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Drug Testing in a Drug Court Environment:

COMMON ISSUES TO ADDRESS

Prepared by the Drug Court Clearinghouse and Technical Assistance Project

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OJP Drug Court Clearinghouse and Technical Assistance Project
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Issues Paper Series

Drug Testing in a Drug Court Environment: COMMON ISSUES TO ADDRESS

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Foreword

Drug testing is a cornerstone of drug court program operations. The functioning of all drug courts relies on the integrity and accuracy of the drug testing process as well as the immediacy with which drug testing services are accessed and the reliability of results obtained.

This issues paper has been prepared by the OJP Drug Court Clearinghouse and Technical Assistance Project to address the most frequent issues that have been raised by drug court programs regarding drug testing. Although this report is by no means a definitive treatment of all of these issues, it is intended to provide an overview for drug court program officials—primarily lay persons—regarding the most critical topics that need to be addressed in developing and maintaining a drug testing capability.

The authors, Jerome Robinson and James Jones, director and deputy director, respectively, of the District of Columbia Pretrial Services Agency Drug Laboratory, are forensic scientists and have worked for many years with the application of drug testing technologies in a variety of sectors. The results of their experience, research, and training, as they apply to drug testing in a drug court environment, are synthesized in this document.

We are grateful for the helpful comments and insights of the following individuals who reviewed this document in draft: John N. Marr of Las Vegas, Nevada, who directs the drug treatment component of most of the Nevada drug courts, including the drug testing conducted by those programs, and Dr. Leo Kadehjian, of Palo Alto, California, a biomedical scientist who oversees the drug testing program for the U.S. Federal court system. Their advice and suggestions have been incorporated throughout the text.

Drug testing is a science that requires the guidance and oversight of appropriately trained forensic scientists. We hope that this document will assist drug court officials in working with forensic experts in the design and operation of the drug testing component of their drug court programs.

Caroline S. Cooper, Director
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1. Introduction

The effective operation of a drug court program is premised upon having the capacity to:

- conduct frequent (often two to three times per week) and random drug tests of participants;
- obtain test results immediately;
- maintain a high degree of accuracy in test results.

Drug testing is a key component of drug court programs because it provides readily available and objective information to the judge, other justice system officials, treatment personnel, and caseworkers regarding a participant's progress in treatment. The drug testing process, coupled with immediate program responses, forces defendants to address their substance abuse problems immediately and continuously.

Every professional discipline requires professionally trained individuals. Forensic drug testing is no exception. Drug testing is a complex science and requires the support of a forensic expert regardless of the testing method that is used. As with any scientific test, the interpretation of a drug test result requires balancing a number of factors, including elements directly related to the test, the physical characteristics of the individual being tested, and the nature and length of the individual's drug usage. The value and usefulness of a drug testing regime are dependent on the scientific integrity of the drug testing process and the accurate interpretation and assessment of the raw data. This is not to say that every program must hire a pathologist or certified lab technician to interpret test results. However, every court should have technical support, which is generally available from the drug testing/chemical companies that provide equipment, supplies, and training in this area.

Drug Testing: A Continually Evolving Science

The large-scale application of drug testing to detect drug use was initiated by the U.S. Department of Defense (DOD) during the late 1960s to deal with the problems of marijuana and heroin use by military personnel in Vietnam. The military's desire to respond to these problems was the driving force that led to the initial developments in urine drug testing technology. During this process, cutoff levels (i.e., standards determining the level of drug concentration in the human system above which would be deemed a "positive" finding) were established. Workplace testing followed several years later and developed rapidly after President Reagan's 1986 directive on drug abuse and drug-free workplaces. The National Institute on Drug Abuse (NIDA) became the oversight agency involved with federally regulated workplace drug testing and established a second and similar set of cutoff standards for various drugs.

During the early 1980s, the criminal justice system also began using drug testing, with a number of Federal, State, and local agencies becoming involved. The Federal Bureau of Investigation (FBI) also began to use drug testing as a component of its investigations, and pretrial and probation agencies soon adopted drug testing as a component of their supervisory functions.

Unlike the drug testing practices conducted by the military and workplace programs, however, drug testing in the criminal justice system has not been accompanied by the establishment of consistent cutoff standards that are uniformly enforced. Although the knowledge gained through the drug testing activities conducted by DOD and the Substance Abuse and Mental Health Services Administration (SAMHSA) has provided useful guidance for criminal justice drug testing programs, the range of applications of drug testing programs in the criminal justice environment has raised unique issues that have frequently required the development of special policies and protocols.

The development of appropriate drug testing methodologies and procedures for criminal justice system defendants generally—and for drug court participants in particular—requires a consideration of the purposes of the drug testing program and the uses of drug test results. Clearly, drug testing's role in the military or the workplace differs from its role in the criminal justice system. Even within the criminal justice environment, drug testing can be conducted for very different purposes: prosecution, supervision of a defendant's compliance with a pretrial release or probation order, or, as is the case in drug courts, monitoring a participant's

progress in treatment and compliance with drug court program conditions.

For a drug court program, drug testing is conducted primarily to monitor a defendant's progress in treatment—to determine whether he or she has been using drugs and, if so, the type and quantity of substances being ingested. The drug test result may be used as a basis for imposing sanctions and/or enhancing treatment services, on the one hand, or reducing treatment service requirements, on the other. Drug test results may also indicate a participant's progress in reducing drug use when he or she has not eliminated it altogether.

Although drug test results are frequently reported in terms of "positive" or "negative," in reality, the determination of the presence or absence of a particular drug in the system is not always a black-and-white determination. Ultimately, for a drug court program, a positive or negative result reflects the presence or absence of certain drug metabolites in the sample at a concentration above or below the established cutoff concentration.

How the laboratory interprets such results and the court responds to them depends upon a complex set of factors requiring an understanding of:

- the biological process that affects the length of time different drugs stay in the human body;
- interactions of one drug with another;
- distribution and elimination rates of the drugs in question;
- the participant's drug history and other physical characteristics;
- the capacity of the testing procedures to identify potential adulteration (e.g., flushing or water loading) that may affect the test results;
- the effect of other variables, such as the individual's health, physical condition, and duration of drug use, on the test analysis.

