




Welcome and Opening Remarks

The National Conference on Substance Abuse, Child Welfare and the Courts


Division of Workplace Programs
Ron R. Flegel, BSMT, M.S. and Charles Lodico, ABFT, M.S.

September 16, 2011



Welcome - SAMHSA's Role

- **Substance Abuse and Mental Health Services Administration (SAMHSA)**
- An agency in the **U. S. Department of Health and Human Services (HHS)**
- Under a delegation of authority from the Secretary of Health and Human Services, SAMHSA's **Division of Workplace Programs** carries out the HHS role in the Federal Drug-Free Workplace Program



Welcome – SAMHSA's Direction

- **Mission:** To reduce the impact of substance abuse and mental illness on America's communities
- **Roles:**
 - Voice & Leadership
 - Funding Service-Capacity Development
 - Information/Communications
 - Regulation and Standard Setting
 - Improve Practice
- **8 Strategic Initiatives**



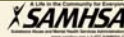

Welcome – SAMHSA Key Messages

- Behavioral health is essential to health
 - Improves health status
 - Lowers costs for families, businesses, and governments
- Prevention works
- Treatment is effective
- People recover




Welcome – SAMHSA Principles

- People
 - *Stay focused on the goal*
- Partnership
 - *Cannot do it alone*
- Performance
 - *Make a measurable difference*



Objectives

- What are the beliefs about drug testing?
- Which drugs do you test?
- Which type of specimen should you test?
- What is the best procedure(s) when testing for drugs?
- How do you interpret the drug test results?
- Who should interpret the drug test results?
- Which type(s) of additional testing should be used?



Executive Order

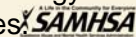
"The Federal Government, as the largest employer in the nation, can and should show the way towards achieving drug-free workplaces through a program designed to offer drug users a helping hand...."

Executive Order 12564
September 15, 1986



Testing Trends

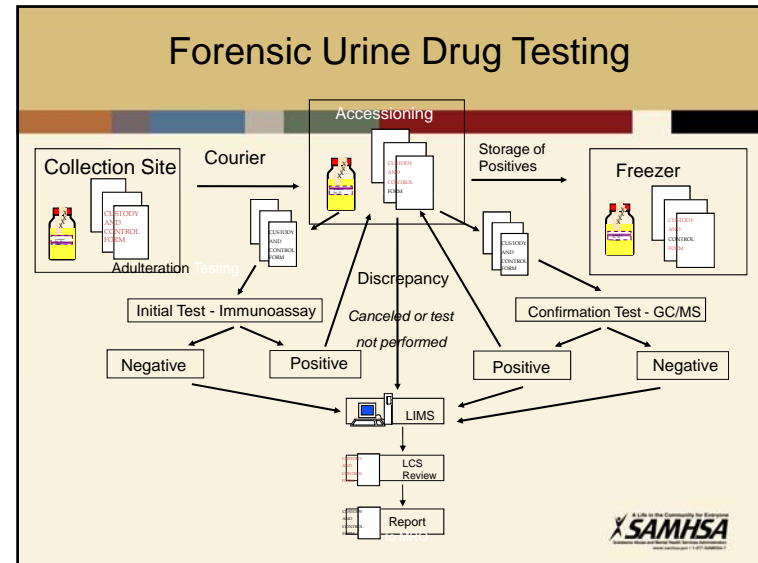
- '70s military testing programs targeted illicit drugs to steer soldiers to treatment.
- '80's Federal workplace programs targeted illicit drugs to deter illegal use.
- '90s DOT authorized MROs to inform employers of safety related issues to Rx drug use.
- '90s Growth of testing by pain clinics and impaired professionals were introduced to monitor compliance and abstinence.
- 2010s Advances in the science and technology are being used to include alternative matrices.



