DEWS Maryland Drug Early Warning System

DEWS INVESTIGATES

Using Urine Specimens from Parolees/Probationers to Create A Statewide Drug Monitoring System

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HIGHLIGHTS

Trends in the drugs detected in urinalyses from offenders have been found to provide advance warning of drug epidemics in the greater community. The recent demise of the national ADAM (Arrestee Drug Abuse Monitoring) program and the Maryland OPUS (Offender Population Urine Screening) program has left Maryland and other states without important tools for forecasting drug epidemics. DEWS staff therefore worked with the Maryland Division of Parole and Probation (DPP) to pilot an innovative program of expanded testing of urine specimens that DPP staff had collected from probationers/parolees. DEWS staff over-sampled drug positive specimens that the DPP laboratory (Guilford Lab) had tested for a panel of five drugs (benzodiazepines, cocaine, marijuana, opiates, and PCP). While about 20% of all specimens screened by DPP tested positive in 2004, 75% of the 299 specimens that we selected had tested positive in the DPP panel. The study specimens were then sent to an independent, private laboratory (Friends Medical Laboratory, Inc.) who tested them for the presence of more than 30 drugs.

Key issues: Is it feasible to establish a statewide drug monitoring system using available urine specimens from probationers/parolees? Does the DPP standard five drug screen detect most drug users? Are probationers/parolees in Maryland using prescription opiates (buprenorphine/oxycodone) or methamphetamine?

Key Findings:

- Almost all (97%) of the probationers/parolees who tested positive for at least one of the drugs in the expanded screen had already tested positive for at least one of the five more common drugs tested for by the DPP. However, the use of some less common drugs, notably buprenorphine, methadone, and oxycodone, would have gone undetected by the DPP's drug screen.
- Sixteen specimens contained oxycodone and 15 specimens contained buprenorphine. However, only one specimen tested positive for amphetamine and confirmatory testing did not detect methamphetamine. Methamphetamine does not appear to be used by this population in Maryland.
- About one half of the specimens that contained buprenorphine or oxycodone also contained two or more other drugs, raising the possibility of abuse of these prescription drugs in Maryland.
- The pattern of positive test results for cocaine, PCP, marijuana, and opiates was consistent with the types of drugs for which the general population in the sampled localities sought treatment.
- It was remarkably quick and inexpensive for the researchers to sample 299 specimens and send them to an independent lab to be screened for a wide variety of drugs.

Recommendations:

Maryland and other states should consider implementing a program of periodic expanded testing of urine specimens routinely collected from probationers/parolees. This relatively low cost and easy-to-execute program will achieve two goals: 1) it will provide criminal justice agencies with the means to ensure that they are routinely testing for the drugs being used by the persons they supervise; and 2) it will provide the state with a tool for rapidly detecting and researching emerging drug problems.

The Value of Offender Urinalysis Results for Research and Policy

In the early 1970's, the District of Columbia established an innovative program of drug testing of arrestees in order to identify and refer persons to drug treatment. The trends in the drug test results from arrestees were subsequently found to provide advance warning of emerging illicit drug epidemics. Persons breaking the law tend to be among the first in the community to use newly available illicit drugs.[1]

In 1987, the Department of Justice implemented the Drug Use Forecasting (DUF, later renamed Arrestee Drug Abuse Monitoring, ADAM) program, to monitor drug use trends in arrestees in 35 sites. The DUF program was modeled after the D.C. arrestee testing program, with a new primary goal of conducting research into drug use and crime. After 17 years, the ADAM program was cancelled in 2004, for budgetary reasons.

Maryland was not a participant in the ADAM program. However, in 1999 DEWS staff im-

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Table 1. The Friends Lab Expanded Drug Screening

Drugs Tested	
Enzyme Multiplied Immunoassay (EMIT®)	
Amphetamines	1 mcg/mL
Barbiturates	200 ng/mL
Benzodiazepines*	200 ng/mL
Buprenorphine	5 ng/mL
Cocaine*	0.3 mcg/mL
Propoxyphene	300 ng/mL
LSD	0.5 ng/mL
Marijuana*	50 ng/mL
MDMA/MDA	500 ng/mL
Methadone	300 ng/mL
Methaqualone	300 ng/mL
Opiates*	0.3 mcg/mL
Oxycodone	100 ng/mL
PCP* †	25 ng/mL
* Drugs also tested for by EMIT by the DPP lab.	
Thin-layer Chromatography (TLC)	
Ami/Nortriptylin	Meprobamate
Ativan/Dalmane	Methadone
Unspecified Barbiturates	Morphine
Unspecified Benzodiazepines	Oxycodone
Clonazepam	PCP†
Codeine	Phenmetrazine
Demerol	Phenobarbital
Doxepin	Phenothiazines
Hydrocodone	Propoxyphene
Hydromorphone	Quinine
Hydroxyzine	Tramadol
Imipramine	Valium
Gas Chromatography/Mass Spectrometry	
GC/MS was conducted only on EMIT positives for amphetamines, barbiturates, benzodiazepines, and opiates when TLC failed to detect a specific drug that could have caused the positive.	
†Test for PCP may also detect high concentrations of dextromethorphan.	