2. Drug Testing Methodologies

Most Commonly Used Samples for Detecting Drug Use

The presence of drugs in the human system can be detected by testing a variety of different samples, most notably urine, blood, hair, sweat, and saliva. Urine testing is the most cost effective, reliable, and widely used test. Each jurisdiction, however, must understand the drug use demographics of the region to determine the most appropriate drug testing strategy to employ. The testing characteristics of the five sample sources, in addition to breath samples, are described below and compared in table 1.

Urine

For reasons of both economy and accuracy, urine testing is currently the most appropriate method for drug courts and most criminal justice agencies for detecting the presence of illegal substances. Generally, urine testing methods fall into two types: instrumental and non-instrumental. Both methods use some form of immunoassay technology to provide an initial determination of the presence of a drug. These technologies are further described in the Testing Technologies section.

Blood

Testing blood for evidence of drug use is a highly invasive procedure. Blood tests can provide discrete information regarding the degree of an individual's impairment, but the invasiveness of the procedure and the potential danger of infection make blood testing inappropriate for drug court programs.

Hair

The introduction of new, powerful instruments for hair analysis has increased interest in hair testing. Many questions remain unanswered, however, regarding the application of hair testing for drug courts, including appropriate cutoff values; dose relationships (hair

Table 1. Comparison of Alternative Drug Testing Methodologies

Source Sample	Invasiveness of Sample Collection	Detection Time	Cutoff Levels	Advantages	Disadvantages	Cost
Urine	Intrusion of privacy	Hours to days	Yes	High drug concentrations; established methodologies; quality control and certification	Cannot indicate blood levels; easy to adulterate	Low to moderate
Blood	Highly invasive	Hours to days	Variable limits of detection	Correlates with impairment	Limited sample availability; infectious agent	Medium to high
Hair	Noninvasive	Weeks to months	Variable limits of detection	Permits long-term detection of drug exposure; difficult to adulterate	Potential racial bias and external contamination	Moderate to high
Sweat	Noninvasive	Days to weeks	Screening cutoffs	Longer timeframe for detection than urine; difficult to adulterate	High inter-individual differences in sweating	Moderate to high
Saliva	Noninvasive	Hours to days	Variable limits to detection	Results correlate with impairment; provides estimates of blood levels	Contamination from smoke; pH changes may alter sample	Moderate to high
Breath	Noninvasive	Hours	No, except for ethanol	Ethanol concentrations correlate with impairment	Very short timeframe for detection; only detects volatile compounds	Low to moderate

Source: Derived from Marilyn A. Huestis and Edward J. Cone, Drug Abuse Handbook, *Steven B. Karch, ed., Boca Raton, FL: 33 CRC Press, p. 431, 1997. Cost assessment provided by Jerome J. Robinson, director of drug testing for the Pretrial Services Agency of the District of Columbia.*

samples do not provide a correlation between the presence of drugs in the system and the extent of an individual's use); and potential differentiations that can be produced by differences in hair color and/or ethnicity of the defendant.[1] Hair analysis is also subject to potential external contamination. There are also indications that hair analysis can produce biased results. For example, dark pigmented hair absorbs drugs more readily than blond or bleached hair. Male African-American hair (black/brown) appears to absorb drugs more readily than hair of other groups, such as female African-Americans (black/brown), male caucasians (black/brown), female caucasians (black/brown and blond).[2]

Sweat

Sweat samples, which are obtained from patches that can be placed on a person for a number of days, have the advantage of providing a longer timeframe for detection and they are difficult to adulterate. They do not, however, provide a correlation regarding the degree of impairment and they are subject to individual differences in sweat production.

Saliva

Saliva samples permit a correlation with the degree of impairment and can be easily obtained. They are, however, subject to contamination from smoking or other substances.

Testing Technologies

Immunoassay

The most widely used technology for testing the presence of drugs in the human system is the immunoassay. Primarily used as a screening test, immunoassays use antibodies that specifically bind to drugs and their metabolites (the chemical compounds that results after the body has metabolized a drug) in urine and other fluids. The immunoassay drug-screening procedures have gained in popularity because they are relatively inexpensive, can provide results in a quick turnaround time, and have been found to produce highly accurate test results if properly performed. There are several major suppliers of immunoassay test kits.

Chromatography

Gas chromatography/mass spectrometry (GC/MS) is an analytical technique that can be used to confirm a positive initial drug screen. Chromatography testing provides a method that is specific to particular drugs and can distinguish a specific drug from other substances that may have similar chemical properties, such as a prescription medication. With this technology, technicians are able to identify and quantify atoms, isotopes, and the chemical composition of a given sample. GC/MS can be used to analyze urine, blood, hair, and other samples to determine the presence of drugs and other substances and is currently the most definitive confirmatory procedure for most substances in most toxicology laboratories.

Testing Procedures

Testing Methods

Generally, urine testing methods fall into two types: instrumental and non-instrumental. Both methods of analysis use some form of immunoassay technology to provide an initial determination of the presence of a drug and chromatography to confirm the presence and quantity of the drug. Regardless of the drug testing method used, the integrity of the collection, testing, and reporting process must be maintained to (a) ensure that the specimen is from the named defendant; (b) detect adulteration; and (c) ensure that no contaminants have been introduced that would affect the validity of the results. These elements are discussed further in chapter 3.

Evidence of drug use may be present in the urine in the form of the parent drug and/or metabolites. Determination of the length of time that has elapsed between the time of ingestion and the time the test was conducted depends upon the rate at which the body metabolizes and eliminates the drug, physical characteristics of the individual's metabolism, and the sensitivity of the testing procedure. The timeframe also can vary depending on the duration of abuse (e.g., long-term heavy doses or infrequent use), the amount of the daily dosage, and the route of administration (e.g., oral, injected, smoked, or inhaled).

Instrument Testing

Instrument testing is analysis that involves instrumentation (a machine) that will sample, measure, and produce a quantitative result (a numeric amount on a scale). Instrumented analysis has the advantage of being automated, provides precise and accurate documentation, and lends itself to convenient storage of samples in the

event that subsequent retesting may be required. Instrumental methods for testing urine rely on immunoassay technology for initial detection. These analyses have increased accuracy and precision in testing results and provide data printouts for review and courtroom presentation. The test results can also be communicated directly from the machine to a program management information system. The reagents for instrument testing are not as expensive as those supplied for non-instrument systems, although the initial cost of the instrument may be expensive. Refurbished machines are frequently available, however, and the cost of a machine should be prorated over a 5- to 7-year period. Frequently, manufacturers of reagents for these instruments provide the equipment at no cost or a nominal fee if the purchaser agrees to purchase the reagents from them. Trained laboratory staff, however, are required. Most, if not all, manufacturers also provide staff training on the use of their drug testing products.