Drug-Free Workplace



Forensic Urine Drug Testing



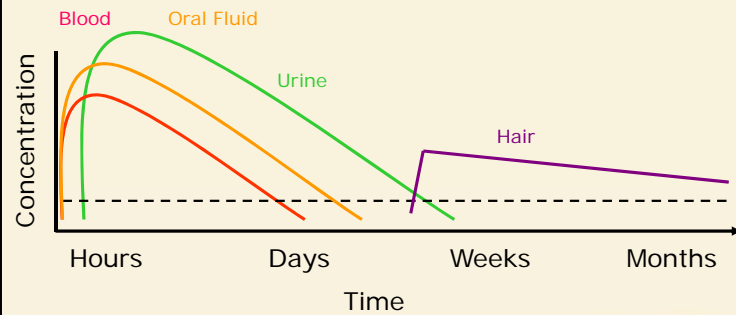
What Type of Drug Test?

- Child Welfare / Child Safety Drug Testing
 - Prenatal Substance Exposure
 - Workplace Drug Testing
 - Probation and Parole Drug Testing
 - Driving Under the Influence of Drugs (DUID)
 - School Drug Testing
 - Impaired Professionals Drug Testing
 - Pain Management Drug Testing
- The SAMHSA logo is located at the bottom right of the slide.

Drug Test Panel Selection

- Drug panel selections are based on the needs of the test
 - Add drugs of concern (e.g. expanded narcotics, stimulants, alcohol, nicotine)
 - Laboratory efficiency of the screening and confirmation methods are the cost drivers for the price of a testing panel
 - Costs for mass spectrometry screens are much more expensive than immunoassays (pennies vs. dollars) and requires hours instead of seconds)
 - Laboratories typically offer limited number of panels to minimize testing complexity – potentially hundreds of panels can be created
 - Broad panels include standard urine tests with automated analyzers, EIA testing, GC/MS or LC/MS/MS screens
 - Often little financial gain is achieved through the elimination of one or two compounds since multiple drugs can be screened or confirmed in the same method (ie. GC/MS screen or LC/MS/MS screen)
 - Data review and reporting is more labor intensive and complicated
 - Matrix type (Urine, Oral Fluid, Hair, Sweat etc.)
- The SAMHSA logo is located at the bottom right of the slide.

Drug Testing Profiles



Potential Advantages of Drug Testing Alternative Matrices

- Less Invasive Collection
- Multiple Sampling May Be Possible
- Greater Specimen Stability
- Lower Disease Risk in Specimen Handling
- Easier Shipment and Storage
- Differences in Window of Detection
Example: Pre-employment (Hair) vs. Post-Accident (Oral Fluid)
- May Be More Difficult to Substitute/Adulterate
- Parent Drug vs. Metabolites (oral fluid - THC vs THCCOOH)



What Laboratory Tests Don't Reveal

- Time of drug use
- Amount of drug use
- Frequency of drug use
 - But concentration, metabolite ratios together with toxicological information.....
 - Helps to establish boundaries
 - Days, weeks months
 - 1 mg, 10 mg, 100 mg, 1000 mg
 - Some specimen types provide more information than others (eg. Urine, Oral Fluid, Hair, Sweat)



Evaluate Substance Use by

- Random Drug Tests
- Self-Reports
- Observation of Behavioral Indicators
 - Positive changes in hygiene and grooming
 - Improved functioning in daily life
 - Improved work behavior
 - Avoidance of people, places, things associated with drug use
 - Compliance of treatment case plans.



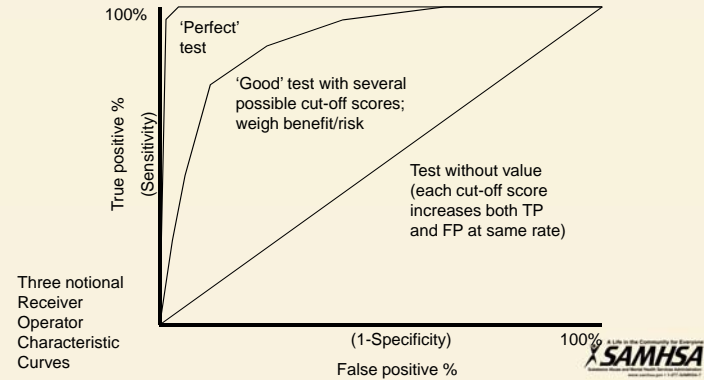
Drugs Typically Monitored in a Professional Panels