plemented a similar program to monitor drug trends in juvenile arrestees in Maryland. The Offender Population Urine Screening program (OPUS) collected voluntary and anonymous urine specimens from samples of youths admitted to DJS facilities. The Juvenile OPUS results documented the use of marijuana by detained youth in Maryland. Since the OPUS program ended in 2005, there exist no statewide programs that use urinalysis results from juvenile or adult offenders to track emerging drug trends in Maryland.

DEWS staff have therefore been looking for alternative ways to measure drug trends in offenders. Discussions with staff at the Division of Parole and Probation (DPP) revealed that the DPP routinely collects thousands of urine specimens from probationers and parolees each year. These specimens are tested for a standard panel of five drugs and are later discarded. We speculated that it might be feasible for DEWS staff to sample some of these specimens and to test them for a wider range of drugs. If this approach were used with all DPP labs, it might provide a cost effective and rapid means to answer important questions about the availability and use of drugs by convicted adults throughout Maryland. This report presents the results from our pilot study of such a system.

Study Methods

The DPP Guilford Testing Laboratory

The Guilford Laboratory is a centralized urinalysis testing facility for 15 DPP collection facilities located in Baltimore City and Baltimore, Howard, Prince George's, Charles, and Washington counties. Urine specimens tested at this lab come from parolees and probationers in these counties who have either been required to participate in drug testing by the court or the Parole Commission. Testing frequency can range from several times a week to once every few weeks. The Guilford Lab tests approximately 2,000 specimens a day.

Specimens Sampled by DEWS Staff

DEWS staff collected 299 urine specimens from the Guilford Lab over the course of three days in March and April 2005. Approximately 5 drug negative specimens and 15 drug positive specimens were randomly selected from each of the 15 facilities that submitted specimens. We over-sampled drug positive specimens; so, a significantly higher percentage of specimens used for this study were positive than would have been had we selected a random sample. Seventy-five percent of our study sample had tested positive by DPP. We suspected that persons who had tested positive for the more common drugs in the DPP drug screen would be most likely to test positive for the less common drugs in the expanded test panel. Per our agreement with DPP, we did not record the specific drugs they had detected. Only one specimen per probationer/parolee was selected for inclusion in this study. The 299 specimens were taken by DEWS staff to the Friends Laboratory in Baltimore for the additional testing.

Expanded Testing by Friends Laboratory

The Guilford Laboratory had tested the specimens for five drugs (benzodiazepines cocaine, marijuana, opiates, and PCP) using Enzyme Multiplied Immunoassay (EMIT®). Friends repeated those EMIT tests as part of an expanded panel of drug tests for more than 30 substances. Initial tests included both EMIT and Thin-layer Chromatography (TLC). GC/MS (gas chromatography/mass spectrometry) confirmation was conducted on selected EMIT positives (see table). The test results, labeled by study ID, were sent to the DEWS staff at CESAR. No names or identifying information were collected.

Test Results

Table 2 presents the results from the larger panel of tests conducted at Friends. As expected, the most common drugs detected were marijuana (92), cocaine (78), morphine, (56) and methadone (30). Quinine, a drug often mixed with injectable heroin, was found in 38 specimens. Oxycodone (16), buprenorphine (15), benzodiazepines (15), and PCP (11) were the next most detected drugs. No other drug was found in more than seven specimens.

DEWS staff have been vigilant for any signs of the availability of methamphetamine in Maryland, as the drug has spread nationally from West to East.[2] Methamphetamine would show up in urine tests as an amphetamine, one of its metabolites. Note, however, that there was only one positive specimen for amphetamine in our sample from the six jurisdictions included in this study and the GC/MS confirmation did not detect methamphetamine. A number of other abused drugs were also not detected, including MDMA (ecstasy), methaqualone, and propoxyphene.

Does DPP Screening Detect All Users?