Thus, although the costs per test are low for instrument testing, consideration must also be given to the initial costs for equipment and the need for trained staff, facilities to house the equipment, and "plant" facility requirements (electricity, water, waste).

Non-Instrument Testing: Point-of-Contact Tests

Non-instrument testing is analysis that involves devices that require manual sampling and manual observation to produce a qualitative result (either negative or positive.) Point-of-contact testing utilizes a non-instrument device to analyze a sample at the point of collection. Non-instrumental test devices have improved significantly in recent years and can be useful if handled by properly trained staff. Although non-instrument testing does not provide the intricate level of information that can be obtained with instrumental readouts, these tests provide quick and relatively accurate results and the supplies are easy to store and use. Cost per non-instrument test tends to be higher than the cost per instrumental test but these costs need to be considered in terms of the total volume of tests being conducted and the alternative costs that would be incurred with instrument testing. Storage of specimens and retrieval of test results may also present a problem if specific provision is not made to address these requirements.

As with instrument testing, staff training is essential to accurately and consistently interpret test results. Relying on a visual detection of a color result can lead to misinterpretation of results for a number of reasons, including color acuity, color perception, and lighting. Care must also be taken to ensure that staff are not color blind. Skill in interpretation is required for weak positives in particular.

Role of Breathalyzers™ in Drug Testing Programs

Breathalyzers, which can be used with considerable frequency and at relatively minimal cost, can be particularly useful in detecting the presence and amount of alcohol that may not otherwise be detected through random urinalysis because of alcohol's relatively short lifespan in the human system. Breathalyzers can therefore be a very effective and a relatively low-cost component of a drug court drug testing program, used in conjunction with urine testing for other substances. The Breathalyzer must be calibrated according to certification standards established by the U.S. Departments of Transportation (DOT) and Health and Human Services (HHS) and/or the State toxicologist. The test must be administered by breath alcohol technicians who are trained in the use and interpretation of breath alcohol results. Local drug court officials may wish to contact their local law enforcement agencies regarding the use of Breathalyzers in their local jurisdiction for requirements such as calibration settings, interpretation of test results, and the expertise available to administer and/or provide training on Breathalyzer testing.

Urine testing, through both instrumental and non-instrumental devices, is also an accurate and reliable method for detecting the presence of alcohol if performed within the relatively short period following ingestion in which it can be detected. Because alcohol is more concentrated in urine than in blood, urine is the best specimen to use if one wants to determine if alcohol has been consumed.

Testing for Special Substances

Inhalants

Testing for inhalants, a chromatographic process, is more complicated than the process required for detecting the presence of other substances and must be conducted by a forensic expert. This process entails taking a sample of blood or urine (blood is preferred) and analyzing the gases emitted. Because of the volatility of the vapors, it is often difficult to detect the presence of inhalants with any consistency because often they are present in only small amounts. To date, no quick point-of-contact tests have been devised to detect inhalants.

Tobacco

In many States, juvenile drug courts are considering restricting tobacco use by participants who are below the age permitted to purchase or use tobacco products. Testing for tobacco use involves primarily testing for the presence of nicotine, which can remain in the system for some time depending upon the frequency of use. Drug court officials interested in testing for tobacco usage by participants should explore products available from drug testing equipment manufacturers and distributors.

Considerations in Selecting the Appropriate Testing Method for Individual Drug Court Programs

To determine the methodology that best meets the needs of a particular drug court program, several factors must be considered, the most significant of which include the following:

- the volume of tests that will be conducted;
- the drugs that will be analyzed;
- the number of trained individuals available to conduct the analysis;
- the availability of automated instruments;
- the turnaround time needed for obtaining test results;
- the need for confirmation of test results and the frequency of and conditions for confirmation;
- the quantification of levels of drugs required.

For jurisdictions with limited resources that are conducting only a small number of tests (e.g., less than 10,000 annually), consideration might be given to:

- using a point-of-contact testing methodology for routine tests, with instrument confirmation and analysis conducted by an outside laboratory on an as-needed basis;
- identifying other entities that conduct drug testing and pooling resources to develop the most cost-effective strategy for meeting these multiagency drug testing needs (State and local probation departments, for example, frequently conduct a high volume of drug tests for defendants under probation supervision and can add the drug court testing component to their existing operations.);
- identifying other agencies that might be willing to join with the drug court in developing a cost-effective drug testing capability.

For jurisdictions that have decided to use non-instrument methodologies, consideration should also be given to:

- the types of drugs being tested for and the non-instrument methodology most accurate for detecting these drugs;
- developing policies regarding confirmatory testing (Will confirmations be made for all positive tests or only in situations in which the test result is challenged? Who will pay for the test if the positive test result is confirmed? Negated?);
- special procedures, in addition to those in place for the drug testing process generally, that can be used to detect adulteration.

3. Critical Components of a Drug Court Drug Testing Program

Ensuring Adequate Staffing

The drug testing component, regardless of the methodology used, should be staffed by qualified and trained employees who can perform the duties to which they are assigned and are prepared to testify in court regarding the testing process and protocols used. Two types of witnesses may be required: *lay* and *expert*. A *lay* witness may be called to testify about objective facts (e.g., the procedures used to collect specimens) and is generally not asked to interpret test results or to give an opinion. The *expert* witness may be called upon to voluntarily share some specialized knowledge that may aid the court in determining the validity of the testing procedure or interpreting the test results. The expert witness is rarely used in drug court programs because the drug testing conducted is primarily for supervision and monitoring purposes—rather than for prosecution—and drug court participants generally have already agreed to participate in the drug testing program and to the sanctions that may be imposed for a positive test result. The lay witness, however, may be used more frequently if questions arise regarding the procedures used to collect and test the specimen. For this reason, documented specimen collection procedures and ongoing training at all levels are essential for the drug testing program. Line staff must be trained thoroughly in the day-to-day procedures of the program as well as in handling common situations that may occur—such as hearing a participant stating he or she is unable to provide a sample or observing an adulteration.

