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[Home](#) > Urine Drug Testing

Urine Drug Testing

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This guide provides:

- Appropriate use of Urine Drug Testing (UDT) to improve patient care
- Available tests and confirmatory testing
- Interpreting test results
- Following up on results and modifying treatment plans
- Establishing a relationship with a laboratory and addiction professionals

Appropriate Use of UDT to Improve Patient Care

Urine drug testing (UDT) is an important component of the treatment plan for patients who are prescribed opioids for chronic pain. While there is not enough information so far to support a specific testing protocol for patient-centered clinical urine drug testing, experts in the fields of pain and addiction and pharmacology have developed recommendations for the use of UDT as an initial assessment and for ongoing monitoring in this population:



Why:

- **Objective Information:**
 1. To provide physicians with objective information about drug misuse prior to prescribing scheduled medications.
 2. To monitor a patient's treatment adherence and possible drug use problems during pain treatment

(Chou, et al, 2009; Cone, et al 2008).

Relying on behavior to monitor your patient may not be sufficient; one study found that over 25% of patients on chronic opioid therapy who didn't display behaviors that suggested aberrant behavior tested positive on urine drug screens (Katz and Fanciullo, 2002).

- **Screening:** To identify the need for further assessment
- **Better Care:** To help provide better care to the patient (Heit and Gourlay, 2004; Chou, et al, 2009).
- **Monitoring:** To monitor patient progress, when used in combination with other

assessments (Heit and Gourlay, 2004; Chou et al, 2009).

Who:

- **High Risk Patients:** The 2009 *Clinical Guidelines for the Use of Chronic Opioid Therapy in Chronic Noncancer Pain* strongly recommends that CNCP patients at high risk for substance use problems (as determined/assessed through the process of risk stratification) undergo urine testing on a periodic basis.
- **All Patients:** A weaker recommendation in the same guidelines suggests that physicians collect information on CNCP patients who are not high risk throughout treatment by performing UDT *or* via other means such as prescription drug monitoring programs, family interviews, or pill counts (Chou, et al, 2009). Some practitioners recommend adopting a policy of testing **all** CNCP patients to avoid stigmatizing or singling out certain patients, as well as to avoid missing problems in patients who might not have been otherwise tested based on their history of drug use (Heit and Gourlay, 2004; Katz and Fanciullo, 2002; Compton, 2009).

When:

- **First Visit:** For all patients new to treatment, confirmatory testing is recommended. This initial baseline result can help predict future compliance and illicit drug use problems (Antoin and Beasley, 2003).
- **Other Indications:** A UDT is also recommended in the following instances:
 - Change in medication type or dosage
 - Decline in patient's level of functioning

(Compton, 2007)
- **Timing:** Collect samples at the beginning of the visit - before a prescription is written (Compton, 2009; Katz and Fanciullo, 2002).
- **Frequency:** The decision on how often to collect samples is up to the practitioner and can vary depending on the individual patient. For example, take into account patient characteristics such as (Heit in Beresford and Dhingra, 2009):
 - Patient behavior
 - Past positive tests
 - Indications of abuse or addiction
- **Schedule:** It is best to collect samples on an unannounced, "as requested" basis. Two to three collections per year can be enough for pain patients who do not show signs of aberrant behavior (Gourlay et al, 2010).
- **Window of detection:** Most drugs have a window of detection in urine of 1 to 3 days after ingestion (Gourlay et al, 2010).

Specific cutoff levels and detection times for different drugs

(Data from: Center for Substance Abuse Treatment, 1993; Heit & Gourlay, 2004; Substance Abuse and Mental Health Services Administration, 2005, 2007; Shurman & Backer, 2006)

Substance	Screening Lower	Confirmation Lower Limit	Duration of Detection	False Positives
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	Limit			
Alcohol	20mg/dL	20mg/dL	7-12 hours	N/A
Amphetamines	500 ng/mL	125 ng/mL	48 hours	Phenylpropanolamine (PPA), ephedrine, products with L-methamphetamine like Vicks Nasal Inhale, clobenzorex, fenproporex, selegiline
Barbiturates (short-acting)	200 ng/mL	100 ng/mL	24 hours (short-acting); 3 weeks (long-acting)	N/A
Cannabis	15 ng/mL	4 ng/mL	3 days - 4 weeks	Ibuprofen, dronabinol, hemp seed products over 12 oz, food products with hemp oil
Cocaine and its metabolites	150 ng/mL	10 ng/mL	6-8 hours (cocaine), 2-4 days (metabolites)	Ampicillin, amoxicillin
Codeine	50 ng/mL	100 ng/mL	2-3 days	N/A
Hydrocodone	50 ng/mL	100 ng/mL	Varies by lab	N/A
Hydromorphone	50 ng/mL	100 ng/mL	Varies by lab	N/A
Methadone	300 ng/mL	100 ng/mL	72 hours	N/A
Morphine	300 ng/mL	100 ng/mL	48-72 hours	Foods with poppy seeds, dextromethorphan, pyrilamine, quinine water, amitriptyline, codeine, heroin
Phencyclidine (PCP)	25 ng/mL	25 ng/mL	3-10 days	Diazepam, dextromethorphan

