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ORIGINAL ARTICLE

# Clinical and Public Health Considerations in Urine Drug Testing to Identify and Treat Substance Use

Andrea G. Barthwell

Encounter Medical Group, Oak Park, Illinois, USA

**ABSTRACT**

*Background*: To expand appropriate use of substance use testing, practitioners must increase their knowledge of the appropriate methodology, scope, and frequency. Yet, there is a current lack of accepted guidelines on clinical testing to identify and treat substance use. *Objectives*: This article (1) conveys the importance of substance use testing as a clinical and public health response to trends of prescription drug abuse and increased access to medical and commercialized marijuana; (2) summarizes central features of the rapidly evolving science and the practice of patient-centered substance use testing in a clinical setting; and (3) provides recommendations that balance costs and benefits and serve as a starting point for appropriate testing to prevent, identify, and treat substance use disorders. *Methods*: The author conducted a search of peer-reviewed and government-supported articles and books in electronic databases and used her own knowledge and clinical experience. *Results*: The author makes recommendations for determining the methodology, scope, and frequency of testing in each stage of care based on clinical considerations and methodological factors. *Conclusion/Importance*: Integrating sensible substance use testing broadly into clinical health care to identify substance use, diagnose substance use disorders, and guide patients into treatment can improve health outcomes and reduce the costs of substance use and addiction. No single testing regimen is suitable for all clinical scenarios; rather, a multitude of options, as discussed herein, can be adapted to meet a patient's unique needs. Ultimately, the practitioner must combine patient-specific information with knowledge of test technologies, capabilities, limitations, and costs.

**KEYWORDS**

Urine drug testing; substance use disorder; substance abuse; diagnosis; treatment; recovery; immunoassay; chromatography-mass-spectrometry



## Introduction

### *Terminology*

Imprecise terminology currently in use has contributed to health care industry-wide confusion over the proper method selection and medical uses in testing for substance use (TSU).* The author has defined certain terminology prone to ambiguity. An asterisk [*] denotes such a definition, which can be found in the Glossary.

The use of the term "TSU in addiction medicine" (and variations thereof) herein refers to the use of TSU in any medical practice setting for substance use* screening* and diagnosis purposes, in addition to care provided by practitioners with specialized education, training, and experience in treating substance use disorder (SUD).

### *Overview*

The bounds of medical necessity of TSU in identifying substance use and treating SUDs are currently being defined (Owen, Burton, Schade, & Passik, 2012). Although TSU alone cannot identify SUDs or physical dependence, when used and interpreted correctly, TSU can provide objective data that health care practitioners may employ in the diagnosis, active treatment, and chronic care stages of addiction medicine (American Society of Addiction Medicine [ASAM], 2013). Determining the most appropriate test method and interpreting test results are complicated tasks, and mistakes can yield serious consequences for patients, providers, and payers (Substance Abuse and Mental Health Services Administration [SAMHSA], 2012).

Two trends have precipitated the need for increased TSU education for practitioners: the prescription drug abuse* epidemic and the legalization, availability, and increased use of marijuana. Of the 20.6 million Americans who suffer from SUDs each year, an estimated 90 percent of them go untreated (SAMHSA, n.d.). Each year, prescription drug abuse causes more than 22,000 overdose deaths in the United States (Centers for Disease Control and Prevention [CDC], n.d.). Many of these substance

**CONTACT** Andrea G. Barthwell drbarthwell@twodreamsouterbanks.com Encounter Medical Group, 610 S. Maple Avenue, Oak Park, IL 60304,USA.

use-related deaths can be avoided through early identification of substance use to prevent the development of or aid in the diagnosis of a substance use disorder, timely detection of substance use following a period of planned abstinence, and referral to addiction treatment (Fareed et al., 2011).

In addition, as of December 2014, medical marijuana laws have been enacted in 23 states, four states have legalized marijuana commercialization and consumption, and the District of Columbia allows for the possession and personal use of the substance (Mayer, 2015). Studies show that the greater availability of marijuana is tied to increases in use and dependence (Cerda, Wall, Keyes, Galea, & Hasin, 2012; Evans, 2013). As a result, practitioners must be able to identify and refer a growing population of individuals who consume marijuana to early intervention services or substance use treatment (Frezza, 2013). In response, this article aims to provide guidance on harnessing the potential of TSU as part of a public health response to prescription drug abuse and increased access to marijuana.

*Drug Testing: A White Paper of the American Society of Addiction Medicine (ASAM)* (White Paper) states that testing for SUDs in medical practice should be as common as clinical diagnostic testing is in the management of hypertension and diabetes (ASAM, 2013). The White Paper "encourages wider and 'smarter' use of drug testing within the practice of medicine, and beyond that, broadly within American society" (ASAM, 2013).