Maintaining the Integrity of the Process

The reliability of a drug court drug testing system is dependent upon sample integrity. To ensure sample integrity, effective techniques must be instituted—and practiced—regarding sample collection, testing, and adulteration detection. Establishment of an airtight chain of custody system, documented in writing, ensures test results in which the drug court judge can have confidence. Such a system requires that each step in the collection process—from specimen collection and transport through the testing process to the validity of the test result—be documented, from the time the defendant checks in to submit the sample to its final disposition. The chain of custody process should document who performed the critical functions entailed in the drug testing process and when they occurred, including:

- the client reporting for testing and his or her being checked in;
- the sample collection;
- the examination of the sample for signs of tampering or adulteration;
- the transportation of the sample to the laboratory;
- the actual testing of the sample;
- followup tests that were performed;
- the review of the results;
- the recording of the results.

It is important that specimens should be kept in a limited access security area and, ideally, refrigerated, if they are not tested within a few days, or frozen, if longer storage is expected.

Direct observation of the sample submission is also essential. This step requires that the observer and the donor be of the same gender.

Upon entry into the drug court program, participants should execute their agreement to comply with the drug court program drug testing requirements, including the submission of observed urine samples. Additionally, clearly defined policies and procedures must be in place for all aspects of the drug testing process, including orientation for the participant regarding the drug testing program; collection of the sample; examination of the sample for signs of tampering or adulteration; chain of custody requirements for the sample; policies regarding confirmation of test results; sample storage; persons to whom drug tests will be reported and under what circumstances and by which staff member; staff training;

and dealing with common situations that may occur (e.g., participant is unable to void).

Detecting Adulteration

Screening for Common Methods of Adulterated Specimens

Even if the specimen collected is the urine of the client, a variety of techniques can be used to adulterate the specimen to achieve an erroneous reading. Although adulteration detection procedures may not ensure complete detection in every instance, they can alert staff to the most common methods that may be employed and can significantly enhance the integrity of the drug testing process. This section provides discussion of common adulteration techniques observed by drug court personnel.

Waterloading
Waterloading refers to an individual's dilution of his or her urine by drinking large volumes of fluids, usually water. It is one of the most common adulteration techniques and one of the most difficult to detect unless the technician is experienced in detecting waterloaded specimens. Running parallel tests for creatinine concentration levels (see Submission of Another's Specimen below) can detect waterloading.

Addition of Common Household Products
Tampering with a specimen by introducing common household products, such as bleach, Drano, and peroxide, to alter the chemical composition of urine can produce a false negative. However, skilled forensic experts can often detect these adulteration attempts. Bleach, for example, will give off a recognizable odor. Drano may make the urine more basic (less acidic) and may also make it unusually warm—even bubbly. Metal shavings may also be detected. KLEAR has been aggressively marketed as a product that, when added to a urine sample, produces a negative result. The presence of KLEAR, however, can be detected through analysis of nitrite levels if the confirmatory tests are run immediately.

Other adulteration techniques are being continually developed and marketed, and scientists are trying to develop new techniques for adulterant detection.

Submission of Another's Specimen
Carefully designed and documented observation of each person's provision of his or her specimen, coupled with established chain of custody procedures, are critical to detecting situations in which a participant may attempt to substitute the urine of another person for his or her own.

Use of Diuretics
A number of teas, milkshakes, fruit juices, and other concoctions act as diuretics that can potentially decrease the retention time for drugs in the system. Most of these products also require the ingestion of large amounts of water, which may result in diluting the urine to such a degree that the presence of drugs falls below drug testing cutoff levels.

There are a variety of other adulteration techniques that clients use from time to time. Publications have been written with suggested adulteration strategies, and several Web pages are devoted to the topic. Program officials need to recognize that, despite their most conscientious efforts, some adulteration may occur undetected. However, careful interpretation of drug test results, coupled with observations of potential clinical signs of drug use (see table 2), reduces the likelihood that adulteration can occur with any frequency.

Checking for Temperature, Color, and Other Evidence of Tampering

Standard procedures should be instituted to detect evidence of tampering at the time of initial collection of the specimen, including observing the color and appearance and detecting odor of the sample. For example, ingestion of Vitamin B_1 (which some drug court clients may be taking to rebuild and rebalance their body's system that has been worn down by years of abuse) gives a bright yellow color to the urine, but an experienced technician can detect that it is quite different from the yellow color of unadulterated urine. Followup analysis should then be performed through additional tests for specific gravity, pH levels, creatinine, and possibly even nitrates. Urine should be a light to golden yellow, free from foreign materials, and have a slight ammonia odor. Samples that are colorless or very pale yellow should be suspect. The average temperature of a freshly voided urine sample is 90 to 100 degrees Fahrenheit (32.2 to 37.8 degrees Celsius); samples outside this range should be suspect. Normal urine has a pH of 5 to 8; specimens above or below this value should be suspect. Measures should also be taken to detect possible waterloading. Two particular tests may be useful.

- A test for *specific gravity*, which compares the density of a drop of water to the density of a drop of urine. If the weight of the urine is below a certain

level, it is indicative that the urine has been diluted. Samples with a specific gravity under 1.003 should be suspect.

- A test to measure the *creatinine* level. Creatinine is a metabolic product normally excreted in the urine by the kidneys. Its concentration in the urine is affected