Almost all of the persons testing positive for the expanded panel of drugs had tested positive for one of the five standard drugs tested for by DPP. There were only eight persons (3%) who tested positive for the expanded panel but who had tested negative by the DPP five drug panel. Four of these persons tested positive for methadone only and three for buprenorphine only, both drugs that could have been medically prescribed. One person tested positive for LSD. Thus,

Table 2. Number of Specimens Positive for Each Drug (N=299)

Drugs detected in at least one specimen	
Marijuana	92
Cocaine	78
Morphine	56
Quinine	38
Methadone	30
Oxycodone (13)/Oxymorphone (3)	16
Buprenorphine	15
Benzodiazepines	15
Unspecified (7)	
Alprazolam* (3)	
Valium (3)	
Clonazepam (1)	
Oxazepam* (1)	
PCP	11
LSD	7
Hydrocodone/ Hydromorphone*	5
Barbiturates	4
Butalbital* (2)	
Phenobarbital (2)	
Codeine	4
Ami/Nortriptylin	2
Amphetamine	1

Drugs not detected in any specimen	
Ativan/Dalmane	Meprobamate
Demerol	Methaqualone
Doxepin	Phenmetrazine
Hydroxyzine	Phenothiazines
Imipramine	Propoxyphene
MDMA/MDA	Tramadol

*These drugs were detected through GC/MS confirmations of EMIT positives for opiates, benzodiazepines, or barbiturates.

from a law enforcement point of view, the current five drug screen used by DPP picked up all of the persons who had used an *illicit* drug, but one, even though users of some specific drugs like methadone and buprenorphine would have gone undetected.

Buprenorphine and Oxycodone

Buprenorphine is of special interest to DEWS staff because it received FDA approval in 2002 as an alternative to methadone for the treatment of heroin addiction. Like methadone, buprenorphine relieves heroin withdrawal symptoms and craving and blocks the euphoric effect of heroin. However, while only methadone clinics can dispense methadone to treat addiction, trained and registered physicians can prescribe buprenorphine.

Approximately 160 doctors in MD are certified to prescribe buprenorphine, and about one half of them are situated in Baltimore City or County. Because there is a potential for diversion and abuse of buprenorphine, DEWS staff have been participating in the national post-marketing surveillance study to monitor any signs of abuse of the drug in Maryland. To date, there appears to have been relatively little abuse of buprenorphine nationally.[3]

Fifteen of the specimens tested positive for buprenorphine and most came from persons 30 years of age or older. It is impossible to tell from a urinalysis test whether these persons were using legally prescribed buprenorphine or illegally diverted drugs. Table 3 presents all of the drugs found in the 15 buprenorphine positive specimens. All but three (80%) of these specimens contained another drug (Note: Because we over-sampled DPP drug positive specimens, most of the buprenorphine positive specimens had to contain another drug); 47% contained 2+ other drugs, and 33% contained 3+ other drugs. The drugs detected most frequently were morphine (5), quinine (3), cocaine (3), codeine (3), and methadone (3). It is noteworthy that the three persons with a specimen positive for buprenorphine alone would have tested negative and gone undetected by the current DPP five drug panel.

Oxycodone also has a potential for being abused. We found that ten of the sixteen (63%) specimens positive for oxycodone contained two or more other drugs. The most prevalent other drugs found were quinine (8) morphine (7), and benzodiazepines (5).This pattern of results suggests to us that oxycodone was being used by persons who may have been abusing heroin.

Urinalysis Results Compared to Treatment Admissions

We wanted to gain some indication of whether the drug test results were consistent with other indicators of the availability of these drugs in the six counties where the DPP facilities were situated. We compared the pattern of positive test results with the FY04 county rates of treat-

Table 3. Other Drugs Detected in the Fifteen Specimens that were Buprenorphine Positive

Buprenorphine Positive Specimen #	Morphine	Quinine	Cocaine	Codeine	Methadone	Benzodiazepine, unspecified	Oxycodone	Butalbital	Hydrocodone/ Hydromorphone	LSD	Marijuana	Phenobarbital	Valium	Total Other Drugs
1	+	+		+		+	+					+		6
2	+			+		+		+						3*
3					+				+	+				3
4	+	+					+							3
5	+	+									+			3
6	+				+									2
7			+		+									2
8	+			+										1*
9													+	1
10	+													1
11			+											1
12			+											1
13														0
14														0
15														0
Total	5*	3	3	3	3	2	2	1	1	1	1	1	1	27

* Morphine is a metabolite of codeine, therefore it is not included in the drug counts for total other drugs or morphine when morphine and codeine were detected in the absence of quinine, a marker for heroin.

ment admissions for heroin, cocaine, PCP, and marijuana. Of the six localities, Baltimore City had the highest rate of treatment admissions for heroin (2637.2/100,000) and it ranked first in the percentage of specimens testing positive for methadone (16%) and second (29%) for morphine (a metabolite of heroin) positives. In addition, 80% of the buprenorphine positives came from Baltimore City or County, areas with many treatment admissions for heroin. Baltimore City ranked first in treatment admissions for cocaine (2157.6/ 100,000) and first in the percentage testing positive for cocaine. The highest rates of treatment admissions for PCP in Maryland occurred in Prince George's County (59.8/ 100,000) and Charles County (39.0/100,000) the only two counties where we found PCP positives. Washington County had the second highest rate of treatment admissions for marijuana (550.3/100,000) and the highest percentage (60%) of specimens testing positive for marijuana.

