Objectives

By the end of this lecture, the learners will

- Know the difference between drug screens and confirmations
- Be able to interpret clinical drug screens
- Know the screening options and limitations of the TriCore Lab drug screens
- Begin to apply the use of clinical drug screens in primary care
Uses of Clinical Drug Screens

- Employment related
- Legal reasons
  - Probation
  - Accidents on the job
- Clinical
  - Monitoring patients with addiction history for relapse
  - Monitoring patients on controlled substances for adherence and for substance abuse
  - Monitoring a patient with a condition in which drug use puts them at additional risk
    - Pregnancy
    - Hepatitis C
    - HIV
Think about why you’re testing

• Clinical Drug Screening is done for the patient, not to the patient
• Never make drug testing punitive
What will you do with the results?

• Always think about why you are doing the test and what you might do with an unexpected result
What are you looking for?

Drug tests DO detect
- Recent drug USE
- Except hair and nail testing, can only detect use within the past week

Drug tests DO NOT detect
- Impairment
- Addiction
- Abuse
- Dependence
What can be tested?

- Urine
- Blood
- Hair
- Saliva
- Sweat
- Nails
- Breath
- Practically, and at UNM, our option is urine testing
What drugs can be tested for?

- **“SAMHSA Five”**
  - Marijuana, Cocaine, Amphetamines, Opiates, PCP

- **Tricore options**
  - Amphetamines, Barbiturates, Benzodiazepines, Cannabinoid, Cocaine, Darvon, Methadone, Opiates, PCP, TCA, Demerol, Oxycodone, Tramadol, Fentanyl, Soma, Zolpidem, Buprenorphine
  - Alcohol, acetaminophen
Screening tests

- Drug screening tests usually test for monoclonal antibodies which are highly specific to the individual drugs or their metabolites.
- High sensitivity (low levels of drugs can be detected) but may not be specific:
  - May have high number of false positives on some assays.
- Relatively inexpensive.
- Available as a send out to lab and as POC (point of care) tests.
Send to lab or POC in clinic?

- What is the difference?
- POC in clinic
  - Immediate result
  - Able to discuss with the patient at the visit
  - Can make prescription decisions at the time of visit
  - Tests for the most commons substances, including oxycodone
- Send to lab
  - Can get a more detailed assay
  - Have to wait for the result
QuickTox

• Cocaine
• Opiates
• Methamphetamines
• THC
• Amphetamines
• PCP
• Benzodiazepines
• Barbiturates
• Methadone
• Tricyclics
• MDMA
• Oxycodone
Screening Options at TriCore

- **UDM**
  - Amphetamines
  - Barbiturates
  - Benzodiazepines
  - Cocaine
  - Methadone
  - Opiates
  - Propoxyphene
  - THC

- **UDM Pain**
  - Amphetamines
  - Barbiturates
  - Benzodiazepines
  - Cocaine
  - Demerol
  - Fentanyl
  - Methadone
  - Opiates
  - Oxycodone
  - Pcp
  - Propoxyphene
  - Soma
  - THC
  - Tramadol
  - Tricyclics
  - Zolpidem
Urine Testing

• The Pluses:
  - Most commonly used matrix
  - Lowest cost
  - On-site testing widely available
  - Large number of drugs can be identified in urine
  - In disputed results, the original sample can be retested

• The Minuses:
  - Cheating
  - Patient “can’t go”
  - Relatively short drug detection window
### Length of time drugs can be detected in urine

<table>
<thead>
<tr>
<th>Drug</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>7-12 hours</td>
</tr>
<tr>
<td>Amphetamines</td>
<td>48 hours</td>
</tr>
<tr>
<td>Barbiturates</td>
<td>Short-24 hrs, Long-3wk</td>
</tr>
<tr>
<td>Benzodiazepines</td>
<td>Short-3 days, Long-30 D</td>
</tr>
<tr>
<td>Cocaine</td>
<td>2-4 days</td>
</tr>
<tr>
<td>Marijuana</td>
<td>3-30 days</td>
</tr>
<tr>
<td>Opioids</td>
<td>2-3 days</td>
</tr>
<tr>
<td>Phencyclidine</td>
<td>8 days</td>
</tr>
</tbody>
</table>
Length of detection

• Marijuana – depends on use
  o Single use
  o Moderate use (4xwk)
  o Daily use
  o Heavy, long-term use

• Opioids – depends on drug
  o Codeine
  o Heroin
  o Hydromorphone
  o Methadone
  o Morphine
  o Oxycodone
  o propoxyphene

• Time of detection
  o 3 days
  o 5-7 days
  o 10-15 days
  o >30 days
  o 48 hours
  o 48 hours
  o 2-4 days
  o 3 days
  o 48-72 hours
  o 2-4 days
  o 6-48 hours
Mrs. Smith

- A 55 yo female with a history of chronic back pain comes in for her refills. She is prescribed oxycodone 5mg QID. A UDM is sent to TriCore and returns the next day. What do you think of these results?