While incorporating TSU in SUD stages of care is reasonable and often necessary, historically, there has been little education or training of practitioners in using and interpreting drug tests in the substance use treatment context, although ASAM does sponsor medical review officer training for workplace drug testing (Starrels, Fox, Kunins, & Cunningham, 2012). While TSU technology has evolved into a highly accurate means for determining individuals' exposure to substances of abuse,* some practitioners lack the education to use TSU technology appropriately, leading to misapplication of such technology and misinformed overutilization of TSU (Collen, 2012; Gourlay, Heit, & Caplan, 2012). Conversely, where gaps in knowledge exist, underutilization of this tool can also lead to missed opportunities to deter and detect substance use.

The purpose of this article is to improve health care by educating practitioners on the proper usage of TSU in identifying substance use and treating patients with SUDs. It sets forth principles and recommendations on clinically appropriate and patient-centered TSU for practitioners in various segments of health care who seek to identify substance use and for specialists who manage SUDs.

The scope of this document is limited to the matrix of urine when testing for SUDs because it is easy to collect, is minimally invasive, is affordable, and allows for the identification of a wide selection of substances and metabolites (ASAM, 2013; Melanson, 2012). This article makes recommendations regarding the methodology, scope, and frequency of TSU in each stage of care* based on the individual patient's clinical considerations* (e.g., indicators of risk* and evidence of use*) and methodology factors*. It summarizes the central features of the rapidly evolving science and practice of individualized TSU in a clinical setting.

## Methods

The author conducted a search of peer-reviewed and government-supported articles and books on TSU in electronic databases, including PubMed, Google Scholar, and HeinOnline. Literature was reviewed from October 2013 through March 2015. Information and articles were restricted to those that examined and measured outcomes of TSU or that included empirical data on perceptions or attitudes on TSU. Assertions that lacked supporting data were excluded. Finally, the author used her own knowledge, approximately 30 years of clinical experience, and more than a decade of drug demand reduction policy development experience to formulate recommendations.

## Results

### *Methods of testing*

TSU identifies the presence or absence, and depending on the technology, the concentration of specific substances and their metabolites (ASAM, 2013). For TSU to be most effective, it is necessary to reduce the likelihood of errors by using reliable testing technology, and TSU results must be interpreted "as a component of overall clinical assessment rather than a stand-alone assessment for drug use" (ASAM, 2013).

Regardless of the location in which a test is conducted, the device used, or administrator of the test, the underlying technology defines the limit of accuracy of each test. Two distinct methods (technologies) are utilized in TSU: immunoassay and chromatography-mass spectrometry-based methods. Immunoassays are based on the ability of an antibody to bind with a specific drug, and are used to indicate the presence or absence of a tested class of substance or its metabolite based on a cut-off concentration. Although immunoassays vary in complexity, the underlying technology defines the analytical limitations and value of the method ("42 C.F.R. 493.5," 1995). Cups, dips, strips, cassettes, and other office

instruments usually involve low-complexity immunoassay technology and detect the presence of the analyte in urine above a predetermined cut-off concentration (Centers for Medicare and Medicaid Services [CMS], 2015). These instruments, often referred to as point-of-care (POC) tests,[1] are designed to rapidly identify samples or to detect substances for which immunoassays are known to be highly sensitive, such as marijuana (Hammett-Stabler & Webster, 2008).

Chemistry analyzers using immunoassay technology involve moderate- to high-complexity technology and are used in office and clinical laboratory settings (CMS, 2015). In some instances, these tests can provide a numeric value representing the concentration of a specific analyte (CMS, 2015). Moderate- to high-complexity immunoassay tests are generally costlier than POC devices and do not deliver results as rapidly as POCs.

Another method commonly used in TSU is based on chromatography-mass spectrometry technology. Chromatographic techniques physically separate chemical analytes in a mixture, while mass spectrometric techniques involve ionization of these analytes into charged molecules and molecular fragments, the measurement of molecular mass, and the identification of the analytes based on their distinctive mass-to-charge ratios (De Hoffman & Stroobant, 2007). These tests, which will be referred to herein as "chromatography-mass spectrometry" tests, include gas chromatography-mass spectrometry (GC-MS), liquid chromatography-mass spectrometry (LC-MS), and liquid chromatography-tandem mass spectrometry (LC-MS/MS) (ASAM, 2013). In this testing context, LC-MS has certain advantages over the older gas chromatography, including smaller volume requirements, often no need for time-consuming extraction and derivatization procedures, and the ability to identify many analytes in a single analytical cycle (ASAM, 2013). LC-MS/MS offers a high level of sensitivity and specificity, allows for user-developed assays, and can also measure several compounds in a single test run (Brandhorst et al., 2012).

In selecting the test technology to use in each patient's case, the practitioner must make her determination based on clinical considerations specific to the individual, including the information necessary to direct care (e.g., knowledge of specific medication use to prevent drug-drug interactions), and methodological capabilities, limitations, and costs (Owen, Burton, Schade, & Passik, 2012).