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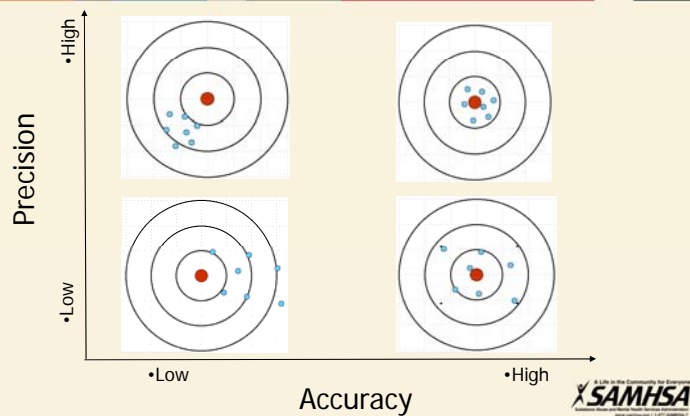
- Narcotics/Opiates
 - Buprenorphine
 - Butorphanol
 - Codeine/Morphine
 - Dihydrocodeine
 - Fentanyl
 - Hydrocodone
 - Hydromorphone
 - Meperidine
 - Methadone
 - Nalbuphine
 - Oxycodone
 - Oxymorphone
 - Pentazocine
 - Propoxyphene
 - Tramadol
 - Cocaine
 - Marijuana
 - PCP
 - Amphetamines
 - Ambien
 - Meprobamate
- Benzodiazepines
 - Alprazolam
 - Clonazepam
 - Diazepam
 - Estazolam
 - Flurazepam
 - Flunitrazepam
 - Halazepam
 - Lorazepam
 - Midazolam
 - Nitrazepam
 - Oxazepam
 - Temazepam
 - Triazolam
 - Barbiturates
 - Stimulants
 - Diethylpropion
 - Ritalin
 - Phendimetrazine
 - Phentermine
 - Ketamine
 - Alcohol (EtG and EtS)
 - Nicotine



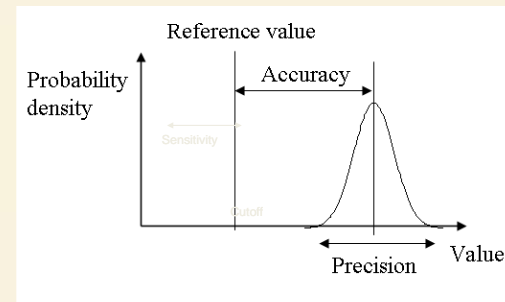
Establishing a Cutoff Value Plot TP/FP rate for each cutoff value