- Amphetamines Positive
- Barbiturates Negative
- Benzos Negative
- Cocaine Negative
- MTD Negative
- Opiate Negative
- Propoxyphene Negative
- THC Negative
Amphetamines

• One of the most difficult assays to interpret
• Many drugs can cause false positive result

- Amantadine
- Benzphetamine
- **Buproprion**
- Chlorpromazine
- Clobenzorex
- L-Deprenyl
- **Desipramine**
- Dextroamphetamine
- Ephedrine
- Fenproporex
- Isometheptene
- Isoxsuprine

- Labetalol
- MDMA
- Trazodone
- Trimipramine
- Methamphetamine
- Phentemine
- Phenylephrine
- Phenylpropanolamine
- Promethazine
- Pseudoephendrine
- Ranitidine
- Ridotrine
- Selegiline
- Thioridazine
Amphetamines

• Always remember to ask about a detailed medication history
  o Prescription drugs
  o Over the counter drugs
  o Herbal medications
  o Cold medications and home remedies
Barbiturates

• Duration of detection is variable depending on the drug and dose
• No common false positive results
• **Short-acting detected 1-4 days**
  - Butalbital
  - Pentobarbital
  - Secobarbital
• **Long-acting detected for weeks**
  - Phenobarbital
Benzodiazepines

- Urine drug testing can be complicated by the multiple drugs available.
- Most assays detect unconjugated oxazepam.
- Chlorazepate, chlordiazepoxide, diazepam, and temazepam metabolize to oxazepam.
- Clonazepam metabolizes to 7-amino benzodiazepine.
- Alprazolam, lorazepam and triazolam are excreted as glucuronide conjugates.
- When in doubt, order confirmatory test or call lab about an assay that will detect what you’re looking for.
Benzodiazepine Metabolism

ALPRAZOLAM (Xanax)
- ALPHA HYDROXY ALPRAZOLAM

CLONAZEPAM (Klonopin)
- 7-AMINO CLONAZEPAM

FLUNITRAZEPAM (Rohypnol)
- 7-AMINO FLUNITRAZEPAM

CHLORDIAZEPOXIDE (Librium)

CLORAZEPATE (Tranxene)

NORDIAZEPAM
- DIAZEPAM (Vallum)
- TEMAZEPAM (Restoril)

OXAZEPAM (Serax)

KNOWN METABOLITES

Oxazepam and Nordiazepam are the primary metabolites of many benzodiazepines. Many Benzodiazepines occur as glucuronide conjugates in urine.

Shading indicates Benzodiazepines confirmed at Andor Labs.

There are > 50 types of Benzodiazepines on the market. Others include:
- ESZOPICLONE (Lunesta)
- Nitrazepam (Insoma)
- Triazolam (Halcion)
- zaleplon (Sonata)
- Zolpidem (Ambien)
TriCore Benzo Assay

- Chlordiazepoxide
- Clonazepam
- Demoxepam
- Desalkylfurezepam
- N-desmethylidiazepam
- Diazepam
- May pick up alprazolam and lorazepam, but may not
Benzodiazepines

- Possible false positives for benzodiazepines
  - Oxaprozin
  - Sertraline
  - Tolmetin
Cocaine

• Screening urine immunoassays measure benzoylecgonine
• Immunoassays for benzoylecgonine are quite specific and have not been reported to have false positives with other drugs
• Both cocaine and “crack” will show positive result
Marijuana

- Immunoassays test for THC - tetrahydrocannabinol
- THC is highly lipophilic and stored in fat tissues
- Passive exposure
  - “I was just around other people smoking”
  - Possible, but unlikely unless around extreme concentrations of passive marijuana smoke
- Current assays have few false positives
  - Dronabinol
  - Hemp seed oil
  - Hemp containing foods
  - Past assays may have false positives with ibuprofen and naproxen but have now been modified to eliminate this cross-reactivity
Opiates

• Opiates are drugs derived from opium, the extract of poppy seeds
  ○ Morphine, Codeine and Heroin