Table 2. Retention/Detection Time: Drugs of Abuse*

Drug Type	Approximate Detection Time	Clinical Effects
STIMULANTS		
Amphetamine/ Methamphetamine	In urine: 1–2 days	Increased heart rate; elevated blood pressure; appetite suppression; elevated temperature; heart palpitations; restlessness; euphoria; heightened sense of well-being; depression; sedation
Cocaine	In urine: 2–4 days	Central nervous system stimulation; rapid heart rate; elevated blood pressure; dilated pupils; mood elevation; inflated self-image; paranoid delusions; impaired performance because of overestimation of abilities; euphoria followed by anxiety and drug craving; paranoia and delusions; depression; heart failure; seizures
HALLUCINOGENS		
Marijuana	Light smoker (1–2 joints/week): 2–3 days Moderate smoker (4 times/week): 5–7 days Heavy smoker (daily): 10–15 days Chronic use (more than 5 joints/day): 14–30 days	Increased cardiac output; increased pulse rate increased appetite; decreased coordination; euphoria; apathy; hallucinations; intoxicated appearance
LSD	2–5 days	Vomiting; diarrhea; flashbacks; dilated pupils; salivation; tremors; decreased coordination; visual illusions; panic attacks; euphoria
Phencyclidine (PCP)	14 days Chronic users: up to 30 days	Elevated blood pressure; sweating; involuntary rapid movements of the eyeball; nausea and vomiting; extreme aggressive behavior; euphoria; intoxicated appearance
NARCOTICS/ANALGESICS/OPIATES		
Opiates (including heroin, morphine, codeine)	3 days May be longer for chronic users	Central nervous system depression; dizziness; lightheadedness; sedation; weakness; nausea and vomiting; euphoria; drowsiness
Methadone	3 days	Central nervous system depression; suppressed pain sensation; lightheadedness; dizziness; urinary retention; reduced respiratory rate
Propoxyphene (Darvon, etc.)	6 hours to 2 days	Blurred vision; headache; nausea and vomiting; euphoria; intoxication; mild depression; seizures; confusion; hallucinations; delusions
DEPRESSANTS/SEDATIVES/HYPNOTICS		
Barbiturate	In urine: 2–4 days and up to 30 days In serum and plasma: 2–3 days	Central nervous system depression; decreased heart rate; euphoria; decreased mental acuity; slowed speech
Benzodiazepine	In urine: up to 30 days Chronic users (1 or more years): 4–6 weeks In serum and plasma: 12 hours to 2 days	Depression; drowsiness; dizziness; lightheadedness; nausea; dry mouth; lethargy; fatigue
Methaqualone	14 days	Decreased myocardial contractility; headache; dry mouth; loss of appetite; nausea and vomiting; euphoria; depression of brain's emotional inhibitory centers
Ethyl Alcohol	In urine: 1–24 hours In serum and plasma: 1–12 hours	Intoxication; depression of reflexes; depression of heart rate; lethargy; loss of inhibitions; sleepiness; insomnia; aggressive behavior; coma

** Detection times are based on the use of standard cutoffs.*

by fluid intake. If the creatinine level of a urine sample falls below a certain level, it is indicative that the client consumed large quantities of fluids prior to giving the sample. Values less than 20 milligrams per deciliter may be an indication of waterloading.

Additional Tips

A few additional tips for drug court officials to avert adulteration include requiring:

- observed monitoring of all submissions;
- the submission of a minimum amount of urine;
- set time limits for providing a specimen (e.g., 1 hour or less from the time of test notification to the time of collection) to minimize the possibility of internal dilution;
- limited access to fluids prior to providing the specimen.[3]

Determining Appropriate Testing Frequency

Determining the appropriate drug testing frequency for any drug court program will depend upon the resources available, the testing methodology being used, and the characteristics of the drugs being tested for. Most drug courts develop a standard policy regarding drug testing frequency (e.g., twice weekly during the first phase, weekly during the second phase) but also increase the required frequency on a case-by-case basis for individuals who need more frequent testing.

In developing a drug testing schedule, special attention should be paid to the length of time particular drugs remain detectable using the selected assay cutoff. As table 2 illustrates, developing a meaningful testing frequency for individual drugs that have a relatively long elimination half-life will require the capacity to determine the quantitative levels of the drugs initially detected, and subsequently tested for, so that even though a positive test may be the result, a declining level may still indicate cessation of use. This assessment of declining levels may be difficult to do in practice because of the key role of dilution. To interpret such test results and determine whether they reflect renewed use, the tester needs both the drug/metabolite levels and the creatinine levels along with a knowledge of pharmacokinetics. Although such interpretation may be possible, it cannot be undertaken simply by looking at instrument-based results.

The retention/detection timeframes in table 2 provide a general framework for determining appropriate testing frequency for specific drugs. Reference should also be made to the special retention characteristics of drugs used in the local community (see Establishing Cutoff Levels for the Drug Court Program).

Spot Testing

Spot tests are unscheduled tests usually conducted by treatment or case management staff when they suspect that the client may be under the influence of a drug or alcohol. Some drug courts use the same testing methods for spot testing as are used in the regular drug testing program. Others, for reasons primarily relating to logistics and costs, have adopted special testing methods. In determining how best to conduct spot testing, consideration should be given to the level of accuracy required, the immediacy with which test results are needed, costs, and the volume of testing that will be conducted.

Random Testing

Unless drug testing is conducted frequently—a practice most programs cannot afford—there is a possibility that clients could ingest drugs without detection. Random testing prevents participants from planning ahead and avoiding detection. A variety of randomized procedures have been instituted by various programs, the most common of which requires a defendant to call in each morning to ascertain whether his or her number or color is scheduled for testing that day. Persons whose number or color is chosen are then given no more than 10 to 12 hours to report to a testing center.

Using Confirmation Testing

For urine drug screens, immunoassay testing is readily available for a quick, qualitative result. However, confirmation may be requested, or required, for positive results, particularly if a sanction is to be imposed or the test is to be used for prosecution purposes. Many programs use GC/MS for confirmation (see Testing Technologies in chapter 2). It should be noted, however, that for most drug court programs confirmation testing is performed in relatively few instances because the purpose of drug testing in drug courts is primarily to monitor a participant's progress in treatment. Many programs charge the participant for the confirmation test if the positive test is confirmed; if the test is not confirmed, however, the program pays.

Although requests for confirmation of positive drug tests are generally much less frequent than in traditional criminal justice drug testing programs, every program should have the capacity for confirmation testing, particularly if sanctions may be imposed for positive test results. Given the high volume of drug tests conducted by drug courts (significantly higher than for persons under standard probation supervision) and the relative frequency of positive test results (drug courts are aimed at persons with significant substance involvement), drug courts should develop policies regarding confirmation testing, including the timeframe for requesting confirmation (see Maintaining Specimens for Retesting, below) and payment responsibility for the confirmation test. It should be noted that there may be valid reasons for an initial positive test to fail to confirm upon subsequent confirmation testing at another laboratory that may not reflect any deficiency in either the onsite or confirmation laboratory results. However, any significant frequency of unconfirmed tests should signal the need for prompt review of the entire drug testing procedure.