(Adapted from Compton, 2007)

How:

- **Types of Tests:** The two main types of UDT testing are Screening (Immunoassay) and Confirmatory (GC/MS or HPLC). These are discussed in detail on the next page.

1. Specify if you are looking for an illicit substance, prescription drug misuse, or the presence of a prescribed medication.
 2. A "no threshold test" at the limit of detection (LOD) should be requested. This enables the test to pick up on a drug (especially a prescribed medication) that may be in the urine at a lower concentration (Heit and Gourlay, 2004).
- **Treatment Agreement:** UDT should be written into the treatment agreement (Cone, et al, 2008) and patients should be made aware that they will have to provide urine samples as requested (Compton, 2009). Note: *Treatment agreements* are covered in greater detail in the Key Info Guide section of this website.
 - **Sample size:** The optimum sample size is 30 mL or more.

Urine Drug Testing in Clinical Practice: The Art and Science of Patient Care (4th Ed.) [2]

Urine Testing [3]

References:

Opioids for chronic noncancer pain: tailoring the therapy to fit the patient and the pain [4]

Tools for pain and opioid abuse risk assessment. Urine screening: an important tool [5]

Clinical guidelines for the use of chronic opioid therapy for chronic noncancer pain [6]

Urine toxicology screening: a case study [7]

Urine drug testing of chronic pain patients: licit and illicit drug patterns [8]

Urine Drug Testing in Clinical Practice: The Art and Science of Patient Care [9]

Urine drug testing in pain medicine [10]

Role of urine toxicology testing in the management of chronic opioid therapy [11]

Screening vs. Confirmatory Tests

There are two main categories of urine drug testing -- screening and confirmatory. Screening tests are initial, qualitative drug tests conducted to identify classes of drugs present in the urine and typically are done using immunoassay. They rely on a set threshold above which a positive result is produced and therefore do not detect lower concentrations of a drug. Confirmatory tests are used for further analysis of a sample -- to confirm a positive or sometimes, negative, result and typically are done using gas chromatography/mass spectrometry (GC/MS) or high performance liquid chromatography (HPLC). Confirmatory testing can identify a specific drug. If the goal is to detect a synthetic or semisynthetic opioid, this test should be used as immunoassays do not typically detect these opioids. Below is a comparison of the general characteristics of these two types of testing:

	Screening (Point of care testing is usually only screening)	Confirmatory
Analysis Technique	Immunoassay	Gas Chromatography-Mass Spectrometry (GC-MS) or High Performance Liquid Chromatography (HPLC)
Sensitivity (power to detect a class of drugs)	Low or none when testing for semi-synthetic or synthetic opioids	High
Specificity (power to detect an individual drug)	Varies based on assay used - can result in false positives and false negatives	High

Use	Qualitative analysis; detects <i>classes of drugs</i> (Heit and Gourley, 2004)	Quantitative analysis; identifies a <i>specific drug</i>
Cost	Inexpensive (FDA five-drug testing kit ~ \$1)	More expensive, may not be paid for by insurance
Turnaround	On-site - rapid	Slow
Other	Intended for use in drug-free population; may not be useful in pain medicine context	Legally defensible results

(Compton, 2007; Heit and Gourlay, 2004; Reisfeld, et al, 2007)

Due to the possibility of false positives and the qualitative nature of screening tests, confirmatory testing is recommended to affirm positive or unexpected results and to identify the presence of a specific drug (Compton, 2007; Reisfeld, et al, 2007).

Point of Care UDT. Point of care UDT offers the advantage of quick results with all the limitations of screening tests described above. Providers may want to conduct screening tests at the point of care by obtaining a CLIA waiver.

