ADDITIONAL INFORMATION ON DRUG OF ABUSE TESTING AT UNIVERSITY OF IOWA HOSPITALS AND CLINICS

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The Clinical Chemistry laboratory at University of Iowa Hospitals and Clinics currently offers two panels for drug of abuse screening:

"DRUG OF ABUSE – URINE"	[EPIC # LAB500]
"DRUG OF ABUSE – URINE + CONFIRM"	[EPIC # LAB1032]

Effective Monday, April 12, 2010, these panels will both include the following screening tests:

Amphetamines
Barbiturates
Benzodiazepines
Cocaine
Opiates
Oxycodone/oxymorphone

In 2009, screening tests for phencyclidine (PCP) and tricyclic antidepressants (TCAs) were dropped from the routine panels due to a high rate of false positives and the uncommon use of PCP in this part of the country.

Confirmatory testing

The "DRUG OF ABUSE – URINE + CONFIRM" includes reflex confirmation (with exceptions outlined below) for positive screens for amphetamines, barbiturates, cocaine, opiates, and oxycodone/oxymorphone. Currently, all confirmation testing is forwarded to ARUP Laboratories (Salt Lake City, UT) with turnaround time taking at least 2-3 days.

Automatic reflex testing is not done for the UI Hospitals and Clinics Emergency Treatment Center (UIETC) for the above tests. Automatic reflex testing is also not done for opiates for patients in either the UIETC or inpatient units. These policies were instituted some years ago given that confirmation results available 2-3 days or more later would often be irrelevant to UIETC patients and due to the high percentage of patients who receive opiates as medications in the hospital. There is also the issue of cost and utilization given that the confirmation send-outs can be quite expensive.

Confirmation testing for benzodiazepines currently requires a positive screening result and a call to Laboratory Specimen Control (6-3527). Due to the way the drug of abuse assays are currently configured, we have not been able to allow for direct ordering of confirmation 'add-ons' within Epic.

Limitations
False negatives

One of the major limitations of drug of abuse screening is false negatives. Three of the most clinically important false negatives are:

a. Poor detection of oxycodone (a synthetic opiate) by the opiates screen.
b. Poor detection of alprazolam and clonazepam by the benzodiazepines screen.
c. Poor detection of MDMA/Ecstasy by the amphetamines assay.

These limitations are common to many commercially available drug of abuse screening tests, not just the Roche Diagnostics system used at University of Iowa Hospitals and Clinics. The mechanism is due to the antibodies used for the assay. For example, opiates assays generally use antibodies that were raised to detect morphine. These antibodies tend to cross-react well with codeine, heroin, hydrocodone, and hydromorphone, but not with oxycodone. This limitation has been addressed with the addition of the oxycodone screen to the routine DAU panels. The opiates assay additionally does not recognize synthetic opioids such as buprenorphine, fentanyl, meperidine, methadone, and propoxyphene. A list of common assay false positives and negatives are listed in the Drug of Abuse screening test summary Table.

Send-out testing

To detect some of the drugs missed by the screening tests, the following send-out testing is available for ordering within Epic:

"AMPHETAMINE, URINE" [for MDMA/Ecstasy]
"METHADONE & METABOLITE, URINE"
"FENTANYL & METABOLITE, URINE"

False positives

False positives are much less common with the current generation of drug of abuse screening than with older versions of these assays. This is consistent with experience at University of Iowa Hospitals and Clinics in the confirmation tests that were sent out over the last year (1/1/2009 – 1/15/2010) following a positive initial screen:

Amphetamines – 96.3% confirmed positive
- 18.5% amphetamine only [all on Adderall or equivalent]
- 77.8% methamphetamine
- 3.7% unconfirmed [false positive]

Barbiturates – 93.8% confirmed positive
- 50% phenobarbital
- 31.3% pentobarbital [all from in-hospital procedures]
- 12.5% butalbital [e.g,. in Fiorinol®]
- 6.3% unconfirmed [false positive]

Benzodiazepines – 100% confirmed positive

Cocaine – 100% confirmed positive

Opiates – 100% confirmed positive

Table
Drug of abuse screening test summary

Urine drug of abuse assay	**Detected well**	**Detected poorly or not at all**	**False positives**
Amphetamines	Amphetamine Methamphetamine	MDMA/Ecstasy MDA	Generally rare Mexilitine Selegiline Sertraline
Barbiturates	Butalbital Pentobarbital Phenobarbital Secobarbital	Thiopental	Rare
Benzodiazepines	Diazepam Lorazepam Oxazepam Temazepam	Alprazolam Clonazepam Eszopiclone Zolpidem	Protein-pump inhibitors
Cocaine	Benzoylecgonine Cocaine	Other cocaine metabolites	Very rare
Opiates	Codeine Morphine Heroin + heroin metab. (6-acetylmorphine) Hydrocodone Hydromorphone	Buprenorphine Fentanyl Meperdine Methadone Oxycodone Oxymorphone	Rare
Oxycodone	Oxycodone Oxymorphone		Very rare
THC	Dronabinol (Marinol®) Marijuana		Rare

Other frequently asked questions

1. "Could passive inhalation have caused the positive THC screen?"

Short answer is essentially no. The cut-off for THC screening used at University of Iowa Hospitals and Clinics is 50 ng/mL, a urine concentration that is almost impossible to achieve even with heavy second-hand marijuana smoke. In controlled research studies where volunteers breathed in heavy second-hand smoke from multiple users in an enclosed room, the highest levels achieved in urine were only 15-20 ng/mL. Similar findings have occurred with studies of passive crack cocaine inhalation.

2. "Can consumption of poppy seeds cause a positive opiates screen?"

This can actually happen if the opiates screen cut-off is 300 ng/mL, as it is at University of Iowa Hospitals and Clinics. The employee (workplace) drug screening cut-off for opiates is much higher (2,000 ng/mL) so a positive with that cut-off due to poppy seeds is extremely unlikely.

3. "Can lidocaine (or another local anesthetic ending in –caine) cause a false positive cocaine test?"

None of the local anesthetics in clinical use cross-react with the cocaine assay.

Other resources:

Pathology Laboratory Services Handbook

Look at entries for Drugs of Abuse Screen, Urine and Drugs of Abuse Screen Confirmation, Urine