[1] Low-complexity urine drug tests are not infallible due to the subjective nature of interpretation of the visual cue and operator error. Operator error stems from failure to attend to test device expiration, time elapsed, test validity measures, control lines, the counterintuitive nature of some devices where a "line" indicates a presumptive absence of the analyte, and other condition-based human error (e.g., poor light, misunderstanding of faint signals, etc.).

**Table 1.** Testing for substance use terminology.

| Immunoassay | Chromatography—Mass spectrometry |
|---|---|
| Presumptive | Confirmatory |
| Preliminary | Definitive |
| Qualitative | Quantitative |
| Point-of-care/in-office/lab-based | In-office/lab-based |
| Screen | Confirmation |
| Semi-quantitative/quasi-quantitative | Absolute level, creatinine corrected |
| Simple test (cup/strip/dip/cassette) | Complex test |
| Class of or specific drug identification | Specific drug identification |

The practitioner typically must balance cost with the clinical goal, consistent with ASAM's call for smarter drug testing (ASAM, 2013).

Confusion exists among clinicians, payers, policy makers, and patients as to the terminology used to describe the distinct methods of urine testing for SUDs. Table 1 presents some of the other terms commonly used to refer to immunoassay and chromatography-mass spectrometry testing. To avoid confusion, the methodology for urine tests for SUDs will be categorized hereinafter as immunoassay or chromatography-mass spectrometry.

## Timing

The length of time it takes to obtain test results varies based on the type of test that is used. Low-complexity immunoassay POCs,[2] such as cups, dips, strips, and cassettes, can provide results within minutes (SAMHSA, 2012). These tests can be beneficial in emergency situations when rapid results are necessary to commence a therapeutic intervention and in facilitating and guiding clinical discussions and decisions in real time (Bertholf & Reisfield, 2014; Nichols et al., 2007). The benefit of faster results, however, can be outweighed by detriments to care if treatment decisions are based on quick but less reliable, less accurate results (Center for Substance Abuse Treatment [CSAT], 2005a).

Urine samples for both immunoassays and chromatography-mass spectrometry tests can be taken onsite where health care is provided. Moderate-complexity immunoassays can be analyzed using office-based equipment, but by and large, unlike POCs, they do not deliver immediate results that the clinician can employ in a therapeutic discussion just minutes after the specimen is taken. High-complexity immunoassays and chromatography-mass spectrometry tests typically

[2] Although POCs may involve either immunoassay or chromatography-mass spectrometry-based technology, in this article, "POC" only refers to tests utilizing immunoassay technology.

require that specimens taken onsite be sent to and analyzed in an off-site laboratory before results are reported; therefore, results of such tests can be delayed 24 to 72 hours or more depending on the laboratory turn-around time ("42 C.F.R. 493.17," 1993; CSAT, 2006).

### Specimen validity tests

Specimen validity tests, also referred to as sample integrity checks, are used to determine whether a urine specimen is consistent with normal human urine and whether it has been adulterated by dilution or other chemical methods to obtain a negative result (SAMHSA, 2012). In SUD diagnosis and treatment, specimen validity tests may be medically necessary when a provider suspects or is not familiar with the patient well enough to determine whether the patient has tampered or is likely to tamper with a urine sample (Gourlay, Caplan, & Heit, 2006). Specimen validity tests also can be viewed as a behavioral indicator, reflective of the patient's intent to deceive the clinician or to perpetuate a state of denial.

### Analyte selection

Clinicians should select analytes for each patient based upon the information they need to direct care (ASAM, 2013). Currently, the more substances selected, the more expensive the testing services will typically be (SAMHSA, 2012). Some third-party payers arbitrarily limit TSU coverage to a small number of analytes per patient encounter (Premera Blue Cross, 2014). ASAM's call for smarter drug testing cites a need for broad drug selections (ASAM, 2013).

The Centers for Medicare & Medicaid Services (CMS) recently proposed a policy that would cover tests for some 50 analytes bundled together and provided for a flat fee, eliminating the need for clinician guesswork regarding the patients' substances of abuse and providing a comprehensive picture of substance use (CMS, 2015). Patient advocates, payers, and policy makers should pay attention to whether policies like the one that CMS proposed actually improve care and reduce costs. If so, such policies should be more widely adopted.

Test panel* use is discouraged because panels often test for substances that are not clinically relevant to the individual patient, and thereby increase health care costs (CMS, 2015). Similarly, blanket orders* are discouraged because they are not personalized for a specific patient but, rather, are identical for all patients in the clinician's practice and may test for substances that are not relevant to the individual patient's circumstances, thereby increasing health care costs (CMS, 2015).

It should be noted that a clinician may develop a standing order, which is a test request customized for a specific patient based upon historical use, community trends, and other circumstances, to continually monitor the patient's condition or disease (CMS, 2015). These clinically determined patient "profiles" are distinguishable from panels by their clinical benefits: Patient profiles respond to the clinical risks of a unique patient under a particular set of circumstances, whereas test panels represent a one-size-fits-all approach.

