THE USE OF DRUG TESTING IN MONITORING THE IMPAIRED MEDICAL PROFESSIONAL

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ABSTRACT

Drug testing is considered a major part of monitoring medical professionals disciplined by licensing boards. Drug testing can serve two different roles when used by a licensee; the other to help the licensee maintain abstinence. The results of the drug tests themselves can also be confounding. As with all medical tests, a drug test may be accurate or yield a false positive or a false negative. For example, a board may learn from other sources a licensee is using drugs, but a drug test is negative. A licensee may insist they are not using drugs, but a drug test is positive. We discuss the role of drug testing in helping boards and the technical aspects of testing, to help boards decide when to use drug tests and how to interpret them.

Chemical dependency and substance-use disorders are major reasons why physicians and other licensees are disciplined by state medical boards. This is not surprising when you consider the lifetime risk for alcohol dependence in a general population has been estimated to be 15 percent.[1] The corresponding risks for amphetamines are 1.5 percent, cannabis five percent, cocaine two percent, and opioids 0.7 percent. The very nature of the illnesses plays a role. Unlike a simple infection, substance dependence is a chronic relapsing illness. Denial, the psychological defense where an individual is unable to recognize the truth of a fact before them, is a characteristic of the illness. As a result, while a physician with an infection may be able to acknowledge it, a physician with a substance-use disorder may be unable to acknowledge it even when directly presented with the facts. This pattern places individuals with substance-use disorders at risk for relapse. If the individual is a physician, they then become a concern of licensing boards.

As part of licensing boards' oversight of physicians with substance-use disorders, a board may choose to require random urine or serum screens for substances. Such screens actually play two roles. Individuals with substance-use disorders experience urges to drink or use their drugs again. This is a known characteristic of the illnesses. For those who want to remain sober, knowing there will be consequences of reuse can help them avoid those urges. This is the rationale for prescribing disulfiram to individuals with alcohol dependence. Disulfiram blocks the metabolism of acetaldehyde, a breakdown product of ethanol. Individuals who take disulfiram and drink become intensely ill, with nausea and vomiting. However, disulfiram alone will not assure sobriety. If an individual taking disulfiram wishes to drink, they can just avoid taking a dose that morning. Disulfiram's major usefulness is in individuals who want to remain sober, but need the added help of an external "conscience," to help them avoid relapsing.

Drug testing can play the same role. By itself, it will not assure sobriety. However, when a licensee under monitoring knows that if they drink, it may be detected and their license may be suspended, then drug testing aids the licensee's sobriety.

Drug testing also helps boards detect relapse. Again, substance-use disorders are relapsing illnesses. As part of their responsibility to protect the public, boards need assistance to help determine when their licensees have relapsed.

To be effective, drug tests need to be able to detect use. Several issues play a role in determining a test's effectiveness. One is the timing of the drug test. A second is the collection protocol. A third is the time that the substance can be detected in the body. A fourth is the sensitivity and specificity of the test used. We will discuss each of these.

TIMING OF DRUG COLLECTION

The timing of the collection protocol plays a major role. If

tests are done on a scheduled basis or with adequate advance warning, the physician can plan to use the drug at a time when he or she will not be tested. How does this occur in real life? Many organizations try to collect "random" urine drug tests but then avoid collecting the tests on weekends. If this occurs, a licensee can wait until Friday night, and then drink that night. If he or she then drinks adequate water, they can have a negative urine test by next Monday morning.

Similarly, if tests are never performed on consecutive days, the licensee can use being tested as a reason for using their drug. If they use a drug with a relatively short-detection period, they know they will not be detected as they will not be tested the following day.

To be maximally effective, a licensee needs to have an equal opportunity of being tested on any given day. For example, a licensee may be screened 15 times a quarter, approximately once a week. This really means that on any given day, he or she should have about a one-in-six chance of being tested. This may result in some quarters where the licensee is tested more than 15 times and some quarters where they are tested less than 15 times. However, it can also result in some circumstances where the licensee is tested three days in a row.

The logistics and costs of establishing a drug monitoring program are not simple. I am not advocating all boards establish such a program. Rather, boards must be aware of the strengths and weaknesses of their monitoring program when they require licensees to be monitored. Knowing this as well as understanding why they are requiring monitoring helps the board determine the best monitoring for any given licensee.

COLLECTION PROTOCOL

The collection protocol for the body fluid is an important factor. If a licensee knows their own urine is positive, they may try several techniques to prevent it from being tested. The broad categories include dilutents, interfering substances, or submitting someone else's urine. Dilutents are substances to dilute urine, to reduce the drug concentration below the detection limit of the laboratory. These can be as simple as a large intake of water, or they can be actual diuretics.

Interfering substances and adulterants are used to interfere with the laboratory assay. Some can be ingested. Others are added to the urine sample. Some are common household chemicals. Others are easily bought over the Internet.

Lastly, it is possible to submit someone else's urine as your own. Hopefully, but not always, the licensee will have purchased the "clean" urine sample from someone who is not using substances.

The collection protocol used can help prevent these activities. The steps to be included may include actually observing micturition. This is not always fool-proof. Individuals have been known to self-catheterize themselves and inject someone else's urine into their bladder. Elaborate schemes involving intravenous bags and tubing have also been used.

Having the individual provide the sample in a room where a coloring agent is placed in the toilet and the water is turned off in the sink reduces the likelihood of dilution by adding additional water. Checking the temperature of the urine sample helps assure that the sample comes from the bladder, or was at least held close to the body.