• Opioid is a more comprehensive term and includes all agonists and antagonists with morphine-like activity
  ○ Natural opiates- morphine, codeine, heroin
  ○ Semi-synthetic- hydrocodone, hydromorphone
  ○ Synthetic- oxycodone, methadone, buprenorphine, fentanyl
Opioid Metabolism

- Known metabolites
- Pattern observed in patients receiving chronic opiate therapy

- NORCODEINE*
- CODEINE*
- NORMORPHINE*
- 6-MONOACETYLMORPHINE
- MORPHINE*
- HEROIN
- HYDROCODONE
- NORHYDROCODONE
- DIHYDROCODEINE*
- OXCODONE
- NOROXCODONE
- OXYPHORMONE*
- OXYPHORMONE*
- DIHYDROISOMORPHINE

* Forms glucuronide conjugate
Opioids

• Screening assays can be difficult to interpret
• Semi-synthetic and synthetic drugs do not always yield a positive screen
• Hydrocodone commonly positive on opiate assay
• Oxycodone, Methadone and Buprenorphine are commonly a separate assay
• Oxycodone can also cause positive opiate assay in high doses
Opioids

- Possible false positives
  - Dextromethorphan
  - Diphenhydramine and metabolites
  - Poppy seeds
  - Quinine
  - Quinolones
  - Rifampin
  - Verapamil and metabolites

- Verapamil and Diphenhydramine may also cause false positive for methadone
Opioids

• Confirmatory testing very useful in our clinical settings
• Can add a confirmation test to a positive screen
  o Call the lab
  o Enter order under power orders
  o Result will yield specific opioid results
    • Hydrocodone
    • Hydromorphone
    • Oxycodone
    • Oxymorphone
    • Codeine
    • Morphine
      o Heroin metabolizes to morphine and 6-MAM, may also see codeine
Confirmatory testing

- Uses highly specific processes with liquid chromatography or gas chromatography mass spectroscopy
- Can be added to a drug screen when positive test is seen and you want to check for false positive
  - For example, a patient who took a decongestant will have a positive screen for amphetamines but a confirmation test should be negative
Confirmatory Testing

• There are limitations to screening clinical drug tests
• GC/MS confirmations are available at TriCore
  o Must be ordered separately
  o Call to let the lab know that you are adding the confirmatory test
Confirmatory test codes

• Opiate GC/MS confirmatory testing--MXCOMO
• Benzodiazepine confirmatory testing—MBENZ
  o Will detect benzodiazepines that the screening assay may not detect
    • Clonazepam, lorazepam, temazepam
What will you do with results?

"You're fired, Jack. The lab results just came back, and you tested positive for Coke."
What are you going to do with the results?

• True Positives
  o Adherence to therapy with prescribed drugs
  o Detects use of illicit or non-prescribed substances

• False Positives
  o Error in the test
  o Cross reactivity

• True Negatives
  o Patient is not using the substance tested for

• False Negatives
  o Not testing correct drug
  o Adulteration or substitution
  o Dilute specimen
  o Drug metabolism is different
**Specimen Validity**

- Specimen validity tests determine whether a urine specimen has been **diluted**, **adulterated**, or **substituted** to obtain a negative result.

<table>
<thead>
<tr>
<th>Diluted</th>
<th>Adulterated</th>
<th>Substituted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diluted urine has something added</td>
<td>An adulterated specimen is one containing a substance that is</td>
<td>Synthetic urine products can be submitted. Or may be using another person’s urine</td>
</tr>
<tr>
<td>that makes the urine so dilute that</td>
<td>not normally found in urine, or is normally found, but is in</td>
<td></td>
</tr>
<tr>
<td>the targeted drug is below the</td>
<td>abnormal concentration</td>
<td></td>
</tr>
<tr>
<td>detected cutoff</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Coping with Cheating

- Observe the collection
  - Difficult to do in a clinical setting
- Test randomly, not scheduled
  - Ask patient to come in between appointments
  - Test when they are picking up a refill Rx
- Test for adulterants
- Monitor for pH
- Monitor for specific gravity
- Monitor for temperature
Unexpected results?

- Ask the patient
  - Ask the patient what might be in the urine when you test it
  - Let the patient know the result and ask why they think it could be an unexpected result
  - Do not be accusatory
  - Remember we are testing FOR the patient, not TO the patient
  - We are not policing them, we’re attempting to help them

- Review medications and herbal supplements for cross reactivity

- Send for a confirmatory test
Let’s talk about your cases

"These drug tests, they’re absolutely confidential right? I don’t want any rumors spread about me."