[Analytical Testing Methods](#) ^[12]

[Drug Cutoff Concentrations](#) ^[13]

[Specimen Validity Testing](#) ^[14]

[Clinical Laboratory Improvement Amendments Waiver](#) ^[15]

References:

[The role of urine toxicology in chronic opioid analgesic therapy](#) ^[16]

[Urine Drug Testing in Clinical Practice: The Art and Science of Patient Care](#) ^[9]

[Urine drug testing in pain medicine](#) ^[10]

[Review: rational use and interpretation of urine drug testing in chronic opioid therapy](#) ^[17]

[Utility and application of urine drug testing in chronic pain management with opioids](#) ^[18]

Interpreting Test Results

While urine tests will provide objective data, interpretation of the results is not black and white, as there are many factors to take into account and a UDT alone is not an indicator of substance abuse or addiction. Physicians must use their best clinical judgment to interpret the results of a UDT and consult with the laboratory toxicologist if there are any doubts. Interpretation of UDTs is complex and interpreting falsely in either direction could have significant harmful consequences for the patient. Screening tests should be followed by confirmatory tests and consultation with the toxicologist for clarifications if needed, before action is taken.

In the medication history, it is important to get a complete picture of any substances the patient is taking that may affect the results of the UDT, including over-the-counter medications and herbal supplements. In this thorough medication history, note the last time each medication was taken (Gourlay et al, 2003).

Expected Confirmatory Test Results

Taking different opioids typically results in either the drug itself or somewhat predictable metabolites being present in the urine. Sometimes the metabolite of the prescribed drug may be another drug; this does not mean the person necessarily also took the 2nd drug. For example, codeine and morphine may be found in the urine after using heroin, morphine may be found after taking codeine, hydromorphone after taking hydrocodone, and oxycodone after taking oxycodone. Additional metabolites may be found when the drug taken is present in high doses (Capital Toxicology, 2010).

Abnormal Results: Negative for Prescribed Medication

While absence of the prescribed drug could indicate diversion, there are other possible explanations:

- The patient may have run out of medication before submitting a sample due to increasing the dose or frequency of administration (Heit and Gourlay, 2004).
- The patient is not taking the full prescribed amount of medication.
- In an attempt to cover up illicit drugs, the patient has tampered with his or her sample (Compton, 2007).
- If immunoassay testing that was not specific for a single drug was used, it will usually not detect semi-synthetic and synthetic opioids - i.e., buprenorphine, oxycodone, hydrocodone, hydromorphone, fentanyl, and methadone. In this case, confirmatory testing should be considered (Gourlay et al, 2010).

Abnormal Results: Positive for an Unprescribed Substance

Upon receipt of a positive test result, physicians should not immediately assume that the patient has a drug abuse or addiction problem. Take the following possibilities into consideration:

Testing-Related Issues:

- Testing Error: False positives

False positives can occur due to cross-reactivity, where OTC and non-illicit drugs can look like illicit drugs and result in a positive test (Heit and Gourlay, 2004).

Additionally, certain compounds that the patient has ingested may have metabolized into the same substance produced as the metabolism of an illegal substance, such as poppy seeds, which can result in a positive UDT (Gourlay et al, 2010).

- Laboratory error: testing or clerical errors. Have the lab retest samples that revealed unexpected results.
- **Variability within and between patients**
 - Different patients can have different rates of drug absorption and metabolism, so expect variability of UDT results between patients on the same dosages. Additionally, patients with similar levels of pain may not respond to the same dosage.

There is also absorptive and metabolic variability *within* a patient, and a

patient's pain may not respond to the same dosage from one visit to the next.

- Blood concentration data may be necessary to provide a more accurate picture of patients' UDT results.

(Nafziger and Bertino, 2009)

- Aberrant behavior driven by undertreated pain
- Therapeutic dependence
- Recreational use
- Pain that does not respond to opioid therapy

(Heit and Gourlay, 2004; Compton 2009)

- the patient's level of functioning
- drug-seeking behavior
- other signs of drug misuse

- Temperature: 90° to 100°F (4 minutes after deposited). Temperature-sensitive cups can help identify abnormal samples.
- pH: 4.5 to 8.0
- Creatinine Concentration: >20 mg/dL
- Specific Gravity: Between 1.003 and 1.020
- Nitrates: Greater than or equal to 500 mcg/mL

Intentionally drinking a lot to reduce the relative concentration of drug in the urine or dilution of the sample can produce lower than expected values. You can request a sample early in the morning to help produce a more concentrated sample.

Patient-Related Issues:

Discuss the results with the laboratory, and have them perform confirmatory testing on positive samples, and in some cases, negative samples, to affirm the presence or absence of a specific compound.

When diagnosing addiction, physicians should consider all the available information and not depend solely on a positive drug screen. Other patient criteria to consider include:

(Compton, 2009)

Recognizing Sample Tampering

Being aware of the normal color, temperature, concentration and other values of urine can help you recognize when a sample has been altered (Gourlay et al, 2010).