Most drug-testing laboratories will detect dilution by measuring specific gravity, creatinine and osmolality. A urine sample with a low specific gravity and a low creatinine should raise suspicions of dilution in an individual with otherwise normal renal function. Laboratories can often detect the presence of adulterants. However, depending on the drug of interest and the adulterant, the adulterant may prevent the lab from measuring the drug in the urine. Boards need to decide how they will deal with licensees who provide urine samples that are adulterated.

Chain-of-custody handling becomes important not for medical reasons, but as boards may need to take action based on a positive sample. In that case, it is important the board can demonstrate that the sample tested was the sample taken from the licensee.

DURATION OF DETECTION

Different drugs have different windows of detection, based both on their biologic half-life as well as their pharmacologic potency. Very high potency drugs may be present in the body in much lower levels, and hence can be much harder to detect. Some of the most difficult drugs to detect are high-potency, fast-acting agents. Sufentanil would be an example of one such drug. If a licensee's drug of abuse is sufentanil, then random drug-testing may not be of benefit to either help the individual maintain sobriety or to

help the board detect relapse. For-cause testing may still be of benefit to an employer.

Most drugs are detectable longer in the urine than in the serum, as they tend to accumulate in the urine. However, urine levels do not reflect the actual amount taken, as they can vary depending on how concentrated or dilute the urine is.

What follows below in Table 1 is an estimate of the window of detection of several substances.

Table 1.

Estimated Window of Detection	
Drug Name	Estimated Window of Detection
Amphetamine	1.5-3 days
Barbiturates	
Secobarbitol – fast-acting	2-3 days
Phenobarbital – slow-acting	5-15 days
Benzodiazepines	
Chlordiazepoxide – long-acting	5 days
Diazepam – long-acting	7-10 days
Alprazolam – short-acting	2 -3 days
Cocaine	1 day
Benzoylecgonine (metabolite)	3-4 days
Ethanol	1 day
Marijuana	3 hours
THC carboxylic acid	10-45 days
Methamphetamine	1.5-2 days
Morphine	2-3 days

TP Moyer

DRUG TEST SENSITIVITY AND SPECIFICITY

Most random drug testing is done in two phases. The first phase is an immunoassay, followed by analysis with gas chromatography/mass spectrometry (GC/MS) for drugs detected by the immunoassay.

An immunoassay will detect broad categories of drugs. A typical report will only tell if a drug of interest is present or not. Immunoassays are very good to screen negative samples, but they have a false-positive rate of about three percent.[2] The test uses antibodies and if a substance of interest is present in the urine, then the antibody binds to the substance. The amount of antibody bound is easily measured. The difficulty is the antibodies cross-react. For example, the antibody used in many laboratories for amphetamines will also bind to phentermine or fenfluramine. Moreover, other substances than drugs of interest may produce detectable urine substances. For example, consuming poppy seeds will result in morphine being detected in the urine, up to 2000 ng/ml for a half-day after eating, even though the poppy seeds cause no intoxicating effects.

If the antibody is present above a certain level, the initial screening is reported as positive. Urine drug levels are not quantitated with immunoassays. As the tests are reported as only "positive" or "negative," many individuals do not realize they too can have false positives or negatives. As noted above, a positive test may result from something other than the drug of interest binding with the antibody. Laboratories can confirm such positive tests by analyzing the sample with gas chromatography/mass spectrometry (GC/MS). GC/MS has a near zero percent false-positive rate, and usually can detect lower levels of the drug than can the immunoassay.

False negatives can also occur with an immunoassay. A false negative is when the laboratory reports the drug is not present, when it actually is in the urine. This occurs when the drug level is so low, not enough antibody binds to it for the test to be reported as positive. Usually, GC/MS can detect lowers levels of the drug than can the immunoassay. If the drug is present in low levels, the laboratory may report it as absent by immunoassay, but then detect and quantitate it with GC/MS, if they are asked to do the GC/MS. If a board wants to test an individual for use of one specific drug, than the most accurate results will occur by letting the laboratory know to quantitate the specimen for that specific drug, rather than to start by screening with an immunoassay.

Laboratories often set lower limits for drugs below which they will not quantitate them or report them as present. These limits are often based on Department of Transportation regulations. These limits may not be appropriate for the need of a medical board, which may want a lower detection limit. Medical boards may wish to establish a relationship with the director of the laboratory that performs their toxicology testing. Having a free flow of information will help boards know what substances are detected by their laboratory and at what level. It will help them when they encounter licensees who use unusual substances, not normally screened.

SUMMARY

Drug testing is a useful tool to help boards monitor licensees with substance-use disorders. As with all tools, it has its strengths and weaknesses. Drug testing may help a licensee maintain abstinence and it may help a board detect relapse. To be effective, the board must think about how to appropriately time the drug tests and assure the specimens are collected in an appropriate fashion. The timing of the tests depends upon the individual licensee's situation. Drug tests themselves are not fail-proof, and have both assets and short-comings. Board members need to be aware of the features of the tests, to apply the results in any particular case.

REFERENCES

1. American Psychiatric Association, Task Force on DSM-IV of the American Psychiatric. *Diagnostic and Statistical Manual of Mental Disorders: DSM-IV.--4th Ed., Test Revision*. Washington, DC: American Psychiatric Association, 2000.
2. TP Moyer, LK Oliver, LE Ebnet, JB Pruett. *Drug Testing: An Overview of the Tests Designed for Detecting Drug Abuse*. Rochester, MN: Mayo Reference Services, 2000.