Precision and Accuracy



Establishing the Cutoff for a Specific Population



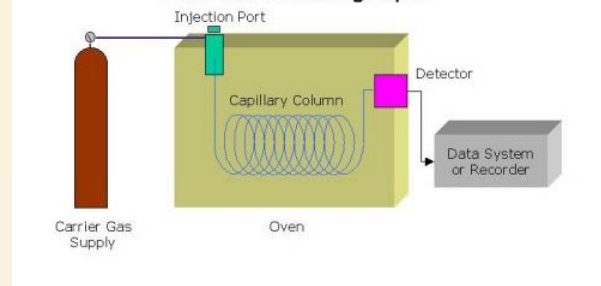
Immunoassays and Cross-Reactants

Potential Immunoassay Reactants and Cross-reactants

COMPOUND (Generic Name)	COMPOUND (Trade Name)	RESULTS
Abacavir	Ziagen	Non-reactive
Acetaminophen	Campal	Non-reactive
Acetaminophen (See also Paracetamol)	Aceta, Acetphen, Acacet, Dipacem, Feneril, Tylenol, Esocin (Combination), Paracetol, Tempus	Non-reactive
Acetaminophen with Cocaine (see also Paracetamol with codeine)	Tylenol 3, Tylenol with codeine	Positive for Cocaine (GC/MS, MDP)
Acetic Acid	Benzoic Acid	Non-reactive
Acetophenetidin	Phenacetin	Non-reactive
Acetylsalicylic acid	Aspirin, Anadin, Anasin, Bufferin, Caprin, Disprin, Spasin, Empirin, Excedrin (combination)	Non-reactive
Adiclovir	Zovirax	Non-reactive
Adisazolam	Deracyn	Non-reactive
Albuterol (salbutamol)	Aerocrom, Aerolin, Albutic, Aerasal, Combivent, Duobest, Ventolin, Verbeofast, Vortuba, Xopenex	Non-reactive
Alibartibal	No known trade names	Positive for Barbiturates (SAR)
Aligand	No known trade names	Positive for Barbiturates (SAR)
Alprazolam	Xanax	Positive for Benzodiazepines (SAR)
Aluminum Chloride Hexahydrate	Orchlor, Antycol Forte	Non-reactive
Aluminum Hydroxide	Alu-Cap, Alusim, Gastrocode, Kodentoon, Mucosil, Mucosil TC, Mucogel, Pyrogenone, Topal	Non-reactive
Alivine Citrate	Seasonal, Seasonal Flow	Non-reactive
Amisulpride	Elixi, Lenzal, Tryptid, Triptalin, Triptalin-M	Positive for Tricyclic Antidepressants (TCA)
Amisulpride	Cocul, Nonac	Non-reactive
Ammonium benzoate	Isocac	Non-reactive
Amobarbital	Amphyl, Trinal	Positive for Barbiturates (SAR)
Amoxicillin or Amoxicillin	Amoxil, Amoxam, Augmentin, Heliclear	Non-reactive
Amoxicillin	Penballin, Polycillin, Prinopen	Non-reactive
Amphetamine	Stripalia	Non-reactive
Amphetamine	Stripalia	Non-reactive
Antabuse	Diaufiam	Non-reactive
Antazoline Sulfonate	Orivine-Antalin	Non-reactive
Antipyrine	4-Dimethylaminopyrimine	Non-reactive
Apizobital		Positive for Barbiturates (SAR)

Confirmatory Methods

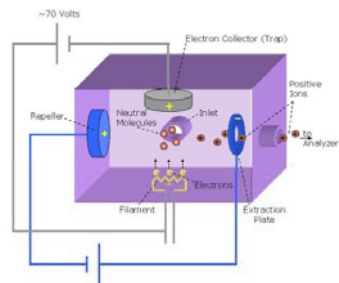
Gas Chromatograph



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Confirmatory Methods

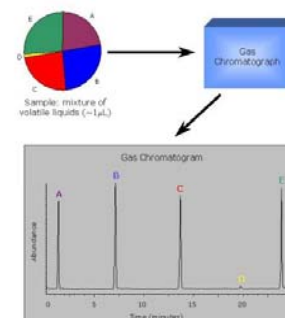
Electron Impact Ionization Source



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Confirmatory Methods

Gas Chromatography



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Adulteration Products Old Technology



SAMHSA
Substance Abuse and Mental Health Services Administration

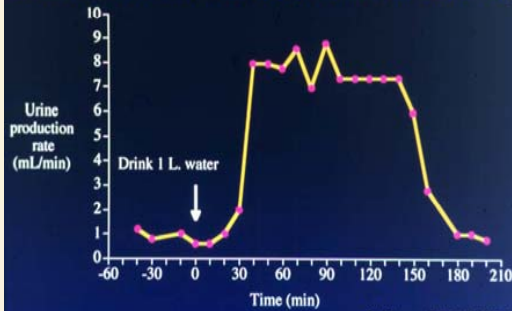
Adulterations Products New Technology



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Urine Production

Urine Production Rate After Water Loading



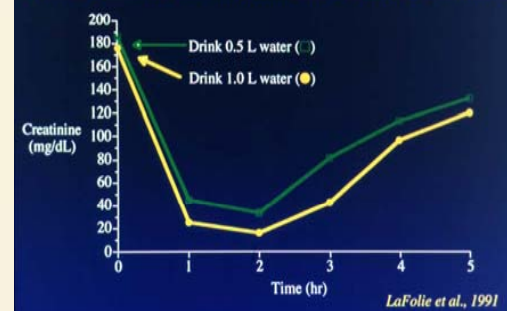
Baldes and Smirk, 1934

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Water Consumption and Creatinine Concentrations