Maintaining Specimens for Retesting

Samples should be kept long enough to reconcile any legal challenges to the test results. As noted above, every drug court should establish a policy regarding confirmation testing and the timeframe in which requests for confirmation must be made. Two weeks to one month should be adequate in a program with frequent testing and prompt responses to new drug use. Specimens should be stored at temperatures between 2 and 8 degrees Celsius but at –20 degrees Celsius if kept longer than 1 week.

Obtaining Accurate and Meaningful Interpretation of Results

Establishing Cutoff Levels for the Drug Court Program

Drug test results are generally reported as positive or negative. The positive or negative finding reflects a determination of whether the specimen is equal to or exceeds the *cutoff concentration levels* that have been established. These cutoff concentration levels must take into account that some small traces of a drug metabolite may be present in a person's system without a determination that the individual has used illegal drugs (e.g., opiate levels below 2,000 ng/ml may be associated with the ingestion of poppy seeds and not necessarily indicative of heroin use). Cutoff levels should therefore be adequate to screen out false positives (i.e., positives that would not be confirmed upon further testing). Positive drug test results from passive inhalation or accidental exposure are extremely unlikely if the cutoff levels established are sufficient to screen out trace drug metabolites.

Each drug court must establish the cutoff values to determine whether a test result is positive or negative. This cutoff value should set the quantitative level at and above which it is deemed that the test is *presumptively* positive and below which indicates a negative result. Cutoffs, therefore, are quantitative values regarding the amount of drug present in the specimen that set the point at which a urine sample is reported as positive. Setting the appropriate cutoff value should also account for accidental exposure and/or passive inhalation to avoid the possibility of false positives.

Cutoff values have been developed by professionals in forensic toxicology for various organizations. The tables in the appendix list the various cutoff guidelines used for screening and confirmation by SAMHSA for workplace testing, DOD for military testing, and the D.C. Pretrial Services Agency for testing of defendants in the D.C. Superior Court for initial screening and for subsequent confirmation.

Addressing "Spiking" Situations

Spiking—a situation in which the quantitative level of a drug may appear to increase because of changing concentration levels of a drug in urine due to the individual's metabolic factors rather than new use—is a phenomenon that must be considered in interpreting drug test results. For example, urine may be more concentrated due to the time of day the sample is taken or because of increased physical activity by the participant, thereby resulting in a quantitative increase in the level of drugs detected even if there has been no resumption of use. The quantitative level of a particular drug must be assessed given the creatinine level in the urine, which can provide an indication of the level of urine concentration. By looking at the creatinine level as well as the drug concentration level, a *normalization value* (the ratio of the drug level to the creatinine level) for an individual can be determined and subsequently compared to normalization levels taken previously.

EXAMPLE

Three successive drug tests are conducted on the same individual with the following results:

Test 1 cocaine level: 200 mg	Creatinine level: 100 mg	Normalization level = 2.0
Test 2 cocaine level: 160 mg	Creatinine level: 100 mg	Normalization level = 1.6
Test 3 cocaine level: 200 mg	Creatinine level: 300 mg	Normalization level = 0.67

Although the cocaine level detected in test 1 in the example remained the same in test 3, the normalization levels, which take into account the relative concentration of the urine, indicate a steady decline in concentration. Although the normalization levels appear to be declining, this decline does not necessarily rule out new drug use. Programs must adopt guidelines regarding the period after which a continued positive reading is indicative of new use.

Understanding the Drug Use Characteristics in the Local Jurisdiction

Uniform guidelines can be developed regarding cutoff levels, but each program must conduct research on its local population to determine how long specific drugs available in the locale remain in the human system. This retention period is frequently affected by the strength of the drugs commonly available in the locale, the drug use history of the individual user, and the user's physical size.

Determining an Acceptable Error Rate for the Testing Program

The integrity of a drug testing program depends upon reliable test results in which the court can have confidence. The program's error rate—the rate of false positives as well as the frequency with which the presence of drugs is not accurately detected—should be extremely low. Testing methodologies should be checked daily, with test samples conducted to ensure that the testing procedures are both detecting the presence of drugs and not falsely reporting the presence of drugs. For example, screening tests should be run periodically (ideally daily) to include one negative, one strong positive, one specimen at 75 percent of cutoff value, one specimen at 125 percent of cutoff value, and one blind control specimen that alternates between positive and negative. The purpose of having controls 75 percent below and 125 percent above cutoff is to test the assay's ability to identify positive tests that are close to the cutoff.

Development and Periodic Updating of Procedures Manual Documenting All Aspects of the Drug Testing Process

A complete policy and procedures manual that describes the entire drug testing process should be prepared, reviewed with staff—initially and regularly—and updated periodically. Every step of the drug testing process must be documented in the policy and procedures manual. The manual should be used to orient new staff members as well as to train staff periodically. The policy and procedures manual should also be referenced on an ongoing basis as questions arise. Procedures must be in place, for example, to detect samples with low or high temperatures (which can be measured using temperature strips or thermometers), low creatinine levels (which can be measured with both automated instrumental and non-instrumental devices), and acidity levels (which can be detected with dipsticks, pH meters, or automated analyzers). Policies and procedures should also be articulated for handling common situations that may occur, such as participants who state they are unable to provide a sample.

The procedures manual should also include the required reagents for each drug tested, applicable quality control procedures, and steps for interpreting the test results. Proficiency testing should be conducted periodically to ensure that the entire drug testing process is operating as intended.

Defendant Agreements To Comply With Drug Testing Program Requirements and for Release of Information

Each participant who enters the drug court program should execute a written agreement acknowledging the requirements of the drug testing component of the drug court program and his or her agreement to comply with drug testing program requirements. The requirements should include required submission of urine samples, compliance with observed testing protocols, and waiver of confidentiality claims to the test results insofar as their transmittal to the drug court judge is concerned. The agreement should require the participant to disclose any prescription or other medications he or she is taking (see also Develop Contracts With Participants That Increase Responsibility for Eliminating Situations That Challenge the Test Results in chapter 4).

4. Tips For Promoting an Effective Drug Court Drug Testing Program

Educate and Train Everyone Involved About the Process and Procedures

In addition to staff training regarding program policies and procedures, everyone involved with the drug court program should be informed about drug testing policies and procedures, factors that need to be considered in interpreting results, drug test result patterns emerging and any significant implications they may have for justice system or treatment staff, and other issues that may surface as the drug testing program becomes operational.