With new variations of substances, such as analogs,* continually becoming available, clinicians should update their test selections to reflect current trends of abuse in their communities and patient populations (Montgomery, 2011). The practitioner should consider consulting with a laboratory when making test selections to obtain information about local and demographic trends in substance use (Reisfield, Webb, Bertholf, Sloan, & Wilson, 2007).

Some POCs adhere to forensic standards, testing for drugs of abuse that are not commonly used, and therefore, have minimal value in certain communities and patient populations. For example, it is unlikely that a 60-year-old Midwestern woman who is prescribed opioids for metastatic breast cancer will benefit from testing for the use of phencyclidine (PCP), an illicit hallucinogen. If the clinician chooses to conduct low-cost POCs, care should be taken to select analytes useful to the management of the patient.

### Comparative analysis

Practitioners must take into account the importance of test accuracy under the applicable circumstances in determining which type of test to use (CSAT, 2005a). Despite the fact that urine tests conducted for health care purposes should not lead to punitive action, clinicians must be aware that inaccurate results can impact patients negatively (CSAT, 2005a; Tate & Ward, 2004). For instance, false positive* results can substantially harm patients who are not using substances by subjecting them to unjust suspicion and accusations, alterations to the treatment plan, and the deterioration of the provider-patient relationship (Hammett-Stabler & Webster, 2008). A false negative* result may give a clinician misplaced confidence that substance use is not occurring, cause the clinician to miss a relapse, lead to misdiagnosis or diagnostic delay, and reinforce aberrant drug-related patient behaviors, which, in turn, may lead to disease progression, overdoses, or death (Hammett-Stabler & Webster, 2008). Goals of TSU differ based on the context of testing, and the suitable methodology will vary accordingly.

In determining test methodology, the practitioner must mindfully consider methodology factors, such as the likelihood of accuracy, ability to identify specific analytes and report a concentration of parent drug and metabolite levels, rapidity of results, and cost.

Immunoassay testing is a cornerstone in forensic toxicology and can be useful in clinical settings so long as the clinician is fully aware of which analytes the technology can and cannot accurately detect. In comparison with chromatography-mass spectrometry, immunoassays can have a relatively low specificity* and sensitivity,* depending on the class of substance, complexity of immunoassay technology used, and the cut-off concentration (ASAM, 2013), (SAMHSA, 2012). Not all immunoassays can identify certain prescription medications and illicit substances, such as analog drugs, and therefore, a negative immunoassay test result does not rule out the presence of such substances of abuse (CMS, 2015). Additionally, some immunoassays cannot distinguish among the distinct substances within a drug class, or multiple drugs present within a drug class, such as multiple opioids or benzodiazepines (ASAM, 2013). While immunoassays are typically less expensive than chromatography-mass spectrometry tests, their inherent deficiencies preclude their use when precise and robust results are necessary to guide clinical decision making.

Nevertheless, POCs may be more practical than chromatography-mass spectrometry tests when containing costs is a primary factor in test selection, when immediate test results are needed in emergency situations, or to identify substances for which immunoassays are known to be highly sensitive and specific (Hammett-Stabler & Webster, 2008). POCs can help facilitate and guide clinical discussions in real time (Bertholf & Reisfield, 2014). For these reasons, POCs can have value in a patient-centered testing algorithm. In contrast, mid- and high-complexity immunoassays are generally costlier than POCs and usually do not provide rapid results. Moreover, given their relatively low accuracy based on the inherent characteristics of their underlying immunoassay technology, mid- and high-complexity immunoassays rarely pose any advantage over POCs and chromatography-mass spectrometry-based tests. CMS limited the use of mid- and high-complexity immunoassays in a recent TSU coverage determination that disallows follow-up or "confirmatory" TSU performed by immunoassay (CMS, 2015; Palmetto GBA, 2015).

When individualized for a particular patient, chromatography-mass spectrometry is generally preferable in the following circumstances:

- To identify a specific analyte within a class of drugs or that is not reliably detected by an immunoassay;
- For use in identifying potential drug–drug interactions;[3]
- For safer prescribing of controlled substances when the clinician has concerns related to the patient's possible use of a non-prescribed medication or illicit substance;[4, 5] or
- When a definitive concentration of a drug is needed to guide care (e.g., discontinuation of THC use according to a treatment plan) (CMS, 2015).

The use of chromatography-mass spectrometry testing may also be advisable to provide additional information that the clinician needs to proceed confidently beyond that which is available by immunoassays. Examples include when the immunoassay result is inconsistent with a patient's presentation, medical history, or current prescribed medication plan (CMS, 2015). Chromatography-mass spectrometry tests may also be preferable, for instance, to confirm a patient's self-report* of use of a particular substance in a drug class and non-use of other substances in the same class, or use of a specific analyte that immunoassays do not accurately detect.