Discussion

Our pilot study has demonstrated that it was possible to sample tested urine specimens from a DPP laboratory quickly and at a very low cost. The total laboratory cost for the 299 urine specimens was about $6,000, or $20 per specimen. Staff time to select a sample of specimens was minimal, involving three day-trips to the lab. The DPP laboratory staff needed only to provide a basic orientation regarding how specimens were stored. The alternative method of training research staff to collect individual urine specimens from probationers/ parolees across the state would have taken months of labor and involved large costs.

Almost all (97%) of the persons who tested positive for the less commonly used drugs detected in the 30+ drug screen had tested positive for one of the five drugs tested for by DPP. The DPP panel of the five more prevalent drugs is therefore probably adequate for identifying most recent drug users in the probationer/parolee population. However, the DPP standard panel cannot provide specific information about the use of the less common drugs. Thus, one value of an expanded testing program is that it provides an indication of the effectiveness of the criminal justice agency's routine testing panel for detecting the variety of drugs used by the population they are supervising.

Over-sampling specimens that tested positive in the DPP five drug panel helped us to find other less common drugs; 87% of the DPP+ specimens contained a less common drug compared with 13% of the DPP– specimens. A program of expanded testing of available specimens might be most cost effective if it focused on drug positive specimens.

The pattern of drugs detected in the counties where these probationers/parolees reported for testing was consistent with the types of drugs for which the general population in these counties have come to treatment. Thus, heroin, methadone, oxycodone, and buprenorphine positives were concentrated around Baltimore, PCP positives in Prince George's County, and marijuana in Washington County. These findings support the validity of this pilot program for obtaining an indication of the relative availability of specific drugs across a state.

Of considerable importance was the fact that we found no evidence of any methamphetamine use in this population. The one amphetamine positive specimen was shown by GC/MS to not contain methamphetamine. The fact that no methamphetamine was found in the more rural region of Maryland (Washington County) lends credence to the CESAR report that concluded that this drug is not widely used in Maryland.[2]

A testing program like the one we have piloted can also offer the state an important tool for conducting research into the availability of emerging drugs. For example, the fact that 15 specimens contained buprenorphine is significant because it shows that this drug is being used by this population, primarily around Baltimore. While 47% of the persons testing positive for buprenorphine also tested positive for two or more other drugs, it is impossible to determine from our data whether the buprenorphine was being used illegally or under a doctor's supervision. Given the interest in determining the misuse liability of buprenorphine since its recent FDA approval in the United States, further research could now be easily conducted. Parole/probation agencies could add buprenorphine to their panel of tests for a limited period. Maryland's DPP, for instance, tests more than 200 persons from Baltimore City and County (where most of the buprenorphine positives came from) each day. It might take under a month for researchers conducting supplemental testing to identify a sufficient sample of buprenorphine positive persons for study. These persons could then be located and interviewed by researchers about their use of buprenorphine and how they obtained the drug.

Limitations

To enhance the likelihood that the expanded testing would detect less commonly used drugs, we selected a sample from DPP containing 75% drug positive specimens. The number of drugs detected by the expanded testing is therefore higher than would be expected in a random sample of all DPP specimens. The number of specimens containing multiple drugs was probably also inflated by our sampling methods. Furthermore, because probationers/parolees may be selected for testing because of known or suspected drug use, the estimates of drug use from their testing program cannot be used to represent the general supervised population. On the other hand, the urinalyses might have underestimated the level of drug use because it only detects most drugs that were used in the prior 24 to 72 hours. Our results therefore can only provide an indication of the relative recent use or availability of these drugs in the probationer/ parolee population.

Recommendation

Maryland and other states should consider implementing a similar program of periodic expanded testing of urine specimens routinely collected from probationers/parolees. This relatively low cost and easy to execute program will achieve two goals: 1) it will provide criminal justice agencies with the means to ensure that they are routinely testing for the drugs being used by the persons they supervise; and 2) it will provide the state with a tool for rapidly detecting and researching emerging drug problems.[1]

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