Anticipate Situations That May Occur

Everyone involved with the drug testing program should be aware of procedures for responding to situations that may frequently occur, such as an individual being unable to provide a sample, a claim that a positive drug test resulted from inhalation or ingestion of other (legal) substances, or an individual providing a sample that is clearly adulterated.

Recognize Situations That Can Create Positive Test Results That Challenge the Integrity of the Testing Process

Situations can occur that may result in positive drug tests that potentially do not reflect illegal drug use. Many of these situations can be anticipated and avoided. For example, a number of prescription drugs can cause a positive result. Participants should be required to disclose at the time of program entry all medications they may be taking—prescribed as well as over the counter. Drug court program officials should consult with physicians to alert them to the participants' involvement with the program and their addiction and ask them to prescribe nonnarcotic medications, if possible.

Prescription medications when used as instructed can produce true positive test results (e.g., codeine in prescription cough syrup or pain relievers; prescription amphetamines for obesity or attention deficit hyperactivity disorder). The *Physicians' Desk Reference* provides a list of more than 350 medications that may produce positive test results for amphetamines, PCP, cocaine, or opiates, ranging from cough suppressants and antihistamines to antibiotics and medications for asthma, hypertension, lymphomas, and irregular heartbeat. Some over-the-counter medications may produce positive test results when misused or taken in amounts above the recommended dosage. Information regarding these various medications is usually detailed in the test assays' package inserts and is well known to testing experts who can assist drug court officials in learning about these possibilities and interpreting any questionable results. The medical history of each participant should be carefully reviewed, and any medications that can produce a positive test result should be identified.

Strategies must also be developed to expedite the flushing of the system of defendants who have been chronic drug users to avoid difficulties in distinguishing between *residual* use and *new* use. These strategies might include increased monitoring of participants and stricter procedures regarding the scheduling of drug court specimen collection. For example, scheduling defendants to provide urine specimens only in the morning, when their urine should be at its highest level of concentration, would obviate the potential ambiguities in drug test results that can occur when specimens are voided later in the day (see chapter 3).

Develop Contracts With Participants That Increase Responsibility for Eliminating Situations That Challenge the Test Results

The drug court contract that participants sign should also include a provision stating that they agree to refrain (1) from being in environments where drugs are used because passive smoke could affect their results; (2) from eating poppy seeds; and (3) from participating in activities (e.g., using toiletries, over-the-counter medications, or other products) that could create a false positive. Complying with such a provision would decrease the chances of false positives.

Document All Policies and Procedures in Writing

Every aspect of the drug testing program should be documented in the policy and procedures manual. As new situations arise, they and their appropriate responses should be included in the manual. Areas where discretion may be exercised, such as spot testing, should be clearly explained.

A written summary of the drug testing program and salient policies and procedures, including any modifications that are made, should also be explained to participants, their counsel, and others who may be involved in the drug court program.

5. Estimating Drug Testing Costs

Drug testing technology is changing rapidly, as are associated costs. Budget estimates for drug testing should therefore be based on costs at the time the budget is being prepared. Currently the costs of supplies to maintain a point-of-contact testing process and the costs of instrument analysis vary because of many factors, including different pricing structures used by different manufacturers. Each drug court should consider all opportunities for conducting drug testing of participants to procure the most cost-effective urine monitoring system for its program.

Drug testing costs are not necessarily fixed price services. Like any contractual service, the specific costs for drug testing should be negotiated with prospective vendors, taking into account the volume of tests to be conducted and the degree to which the drug court drug testing activities provide a marketing opportunity for the vendor in the local community.

Jurisdictions exploring the feasibility of instrument testing should keep in mind that although the cost for procuring equipment to produce instrument analysis may initially appear substantial, some economies can be realized through the purchase of used equipment or smaller table-model types (see question 1 in chapter 7, Frequently Asked Questions). Additional costs for supplies need to be budgeted for each test.

Regardless of the type of methodology, additional costs for staffing, training, facilities, and storage of specimens should be calculated. A Breathalyzer is also a critical component of drug testing programs, and costs for purchasing new Breathalyzers should be considered.

Determining the appropriate costs for drug testing functions should be made after considering many factors. Relative costs are not the sole indicators of the quality of the process for the drug court's purposes, and local officials should investigate the degree to which alternative processes meet the drug court's needs, over both the short term and the long term. Preliminary questions to raise with distributors of drug court supplies for point-of-contact systems are listed in chapter 6, and a suggested strategy for developing a drug testing budget is provided in the response to question 1 in the Frequently Asked Questions chapter.

6. Questions To Ask Drug Testing Equipment and/or Supply Vendors

The following is a list of suggested questions to guide drug courts in their initial inquiries with vendors of drug testing equipment and/or supplies.

- What supplies are needed to conduct the drug testing? What are their costs?
- What staff and facilities will be needed to conduct the testing, store supplies and samples, etc.?
- What is the methodology used to produce the test results? Who interprets the results? What staff training is needed? How are test results recorded? How are test results reported to the court?
- How quickly can test results be obtained?
- What potential for error is associated with producing drug test results? Reading the test results?
- Is the test more accurate for some types of drugs than for others?
- What type of confirmation process is required? Suggested?
- How much does each test cost? What does this cost include? What additional costs associated with the drug testing process need to be budgeted?
- How many drugs can the methodology test for at once?

7. Frequently Asked Questions

Question 1: We are a small community. How much should we budget for drug testing?

Response: To determine the costs for drug testing, you will need to consider the following:

a. How many tests will you be doing monthly or weekly?

   If, for example, you conduct 2 tests each week per person for the first 120 days and then weekly for the next 8 months and you have approximately 50 persons in the program during this period, you will conduct approximately 3,300 tests during the year.

   (2 tests x 17 weeks x 50 persons)
   + (32 weeks x 50 persons) = 3,300 tests during the year.

b. At a very rough estimated cost of $5 to $15 per specimen for a full (5 to 7) test panel, you will need to budget (the cost per screen currently runs between $5 and $20)

   3,300 drug tests x $5 to $15 = $16,500 to $49,500.

   Non-Instrument Point-of-Contact Testing

   $16,500 to $49,500 for drug testing supplies if a point-of-contact system is used.

   Additional costs for the following must also be included:

   - staff to conduct the drug testing program;
   - facilities for sample collection and analysis;
   - training of staff conducting the drug testing and for educating others involved in the program.