## Discussion

The recommendations set forth below constitute suggestions for the clinical use of TSU in the SUD diagnosis, treatment, and chronic care stages. They reflect a deliberate balance of costs and benefits, and they may serve as a reasonable starting point for the appropriate utilization of urine testing in preventing, identifying, and treating SUDs.

The author developed these recommendations by combining her experience in addiction treatment with a literature review. Sources from which these recommendations were derived include the ASAM White Paper; *the Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (DSM-V); the Substance Abuse and Mental Health Services Administration's Clinical Drug Testing in Primary Care, Technical Assistance Publication Series (TAP) 32 and Medication-Assisted Treatment (MAT) for Opioid Addiction Treatment Programs, Treatment Improvement Protocol (TIP) 43; and Palmetto GBA's Local Coverage Determination (LCD): Controlled Substance Monitoring and Drugs of Abuse, among other sources.

In the clinical setting, practitioners often should test to identify substance use and create a treatment plan around

[3] Practitioners can assess parent drug and metabolite using the patient as his own control over time to determine whether metabolism of specific drugs has changed. An immunoassay would not show such a change or identify multiple drugs within a class.

[4] Immunoassays do not detect all drugs that a patient might be using, such as Tramadol and many forms of benzodiazepines, so they many not provide enough accuracy to support safer prescribing precautions.

[5] It is advisable for the practitioner to be aware of a patient's use of any substance - at any concentration - that, when combined with a prescription medication under consideration, is likely to yield an undesirable pharmacological effect. Even low concentrations of an analyte in the patient's specimen indicate that the patient has access to the substance detected and has a history of using it, both of which can affect prescribing decisions.

that use. This section provides suggestions that practitioners may customize to meet their patients' unique needs. Practitioners should take into consideration that preliminary tests are typically only appropriate when urgent tests results are needed and when testing for substances for which preliminary tests are known to be accurate. They should note that testing in a clinical setting is entirely different from testing in a forensic setting. In the forensic setting, it is common to rely on preliminary negative results and to confirm preliminary positive results to prevent the unjust loss of a job, incarceration, or the striping of other rights resulting from a false positive. Yet, in the clinical setting, preliminary negative results should not be relied upon because a false negative can lead to an overdose-related death. Therefore, due to the possible detriment of inaccuracy, at least one out of three tests per month in the active recovery phase should be definitive, as discussed more thoroughly below, and all tests should be customized to the individual patient's needs.

SUDs are measured on a broad continuum, from mild to severe based on the presence of certain criteria, which are discussed thoroughly in the DSM-V (American Psychiatric Association, 2013). TSU is a vital tool in the deterrence, detection, and treatment of substance use. With greater information on TSU, clinicians can learn to make a proper determination of the appropriate testing methods to employ throughout the stages of care. They may then customize that method to reflect their individual patients' unique circumstances, which often include the need to weigh greater accuracy against lower costs.

Before testing begins, the practitioner should explain the purpose of TSU and obtain informed consent from the patient. The practitioner must always document the patient's unique clinical considerations and the rationale underlying the practitioner's order for TSU. The framework below may assist the provider in determining how frequently to conduct TSU and the methodology of TSU that might be most advantageous under various circumstances.

### *Screening and diagnosis*

ASAM has stated that "the integration of drug testing into all segments of health care is a trend" that ASAM encourages and seeks to shape for the benefit of the nation's public health (ASAM, 2013). An important step toward that goal is for the fields of pain medicine, primary care, emergency medicine, psychiatry, obstetrics, and surgery to implement routine screening into practice in order to identify substance use and intervene* before the behavior progresses to more chronic forms of use (SAMHSA, 2013; Gudin, Mogali, Jones, & Comer, 2013).

For all patients who have not been diagnosed to have an SUD, practitioners should screen for indicators of risk and evidence of use (1) by reviewing symptoms, conducting an interview, analyzing the patient's health care history, and performing a physical exam (collectively referred to herein as conducting an "H&P"); or (2) through a combination of H&P and TSU.

The diagnosis phase of care includes the initial assessment of an individual to evaluate whether the individual is at risk for or has already manifested an SUD (Powers, Nishimi, & Kizer, 2005). Although evidence of substance use alone is insufficient to substantiate that an SUD is present, it can be used to help diagnose both the presence and the severity of substance use (ASAM, 2013). For example, it can provide the practitioner more information on a patient's history (including which substances the patient is using), whether treatment with certain pharmacotherapies is appropriate, and whether the patient may be diverting prescription medications.

If, based on a competent and thorough H&P, the practitioner can confidently determine that there are no indicators of risk or evidence of use, it may be appropriate to utilize immunoassay technology or forego TSU based on the minimal expectancy of substance use and in efforts to reduce cost. It should be noted that, in order to rely solely on the H&P, the practitioner must be skilled at uncovering indicators of risk and evidence of use in a population in which use is often not disclosed and is sometimes even purposely concealed.