Effect of Water Consumption on Urinary Creatinine



LaFolie et al., 1991

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POCT Specimen Validity Testing



Product Types

- Dilution Products
 - In Vitro – Physical (water)
 - In Vivo – Water loading (e.g., >120 oz of fluid)
 - In Vivo – Pharmacologic (e.g., xanthenes, alcohol)
- Cleansing Products
 - Internal colonic, metabolic (e.g., golden seal, psyllium)
 - Cleansing Drinks – combination
- Adulteration Additives
- Substitute Urine
 - Devices
 - Reservoirs
 - Catheter

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Dilution Products High Times December 2007 (pg 41)

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Cleansing Products High Times November 2007 (pg 71)

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<p>SUB-SOLUTION</p> <ul style="list-style-type: none"> • 100% Effective • Works for All Tests • Truly Undetectable • Taste Free Synthetic Urine • Short Heat Source - Repeat Temperature within Seconds • Urine - For Made or Residual Use • 100% Double Your Money Back Guarantee <p>\$45= Buy 3 get 1 Free</p>	<p>GREEN CLEAN</p> <ul style="list-style-type: none"> • One Hour Liquid Concentrate • Product Size 8.7 oz. Tube • Up to 3 Hours • Delicious Apple Flavor • 100% Double Your Money Back Guarantee <p>\$40= Buy 3 get 1 Free</p>	<p>Instant Gum ADD-IT-UP</p> <ul style="list-style-type: none"> • The Solution for Standby Situations • Undetectable Formula • Includes Heat Source for Control • No. More Hot • No. More Repeat • 100% Double Your Money Back Guarantee • Not recommended for Drug Testing <p>\$35= Buy 3 get 1 Free</p>
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Adulterants Targeting Oral Fluid

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Adulterants Targeting Hair

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PROBLEM:
 800 W. Customer Service
 Had to a Customer Service Representative that a hair follicle shampoo was not working. I had to wait a long time to get a response. I was told to use a hair follicle shampoo. I was told to use a hair follicle shampoo. I was told to use a hair follicle shampoo.

SOLUTION:
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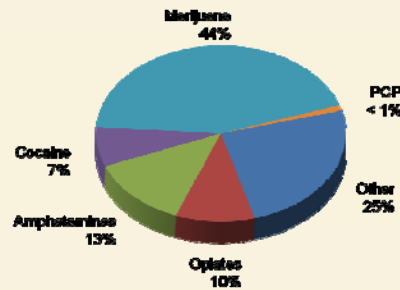
For more information, please call 1-888-281-4207 or visit us at www.purifyit.com

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Drug Distribution of Positive Urine Tests Among U.S. Workforce Tested by Quest Diagnostics Inc., Jan.- Dec., 2009

