Urine Drug Screening (UDS)

Table 1: Why, who, and when?

Why do UDS?[1,2,3]	Which patients should receive UDS?	When should UDS be ordered?[1]
• Improve safety, encourage communication, and promote transparency of drug use • Establish reliability of patient's reported medication history • Monitor adherence and detect potential diversion	• Should be used routinely regardless of how well the patient is known to the prescriber • A universal approach will help destigmatize testing • "I do this routinely for all of my patients on opioids"	• At baseline (when receiving a new patient or opioids or starting an opioid trial) • At follow-up after initiation • Then annually or more frequently if high risk or aberrant drug-related behaviours • Consider testing randomly to minimize potential for tampering

Table 2: Immunoassay vs. broad spectrum (mass spec/chromatography)[2,3]

	Immunoassay (IA)	Gas Chromatography/Mass Spectrometry (GCMS) Liquid Chromatography/Tandem Mass Spectrometry (LC-MS/MS)
Use	Screening test Presumptive only; confirmatory testing needed for significant decisions (e.g. legal/employment/forensic)	Reserved for confirmatory testing (due to expense and time required)
Interpretation	Does not differentiate between various opioids May not detect: • Semi-synthetic opioids (e.g. buprenorphine, hydrocodone, hydromorphone, oxycodone, levorphanol) • Synthetic opioids (e.g. tramadol, fentanyl, meperidine, methadone)	Differentiates: codeine, morphine, oxycodone, hydromorphone, heroin More sensitive for semi-synthetic and synthetic opioids Sensitivity will depend on individual laboratory cut-off criteria
Detection time	Longer timeframe (3-5 days)	Shorter time-frame (1-2 days)
Convenience	Rapid results; inexpensive	Longer turnaround time for results; more expensive

Table 3: Detection times[3,4,5]

Drug	Detection time
Amphetamines	Up to 2-5 days (false positives common due to cross-reactivity – see Table 5)
Benzodiazepines	Short acting: 1-7 days Long acting: 30 days Does not distinguish different benzodiazepines; false negative for clonazepam & lorazepam
Cannabinoids - THC	Single use: 3 days Moderate use (4x/week): 5-7 days Chronic daily use: 10-15 days Chronic heavy smoker: >30 days Nabilone not detected Nabiximols (Sativex) test positive for THC
Cocaine + metabolite	2-4 days IA (for acute users) up to 1 week (for chronic users)[6,7,8]; 1-2 days GCMS
Heroin 6-MAM[monoacetylmorphine]	Rarely detected (short half-life 3-5 minutes) 2-8 hours IA; <12 hours GCMS
Methadone/EDDP metabolites	3 days (methadone); 6 days (EDDP metabolites)
Opioids	3 days IA (codeine, hydrocodone, hydromorphone, morphine); 1-2 days GCMS Often missed: fentanyl, oxycodone, methadone

Note: Must also consider factors that could affect detection time: half-life of drug, drug metabolites, drug interactions, dosing interval, dosage, chronic vs occasional use, time of last ingestion, body mass, pH of urine, urine concentration, and renal or liver impairment

Interpretation[1,2,3,4]

- Give opportunity for patient to address results
- Remember results could be false (false negative or false positive, see Table 4)
- Repeat UDS if results are plausibly false or use confirmatory test (GCMS or LC/MS-MS)
- Review opioid metabolism

Opioid metabolism[5]

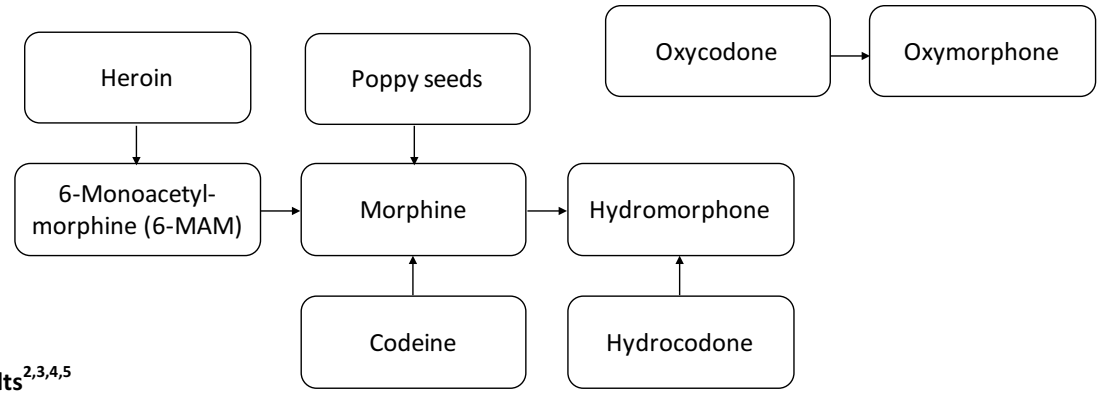

Table 4: Unexpected results[2,3,4,5]

Results	Possible explanation	Action
False positive	• Could occur when an interfering drug or substance is present in the sample and is detected by the assay (common with immunoassays); see Table 5	• Repeat UDS • GCMS can assist in ruling out suspected false positives in immunoassays
False negative	• Absolute quantity of drug is below the limit of detection (check with your lab for detection cut-offs) • Last dose taken outside of detection window • Drug not recognized by assay • Specimen tampered with	• Repeat using GCMS; specify drug of interest (e.g. oxycodone, fentanyl, methadone often missed by IA) • Confirm dose and time last dose taken • Sample control (check temp, specific gravity, pH, creatinine, eliminate water sources, direct observation)

* Due to the complexity of UDS and potential for errors, consider discussing with a colleague or service that deals with UDS frequently. Remember to use as a tool to help offer quality patient care rather than as a punitive tool.

Table 5: Cross-reacting substances[2,3,4,5]

Substance tested via immunoassay	Interfering agents
Amphetamines	Amantadine, bupropion, desipramine, diet pills, dextroamphetamine, doxepin, labetalol, methamphetamine, pseudoephedrine, ranitidine, trazodone, venlafaxine, desvenlafaxine
Benzodiazepines	Sertraline, dimenhydrinate, efavirenz
Cannabinoids	Proton pump inhibitors, efavirenz, NSAIDS, baby wash products, nabiximols
Cocaine	Coca leaf tea, topical anesthetics containing cocaine
Opiates	Dextromethorphan, poppy seeds, quinine, quinolones, rifampin
Methadone	Diphenhydramine, doxylamine, verapamil, quetiapine
Fentanyl	Risperidone, trazodone

Table 6: Urine tampering[2,3,4]

Substitution	Dilution (most common)	Adulteration (foreign substances added to sample to mask drug)
• Different person • Different time period	• Pre-collection → hydration, water loading, diuretics • Post-collection → adding water or fluid to sample • Check creatinine (<2-3 mmol/L suggests dilution)	• pH shift: vinegar, bleach, ammonia, lemon, Drano • Disrupt testing chemistry: salt, methanol, detergent

Evidence[1,9]

- 30% of UDS will show aberrancy; mostly non-detection of prescribed opioids and presence of THC
- Canadian Guideline for Opioids in Chronic Non-Cancer Pain: UDS is an expert opinion (not a guideline) for risk mitigation due to lack of evidence
    - Large retrospective cohort study: no difference in rates of opioid overdose for those who did or did not receive baseline UDS but very low-quality evidence
    - Non-randomized study: higher levels of UDS in a Veteran's Affairs healthcare system were associated with lower risk of suicide and drug events

References

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