As indicated in Table 2, if the practitioner does conduct a test and the results indicate abstinence, she should consider testing the patient again if a change in patient risk or presentation indicates possible substance use or no more than once per year if no change is identified. If immunoassay results indicate use, the practitioner should confirm use with a chromatography-mass spectrometry test if more specific or accurate information is necessary to manage the patient. If the chromatography-mass spectrometry test results confirm use, the practitioner should intervene and establish a treatment plan appropriate to the use. If the results indicate abstinence, the immunoassay was a false-positive, and the practitioner should test the patient if a change in patient risk or presentation indicates possible substance use or no more than once per year if no change is identified.

When the practitioner conducts a competent and thorough H&P and discovers one or more indicators of risk or evidence of use, she must engage in further diagnostic techniques customized to the individual's unique circumstances. Recognizing that the practitioner is dealing with a patient population that oftentimes does not know or disclose the full extent of exposure to substances of abuse, she should consider using more reliable yet more costly

**Table 2.** Testing for substance use: Screening & diagnosis.

| Findings at first consultation | No risk identified | One or more indicators of risk or evidence of use |
|---|---|---|
| In addition to H&P, UDT by: | Immunoassay | Chromatography-mass spectrometry |
| If active treatment not indicated, routine follow-up in: | One year | One year |
| Recommended methodology for follow-up test: | Immunoassay | Chromatography-mass spectrometry |

Select substances based on clinical considerations.

chromatography-mass spectrometry testing. The purpose of the test is to obtain more information about the potentially harmful behavior, condition, or disease state given the heightened degree of risk associated with indicators of risk and evidence of use and the corresponding need for accuracy greater than that provided by immunoassay testing.

If the patient exhibits one or more known indicators of risk for substance use or evidence of use, the practitioner should conduct a chromatography-mass spectrometry test. If test results indicate abstinence, the practitioner should test the patient again if a change in patient risk or presentation indicates possible substance use or no more than once per year if no change is identified. If test results indicate use, she should intervene and establish a treatment plan appropriate to the use.

### *Active treatment*

Active treatment for SUDs entails the use of any planned, intentional intervention in the health, behavior, personal life, or family life of an individual who has an SUD (ASAM, 2013). It is designed to enable the affected individual to achieve and maintain sobriety, physical and mental health, and a maximum functional ability, and is separate and distinct from the chronic care management phase (ASAM, n.d.).

TSU helps health care professionals determine whether patients are using substances or are not taking a prescribed medication, which may indicate prescription drug misuse* or diversion (Leavitt & Reisfield, 2012). Such testing fosters honesty and trust between patients and their providers, encourages patients to follow the prescribed course of treatment, and assists practitioners in determining whether the treatment plan should be modified (Young, Nakashian, Yeh, & Amatetti, 2006).

As indicated in Table 3, When a patient is in active treatment, testing should be conducted, to the extent possible, on a regular basis and at random intervals to reduce the likelihood that the patient could successfully plan to undermine the test results (CSAT, 2005a). The process of collection should also be structured to reduce the likelihood that the patient could successfully undermine the test results.

In order to comply with standard medical practice and professional risk management, practitioners directing MAT* for opioid dependence should use chromatography-mass spectrometry tests to reliably identify the specific opioid substances in their patients' specimens. Of course, all patients in active substance use treatment should be given high-quality care regardless of whether or not the patient receives MAT and whether MAT is performed in an office-based setting, a methadone clinic, or elsewhere. Nevertheless, these recommendations may be modified to take into account the fact that resources available to provide counseling, medications, monitoring, and case management may vary.

As indicated in Table 3, when a patient is in active treatment for an SUD, if the clinical record and prior test results suggest that the patient has abstained from substance use for 30 days or less, the practitioner should perform, based upon clinical considerations and methodology factors, an immunoassay or chromatography-mass spectrometry test one time per week.[6] No more than one in every three tests should be a chromatography-mass spectrometry test.

If the clinical record and prior test results suggest that the patient has abstained from substance use for 31 to 90 days, the practitioner should perform, based upon clinical considerations and methodology factors, an immunoassay or chromatography-mass spectrometry test one time per week.[7] No more than three tests per month should be chromatography-mass spectrometry.

If the clinical record and prior test results suggest that the patient has abstained from substance use for 91 days to 2 years, the practitioner should perform, based upon based on clinical considerations and methodology factors, an immunoassay or chromatography-mass spectrometry test one to three times per month. No more than three tests per quarter should be chromatography-mass spectrometry.

If, at any point during active treatment, immunoassay results indicate use, the practitioner should follow up with a clinical interview and possibly a chromatography-mass spectrometry test to confirm the finding or collect more

[6] In some instances, it may be appropriate to test more frequently to determine every instance of substance use and establish abstinence. In such a case, testing should be done no more than three times per week with either immunoassay or chromatography-mass spectrometry tests based on clinical considerations.

[7] If every instance of use is vital to establish abstinence or provides information necessary for a treatment plan, testing may be done more frequently. In such a case, testing should be done no more than three times per week with either immunoassay or chromatography-mass spectrometry tests based on clinical considerations.