   Instrument Testing

   Instruments geared to perform a small volume of tests are available. They do not require much space (some fit on a tabletop), are easy to work with, and require only distilled water or other readily accessible reagents. The purchase cost for these instruments usually begins at approximately $20,000 and increases depending upon the volume and capabilities of the system. Most manufacturers provide staff training. These instruments generally provide more reliable, cost-effective testing results than a dipstick method.

   Several manufacturers have special incentive programs for instrument purchases or leases. These manufacturers should be consulted regarding current market prices. Used machinery is also available.

   Additional costs for alcohol testing

   Breathalyzers are an important component of your drug testing program because they identify the level of alcohol in the system, whereas most urine testing techniques only detect the presence or absence of alcohol. If determining the degree of intoxication is important, a Breathalyzer should be used together with a urine test.

To determine the most appropriate drug testing strategy for your program, you should also consider contacting other nearby agencies that either are conducting drug testing or are in the planning stages. Other criminal justice agencies, as well as health departments, businesses, and other entities may be interested in pooling resources to develop a drug testing program that can take advantage of the cost savings provided by high-volume systems.

Question 2: How long should we keep samples?

Response: Samples should be retained as long as there is a possibility of a challenge or a hearing on a result. Some programs retain samples for 14 to 30 days. Private organizations may keep them for a year or more. Because drug testing in drug courts is used primarily to monitor participants' progress in treatment and the degree to which they have stopped using drugs, requests for confirmation of positive drug tests are generally more infrequent than in traditional criminal justice drug testing programs. Each drug court program should develop a policy regarding a reasonable period for retaining samples that is consistent with the timeframe in which requests for confirmation testing can be made.

Question 3: How frequently should we drug test?

Response: Generally, random testing should occur twice or more each week in the initial phase of a client's

participation in a drug court program and decrease to once weekly if the client demonstrates progress in treatment and improvements in drug test results. Hair and sweat patch testing may be useful after prolonged abstinence.

Question 4: What is an acceptable error rate for a drug court drug testing program?

Response: With a well-managed testing system, all errors should be detected and reconciled before the testing program begins operation. The level of accuracy for drug test results in any given program should, therefore, be as close to 100 percent as possible for the court and others involved in the drug court program to have confidence in the drug testing program and its results. Testing methodologies should be checked daily to ensure that the testing procedures are both detecting the presence of drugs and not falsely reporting the presence of drugs. If false positives should occur, they should be promptly tracked and the underlying reasons for the false positive should be identified and addressed immediately.

Question 5: What special issues should we be concerned with when testing juveniles in a drug court program?

Response: The testing process for juveniles is identical to that for adults. The types of drug used or detected, however, may differ. For example, special procedures may apply to testing for inhalants or for high volumes of over-the-counter medications that juveniles may use more regularly than adults. The other principal issue regarding drug testing of juveniles concerns requirements for parental consent. Jurisdictions planning to implement a juvenile drug court should review applicable State statutes concerning who must consent to medical procedures for juveniles. The mature minor rule of some States permit minors over a specified age or maturity level to consent to medical procedures without parental consent. Other States limit these provisions to health care relating to substance abuse, mental health, or sexual activity. Still other States require the consent of a parent or legal guardian prior to any medical treatment of a minor. Determination also should be made of whether drug testing is considered a medical procedure under State statute.

Appendix: Drug Test Cutoff Values

Drug Test Cutoff Values Developed by Different Organizations: Screening			
Drug	**SAMSHA**	**DOD**	**D.C. Pretrial**
Amphetamine	1,000 ng/ml	1,000 ng/ml	1,000 ng/ml
Cocaine	300 ng/ml	150 ng/ml	150 ng/ml
Opiates	2,000 ng/ml	2,000 ng/ml	300 ng/ml*
Phencyclidine	25 ng/ml	25 ng/ml	25 ng/ml
Marijuana	50 ng/ml	50 ng/ml	50 ng/ml
Methadone	—	300 ng/ml	300 ng/ml
Benzodiazepine			200 ng/ml
Barbiturates		200 ng/ml	200 ng/ml
LSD		200 ng/ml	500 pg/ml
Propoxyphene		500 pg/ml	300 ng/ml

ng/ml = nanograms per milliliter.

**Possible to change to 2,000 ng/ml.*

Drug Test Cutoff Values Developed by Different Organizations: Confirmation*			
Drug	**SAMSHA**	**DOD**	**D.C. Pretrial**
Amphetamine	500 ng/ml	500 ng/ml	500 ng/ml
Methamphetamine	500 ng/ml†	500 ng/ml†	500 ng/ml
Cocaine	150 ng/ml	100 ng/ml	100 ng/ml
Opiates	2,000 ng/ml	2,000 ng/ml	300 ng/ml
Phencyclidine	25 ng/ml	25 ng/ml	25 ng/ml
Marijuana	15 ng/ml	15 ng/ml	15 ng/ml
Methadone		300 ng/ml	300 ng/ml
Benzodiazepine		200 ng/ml	200 ng/ml
Barbiturates		200 ng/ml	200 ng/ml
LSD		500 ng/ml	500 ng/ml‡
Propoxyphene			300 ng/ml

ng/ml = nanograms per milliliter.

** Levels established for confirmation are lower than levels established for screening because two entirely different testing methods are used.*

† Must also have amphetamines at 200 ng/ml as well as methamphetamine at 500 ng/ml.

‡ Possible to change to 2,000 ng/ml.

Notes

1. More than 400 published articles deal with the analysis of hair for evidence of drug use, with no apparent consensus on the agreed interpretation of quantitative results.

2. See Matthew H. Slawson, Diane G. Wilkins, Padger L. Foltz, and Douglas E. Rollin, "Quantitative Determination of Phencyclidine in Pigmented and Nonpigmented Hair by Ion-Trap Mass Spectrometry," *Journal of Analytical Toxicology*, 20 (October 1996): 350–354; Robert E. Joseph, Jr., Tsung-Ping Su, and Edward J. Cone, "In Vitro Binding Studies of Drugs to Hair: Influence of Madanim and Lipids in Cocaine Binding to Caucasoid and Africoid Hair," *Journal of Analytical Toxicology*, 20 (October 1996): 338–346.

3. Current HHS and DOT procedures permit 40 ounces of water distributed during the 3 hours preceding the test.

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