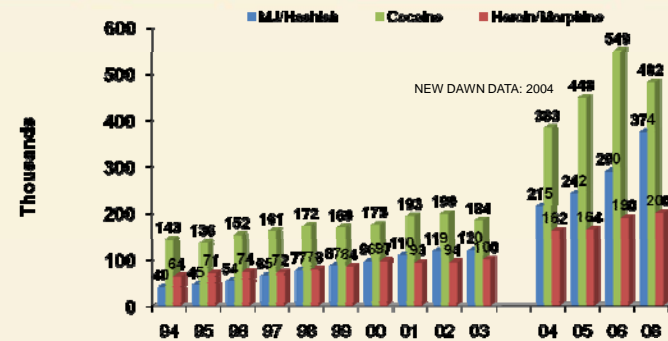
Jan.- Dec., 2009



Source: Quest Diagnostics, Drug Testing Index, 2010

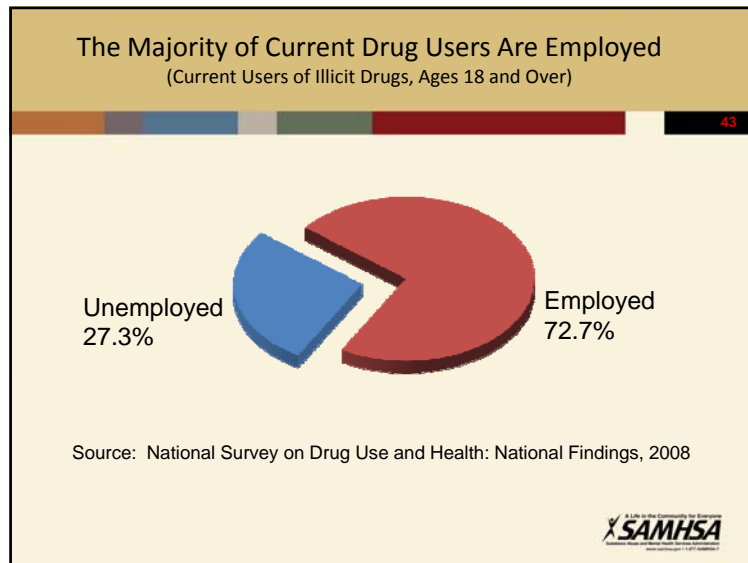
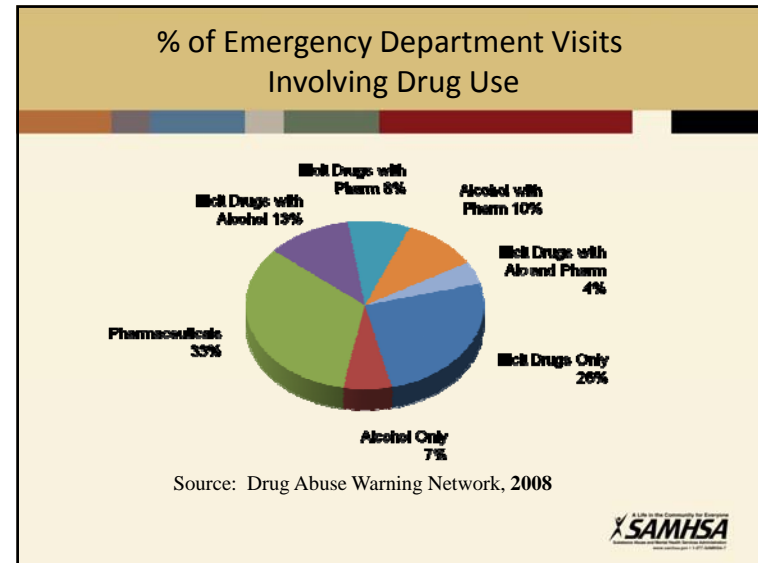
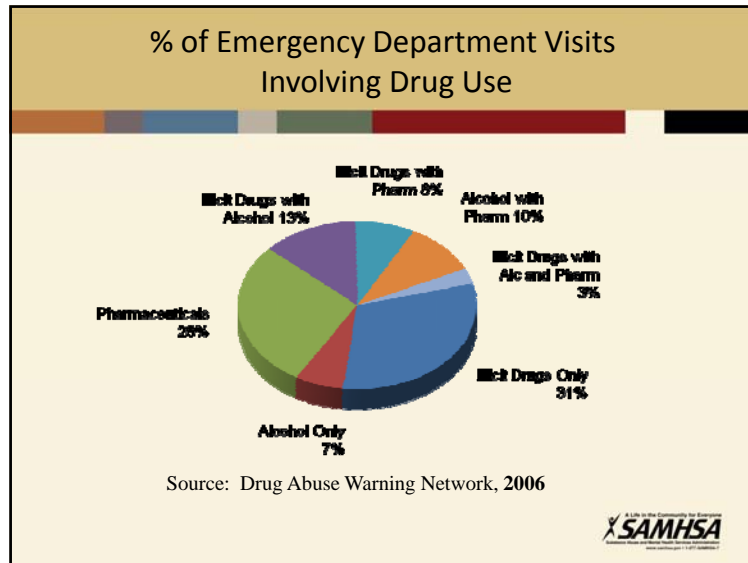