**Table 3.** Testing for substance use: Active treatment and chronic care management.

| | Active treatment | | | Chronic care management | |
|---|---|---|---|---|---|
| Length of Consecutive Abstinence | ≤ 30 days | 31–90 days | 91 days–2 years | > 2 years – ≥ 5 years | > years |
| Frequency of Immunoassay[1] | 1/week[2] | 1/week[2] | 1–3/month | N/A[3] | N/A[3] |
| Frequency of Chromatography-Mass Spectrometry | 1 of every 3 tests, randomly | Not more than 3/month | Not more than 3/quarter | 1/year | Based on clinical judgment |

Select substances based on prior use, common use in the community, and circumstantial considerations.
[1] A clinician may skip immunoassay and go directly to chromatography-mass spectrometry when there is a need to identify: (a) specific analyte, (b) potential drug-drug interactions, (c) issues relevant to safe prescribing, or (d) definitive concentration.
[2] Testing may be done up to three times per week, as indicated by clinical considerations.
[3] A higher level of accuracy is needed due to the infrequent nature of testing; therefore, chromatography-mass spectrometry is preferable.

specific information. If the chromatography-mass spectrometry test results are positive or if clinical considerations indicate use after a period of abstinence, the clinician should consider the use of TSU in documenting the extent and nature of the use and then resume the testing schedule recommended for abstinence of 30 days or less.

Treatment may need to be adjusted or intensified to meet the clinical requirements of the patient. Even though durability of abstinence is thought to be related to length of abstinence, the clinician may make the decision not to revert to a higher frequency of testing for substance use based upon clinical considerations. In both the active treatment and chronic care management stages of care, the clinician's judgment can be influenced by knowledge of the patient gained over time, highest level of stability, substance(s) used, duration of use, response to using episode, current functioning, social stressors, etc.

### *Chronic care management*

Patients who have maintained abstinence for a significant period may be considered to be in remission, but there is a recognized potential for relapse due to the chronic, recurring nature of SUDs (ASAM, 2011). It is useful, therefore, for practitioners to conduct clinical vigilance, continuous assessment, and chronic care management to support the best outcomes (Chang & Compton, 2013). Despite the recognized potential for relapse, individuals who have accumulated over 2 years of continuous abstinence from substance use are often self-directed in the activities that support their recovery. Consequently, consultation with the professional is less prescriptive, may be periodic, and is often driven by the individual's self-determined need. A practitioner may use TSU to continue to monitor the patient after active treatment has ended to assess whether the patient is at risk for relapse or has relapsed, and to alert the practitioner that she should encourage the patient to recommit to recovery (SAMHSA, 2012).

When a patient enters the chronic care management phase of treatment, urine testing should be conducted, to the extent possible, on a regular basis and at random intervals to reduce the likelihood that the patient could successfully plan to undermine the test results (CSAT, 2005a). The random nature of the test is hard to accomplish with a reduced frequency of visits. Often patients in stable mature recovery, when advised of the value of random testing, will agree to or encourage their practitioner to work out a random schedule of appointments for testing that is not necessarily connected to office visits. A higher level of accuracy is recommended due to the infrequent nature of the testing, and therefore, periodic chromatography-mass spectrometry is suggested.

As indicated in Table 3, if more than two years but less than five years have passed since the patient's last substance use, the practitioner should perform a chromatography-mass spectrometry test at a frequency of no more than once per year. If five years or more have passed since the patient's last substance use, the practitioner should perform a chromatography-mass spectrometry test based on clinical considerations. If, at any point, the test results are positive, the practitioner should establish an active treatment plan appropriate to the recent use.

## Summary

TSU is a valuable tool in identifying and treating SUDs. No single urine drug test is suitable for all clinical scenarios; rather, a multitude of options can be adapted to meet patients' unique needs (ASAM, 2013). Practitioners, payers, and policy makers must improve their knowledge of the purposes, proper utilization, and benefits of TSU in addiction medicine. In doing so, they can protect access to care, enhance patient outcomes, and lower costs by advancing the proper diagnosis, treatment, and recovery of individuals with SUDs.

## Glossary

*Analog*: "Analogs" are psychoactive drugs developed by replicating or slightly modifying existing drugs of abuse. As used in this article, "analogs" include "synthetics" and "designer drugs."

*Analyte*: The chemical substance that is the subject of chemical analysis.

*Blanket order*: A request to test a set of substances in all cases.

*Clinical considerations*: Factors that a practitioner should use to ascertain the methodology, scope, and frequency of testing in each stage of addiction treatment, such as indicators of risk, evidence of use, information necessary to direct care (including the need for accuracy), cost constraints, and special circumstances, such as the presence of a substance of abuse in a clinic.

*Cut-off concentration*: The point of measurement at or above which a result is considered "positive" and below which a result is reported as "negative" (SAMHSA, 2012).