Responding to a Positive Sample

If the UDT is positive, it should be discussed in a non-judgmental, supportive way with the patient to see if there might be another cause of the positive result. Sometimes detecting an illicit substance can be used as a motivation to change. Referral to addiction specialist should be considered if it is not your area of expertise. The federal regulations on

prescribing to a narcotic dependent individual should be considered. See the *Key Info Guide: Government Regulations on Prescribing Controlled Substances* on this website.

A more complete discussion of interpretation of test results is provided in the resource on this page.

[Urine Drug Testing in Clinical Practice: The Art and Science of Patient Care \(4th Ed.\)](#) [2]

References:

[Common Opiate Metabolism Pathways](#) [19]

[The role of urine toxicology in chronic opioid analgesic therapy](#) [16]

[Urine Tox Screening: Disease & Therapy Related Considerations](#) [20]

[Urine drug testing in pain medicine](#) [10]

[Utility and Application of Urine Drug Testing in Chronic Pain Management with Opioids](#) [21]

[Urine Drug Testing in Clinical Practice: The Art and Science of Patient Care](#) [9]

Recommended Starting Points/Getting Started with UDTs in Your Practice

Relationship with a Laboratory

It is important for physicians who are conducting UDT to have a good relationship with a laboratory. Inform the laboratory of the purpose of the UDT and which drugs should be present or which you think could be present in each case. Results that are unexpected or abnormal need to be discussed with the laboratory before talking to the patient (Gourlay, et al, 2010) When choosing a laboratory to work with, it is a good idea to shop around for the laboratory that offers you the best price for testing (Heit and Gourlay, 2004).

Setting Up a Standard Screen

Have a standard set of drugs for which to screen in place, and then conduct further, confirmatory testing if necessary. As a starting point, one recommended set of drugs to include in a urine screen is:

- Cocaine
- Amphetamines
- Opiates
- Methadone
- Marijuana
- Benzodiazepines

(Gourlay, et al, 2010)

Management of Results and Coordinating Care

Add urine test results and interpretation to the patient's chart (Compton, 2009).

If the results are confirmed to be abnormal after other possibilities are ruled out, meet with the patient to discuss. Maintain a positive attitude to encourage motivation to change.

If referral to a specialist for a comorbid condition is being considered, UDT results can help in the decision (Gourlay, et al, 2010). Referral to an addiction specialist and continued management of the patient are discussed in the *Ongoing Management* course.

State List of HHS Certified Laboratories [22]

References:

Urine Tox Screening: Disease & Therapy Related Considerations [20]

Urine drug testing in pain medicine [10]

Urine Drug Testing in Clinical Practice: The Art and Science of Patient Care [9]

Summary

- Experts recommend developing a standard urine testing procedure that is part of the treatment agreement and evaluating all patients, before initial treatment and then on an "as requested" basis.
- The UDT is one objective patient management tool, but it alone cannot be used to diagnose a drug use problem.
- There are two main types of urine drug testing - screening and confirmatory. Screening tests are an initial, qualitative test that can detect classes of drugs. Confirmatory tests can affirm the presence or absence of a specific drug.
- An abnormal result does not necessarily mean patient misuse or diversion is occurring. Consider the possible scenarios that could have led to the result, including cross-reactivity and laboratory error.

The End

[Return to the list of Key Info Guides](#) [23]

Source URL: <http://www.opioidrisk.com/node/487>

Links:

[1] <http://www.opioidrisk.com/print/book/export/html/487>

[2] <http://www.opioidrisk.com/node/826>

[3] <http://www.opioidrisk.com/node/497>

[4] <http://www.opioidrisk.com/node/1614>

[5] <http://www.opioidrisk.com/node/1820>

[6] <http://www.opioidrisk.com/node/1483>

[7] <http://www.opioidrisk.com/node/1619>

[8] <http://www.opioidrisk.com/node/1620>

[9] <http://www.opioidrisk.com/node/1821>

[10] <http://www.opioidrisk.com/node/1621>

[11] <http://www.opioidrisk.com/node/1616>

[12] <http://www.opioidrisk.com/node/760>

[13] <http://www.opioidrisk.com/node/761>

[14] <http://www.opioidrisk.com/node/763>

[15] <http://www.opioidrisk.com/node/1359>

[16] <http://www.opioidrisk.com/node/1618>

[17] <http://www.opioidrisk.com/node/1623>

[18] <http://www.opioidrisk.com/node/1931>

- [19] <http://www.opioidrisk.com/node/1822>
- [20] <http://www.opioidrisk.com/node/1823>
- [21] <http://www.opioidrisk.com/node/1624>
- [22] <http://www.opioidrisk.com/node/765>
- [23] <http://www.opioidrisk.com/node/486>