Drug Abuse Warning Network (DAWN) Trends 1994-2008



Source: SAMHSA, ED Trends from the DAWN Final Estimates 2008





- ### Drug Test Result Interpretation
- Policy decisions for interpreting negative, positive, refusal to test, adulteration, substitution, and invalid results
 - Legal Prescription Drug Use
 - Illicit Prescription Drug Use
 - Protection of Health Information (Health Insurance Portability and Accountability Act (HIPAA))
-

Opiate and Opioid Metabolism

Drug	Process	Metabolite 1	Metabolite (s) 2	Metabolite (s) 3
Codeine		Hydrocodone	Norhydrocodone 6-Hydrocodol Hydromorphone	
Codeine	O-demethylation	Morphine	Normorphine Morphine glucuronide Hydromorphone	
Codeine	N-demethylation	Norcodeine		
Diacetylmorphine	Hydrolysis	6-Acetylmorphine	Morphine	Normorphine Morphine glucuronide
Methadone		Methadol	Normethadol	
Methadone		EDDP	EMDP	
Oxycodone		Glucuronides		
Oxycodone	O-demethylation	Oxymorphone	6-Oxymophol	Glucuronidides
Oxycodone	N-demethylation	Noroxycodone	Glucuronides	
Meperidine		Normeperidine		
Propoxyphene		Norpropoxyphene		



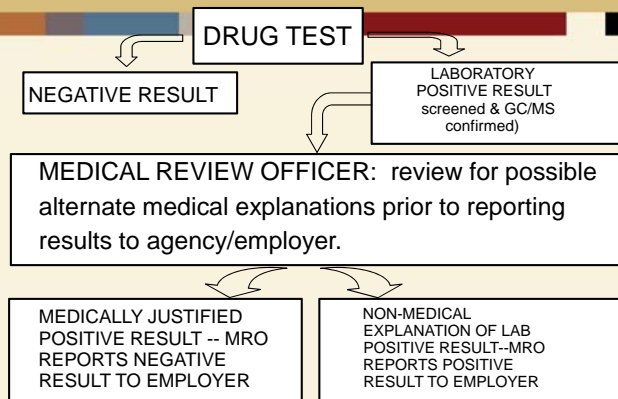
Benzodiazepine Metabolism

Drug	Functionalization	Oxidation*
Mediazepam (Nobrium)	Diazepam (Valium)	Temazepam (Restoril) → Oxazepam (Serax)
Clorazepate (Tranxene)	Desmethyldiazepam (nordiazepam)	Oxazepam (Serax)
Halazepam	Desmethyldiazepam (nordiazepam)	Oxazepam (Serax)
Prazepam (Centrax)	Desmethyldiazepam (nordiazepam)	Oxazepam (Serax)
Chlordiazepoxide (Librium)	Desmethyldiazepam (nordiazepam)	Oxazepam (Serax)
	Demoxepam → Desmethyldiazepam (nordiazepam)	
Flurazepam (Dalmane)	N-OH-ethylflurazepam → N-desalkyl-flurazepam	3-OH-flurazepam
Quazepam (Doral)	2-oxo-quazepam → N-desalkyl-flurazepam	3-OH-flurazepam
Quazepam (Doral)	2-oxo-quazepam	2-oxo-3-OH-quazepam
Estazolam (ProSom)		3-OH-estazolam
Alprazolam (Xanax)	α-hydroxyalprazolam	
Midazolam (Versed)	α-hydroxymidazolam	
Clonazepam (Clonopin)	7-aminoclonazepam	7-acetamidoclonazepam
Clonazepam (Clonopin)	7-aminoclonazepam	
Lorazepam (Ativan)		

* Oxidative products are conjugated by glucuronidation



THE MRO CHAIN



Summary

- Identify a clear purpose for using drug testing
- Determine how drug testing fits
- Select the type of specimen(s)
- Determine when to use POCT testing vs. laboratory based testing
- Establish specimen collection and observation procedures
- Determine which drugs to include in the drug testing panel
- Consider Cost and the choice of the vendor
- Determine the review procedure and staff training
- Establish the frequency of the test



Thank You
Division of Workplace Programs

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and Charles Lodico, ABFT, M.S.