*Evidence of use*: Any physical or behavioral sign or symptom that provides proof that an individual has recently used or might be using an illicit substance or a controlled substance for nonmedical purposes. It includes self-reports; unexplained symptoms, such as weight loss, constipation, lack of energy or motivation, and neglected appearance, constricted or dilated pupils, slurred speech, needle marks; mood or behavior changes, such as depression or insomnia; etc. (Mayo Clinic, 2014).

*False negative*: Occurs when a test fails to detect the presence of a substance or metabolite above a particular cut-off concentration (SAMHSA, 2012).

*False positive*: Occurs when a test incorrectly detects the presence of a substance or metabolite when it is not present (SAMHSA, 2012).

*Indicator of risk*: Characteristics of individuals or their environments that, when present, increase the likelihood that individuals will develop a substance use disorder (Weimer, Kennedy, & Graham, 2007). Indicators may include such factors as a personal or family history of substance use, and the legitimate prescription of a controlled substance or other central nervous system drug (Boschloo et al., 2011). It should be noted that a prior diagnosis of an active SUD is more than an indicator of risk given that an SUD is a life-long disorder and is managed according to the stage of care.

*Intervene*: Addresses the patient's medical history, physical condition, laboratory diagnostic findings, and identified substance use, and make recommendations to improve the patient's health and prevent undesirable consequences.

*MAT*: Any treatment for an SUD that includes an FDA-approved medication for withdrawal or dependence as part of a comprehensive treatment plan. An ultimate goal of MAT is patient recovery and full social function (SAMHSA, 2015).

*Methodology factors*: "Elements that differ among immunoassays of varying complexities and between the immunoassay and chromatography-mass spectrometry testing methodologies that practitioners should consider when choosing test methodology. Methodology factors include the likelihood of accuracy, ability to identify specific analytes and report a definitive concentration level, rapidity of results, cost, and value.

*Prescription drug abuse*: "The intentional self-administration of a medication for a nonmedical purpose, such as "getting high" (Katz et al., 2007).

*Prescription drug misuse*: The use of a medication for a medical purpose other than as directed or indicated, whether willful or unintentional, and whether harm results or not (Katz et. al, 2007).

*Screening*: The performance of a medical evaluation or diagnostic test in asymptomatic persons based on the premise that early diagnosis can lead to improved outcome (Weimer et al., 2007).

*Self-report*: Statements from the patient or other individuals supporting a patient's care, such as a family member or caregiver.

*Sensitivity*: A test's ability to detect the presence of a drug or metabolite at or above the designated cutoff concentration (Weimer et al., 2007).

*Specificity*: A test's ability to exclude substances other than the analyte of interest, or the test's ability not to detect the analyte of interest when it is below the designated cutoff concentration (Weimer et al., 2007).

*Stage of care*: Determined by the time abstinent, not the location of care (hospital, clinic, recovery residence, home, etc.) or the treatment modality (i.e., MAT, detoxification, intensive outpatient [IOP], outpatient, individual counseling, etc.; CSAT, 2005b). The author chose this paradigm because duration of abstinence is related to durability of abstinence and tendency to continue in the abstinent state.

*Substance use*: The consumption of an illicit substance or an analog thereof, prescription drug misuse and abuse, and alcohol abuse. It excludes taking medications as prescribed by a physician.

*Substances of abuse*: Those that are defined in the DSM-V, which include alcohol; cannabis; hallucinogens; inhalants; opioids; sedatives, hypnotics, and anxiolytics; stimulants, tobacco, and other substances (American Psychiatric Association, 2013).

*Test panel*: A set of substances for which a practitioner may test, typically predetermined by a laboratory or forensic-testing standards.

*Testing for Substance Use (TSU)*: A group of analytical techniques that involves testing urine samples to identify the presence or absence or the concentration of substances and their metabolites (ASAM, 2013).

## Declaration of interest

The author serves as a consultant for Millennium Laboratories and Alere Laboratories. The author alone is responsible for the content and writing of the article.

## Notes on contributor

***Andrea G. Barthwell***, M.D., F.A.S.A.M., is the founder and Chief Executive Officer of the global health care and policy consulting firm EMGlobal LLC and Director at Two Dreams Treatment Centers. President George W. Bush nominated and the United States Senate confirmed her to serve as Deputy Director for Demand Reduction in the Office of National Drug Control Policy (ONDCP) from

January 2002 to July 2004. As a member of the President's sub-cabinet, Dr. Barthwell was a principal advisor in the Executive Office of the President (EOP) on policies aimed at reducing the demand for illicit drugs. Dr. Barthwell received a Bachelor of Arts degree in Psychology from Wesleyan University, and a Doctor of Medicine from the University of Michigan Medical School. Dr. Barthwell is a past president of the American Society of Addiction Medicine and in 2003, Dr. Barthwell received the Betty Ford Award, given by the Association for Medical Education and Research in Substance Abuse.

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