimens (4.2%) were considered dilute since the creatinine concentration was <25 mg/dL. 50% of the dilute specimens were negative for all drugs/metabolites. A small number of specimens (37) were rejected due to various reasons: unable to read temperature, high initial absorbance by immunoassays or insufficient volume of specimen submitted (<15 mL). The results of positive tests by drug/drug class is found in Fig. 2. The distribution of positive findings were as follows: cannabinoids 11.5%, cocaine metabolite 5.0%, benzodiazepines 14.5%, codeine and morphine 7.1%, codeine 6.6%, diphenhydramine 2.2% and ethyl alcohol 1.6%. Various other prescription drugs/metabolites were detected but the prevalence was <1.0%. The dilute specimens were negative for all drugs in 50% of the urine specimens and positive for one or more drugs in the remainder. The most common drug confirmed in dilute urine specimens was codeine.

Discussion

Over the past 12–15 years, the major focus of forensic urine drug testing has been workplace drug testing. Many jurisdictions in North America may be performing drug testing in child custody cases but the author is unaware of any legislated standards for such programs. Compared to random urine drug testing of the general population or for pre-employment purposes, the overall positive rate of 45.6% in this report is very high. It must be remembered, however, that these results represent cumulative testing results in a relatively small number of individuals (N = 125). Secondly, this program was established for testing of adults with a documented history of chronic abuse of drugs of abuse and/or prescription drugs. Only individuals who were chronic drug users when ordered to submit to drug testing by the Family Courts of Nova Scotia. The court orders state that the individual(s) were not to use any drug of abuse and to receive prescription drugs from one physician only. The Ministry of Health monitors all drug prescriptions in Nova Scotia. The high positive rate for codeine and morphine must be interpreted in the context that codeine in Canada as an over the counter medication. The 300 ng/mL screening cut-off for opiates resulted in many presumptive positive specimens requiring dilution prior to GC-MS confirmation.

Based on the findings of drug testing for this program from 1994–1996, the program was modified effective 1 January 1997. A comprehensive drug screen by TLC is performed only once for

each new client, immunoassay screening and GC-MS cut-off values for opiates (codeine and morphine) were increased from 300 to 2,000 ng/mL and testing for PCP, methaqualone, and barbiturates were discontinued. There were no positive results for PCP and methaqualone from 1994–1996 and the positive rate for barbiturates was <0.5%. One drug screen by TLC for each new client will be included since the preferred drug of abuse may not be detected by the immunoassay screening tests. These include meperidine, hydromorphone and methylphenidate. Whenever any of these drugs are screened and confirmed positive on the initial specimen, subsequent testing for that individual would include TLC screening. Unfortunately, the diagnostic companies have not marketed immunoassays for drugs of abuse such as meperidine and methylphenidate.

Summary

The introduction of urine drug testing for this program has been considered a success by the social services agencies for the following reasons: (1) The results of urine drug testing have been accepted by the Family Courts of Nova Scotia since the urine collection and testing is performed with chain of custody from collection to reporting and the analysis includes confirmation of all positive immunoassay screening tests; (2) Urine drug testing (with established screening and confirmation cut-offs) provides an objective indication of recent drug use compared to relying on self-reporting of drug use; and (3) Urine drug testing is felt to be a deterrent to drug use since several individuals with a history of drug use have consistently tested negative over a 6–12 month period.

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