

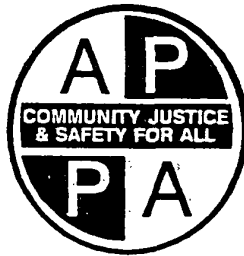
Audio Teleconference Packet ¹⁹⁶⁰⁶²

Technology for Drug Testing

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Presenters



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TECHNOLOGY FOR DRUG TESTING

Training Objectives

As a result of this teleconference, participants will be able to:

- Name six types of technology for substance abuse testing and describe the relative advantages and disadvantages of each.
- Describe the difference between immunoassay and chromatography testing for urine.
- List the classifications of substances that can be detected through urine testing and those for which tests are either unavailable or require more difficult or costly testing methods.
- Identify ways that urine tests can be adulterated or otherwise tampered with and ways to detect and/or avoid these problems.
- Make decisions for program policies and procedures regarding onsite or off site testing, instrument or noninstrument testing, drugs to test for, scheduled or random testing, frequency of testing, specimen collection procedures, chain of custody procedures, confirmation tests, cutoff levels; and
- Specify how positive and negative results will be used

ABOUT THE PRESENTERS

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Kevin Jackson is a Senior Program Manager at the National Institute of Justice and is the Corrections Advocate for the Office of Science and Technology. Previously, he served in both Adult and Juvenile Corrections in New Mexico, including positions as State Director of Probation and Parole and Deputy Secretary of the New Mexico Youth Authority. He has served for the last four years as Chairman of the American Correctional Association's Technology and Design Committee and also serves on the national Drug Detection Working Group.

Saralyn Borrowman is Program Manager for Drug Detection and Testing Technologies and the Drug Detection and Testing panel at the National Institute of Justice. She previously served as Technical Information Assistant at the Office of Law Enforcement Standards and Technology at the Department of Commerce.



Technology of Drug Testing

Kevin M. Jackson
Saralyn Borrowman

Six specimens for drug testing and pros and cons of each:

- Hair analysis
- Sweat analysis
- Oral Fluids testing
- Blood testing
- Breath analysis
- Urine testing

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Pros: Hair Analysis

- + can detect drug use for a considerable time after drug ingestion
- + has great utility in identifying all types of drugs used
- + is relatively non-intrusive, hair is easy to obtain, and can quantify the amount of drugs detected (not the amount ingested).

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Cons:
Hair Analysis

- Hair assays may not detect recent drug use.
- There are a limited number of laboratories which can test hair.
- Results may be subject to race, environment, and sex influence.
- It costs between \$50 and \$100 to screen and confirm the five drug classes.

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Pros:
Sweat Patches

- + are a promising technology, especially for use with prisoners and parolees
- + offer ability to detect future drug intake for a period of weeks
- + are relatively non-intrusive
- + pose little risk to administrators
- + offer greater utility because of ease of application

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Cons:
Sweat Patches

- There are no proficiency testing programs for administrators.
- Accuracy of results from those who use sweat detection technologies is questionable.
- It costs from \$7 for a patch, up to \$15 for screening, to \$22 for confirmation.

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Pros:

Oral Fluids Testing

- + is useful in detecting recent drug and alcohol use
- + does not pose a privacy issue
- + testing is not difficult for the administrator because the specimens are readily available.
- + is considered noninvasive
- + has been used to identify cocaine and cannabinoids

Cons:

Oral Fluids Testing

- There are no proficiency testing programs to determine the accuracy of testing methods and results.
- It should be used in conjunction with a confirmatory test of urine or blood.
- Costs are similar to blood tests: \$50-\$200, depending upon the type and number of analytes.

Pros: Breath Analysis

- + is used widely for detection of alcohol
- + has the ability to detect levels of use
- + is a noninvasive method for testing
- + results are immediately displayed
- + test results for the detection of alcohol use have been upheld in the courts
- + per test costs are low: devices are rather costly but can be reused on an ongoing basis

Cons: Breath Analysis

- devices are expensive initially
- detects only very recent use, a matter of several hours
- short window of detection is a negative factor since substance use previous to that time may not be detected
- will not show frequency or duration of substance use

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Pros: Blood analysis

- + is effective for drug detection
- + is used by the forensics community in post mortem death investigations
- + tests for driving under the influence of drugs
- + is used for post accident investigations
- + is used for drug overdose
- + is used for diagnostics and research
- + results are accepted by courts for criminal justice purposes.

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Cons: Blood analysis

- can be questionable due to lack of proficiency testing programs
- can be questioned due to the fact that most laboratories performing blood analysis are not accredited
- is not easy and requires extensive sample preparation
- testing is invasive
- costs between \$50-\$200 to perform

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Pros: Urine Testing

- + is the most cost effective of all methodologies in use
- + is less invasive than blood testing
- + is very accurate
- + is generally accepted by courts
- + is commonly available for most classes of drugs with the possible exception of inhalants
- + allows very quick results

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Cons: Urine Testing

- has a short window of detection since drug use previous to that time may not be detected
- is invasive
- requires physical facilities for sample gathering
- poses a potential health risk to the test administrator
- will not show the amount, frequency or duration of drug use

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An Overview of Urine Testing Technology

Part I
Immunoassay

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Urinalysis Immunoassay...

- + is effective in detecting recent drug use of 24 to 48 hours
- + offers various types of lab based tests and onsite screening devices
- + is used universally in most onsite drug tests
- + is accurate and reliable
- + testing devices are relatively inexpensive (on-site screening costs less than \$10 and may cost up to \$100 for laboratory confirmation)
- + is easy to administer
- + when confirmed by an accredited laboratory is accepted by courts for criminal justice purposes.

Urinalysis Immunoassay...

- is invasive
- requires physical facilities for sample gathering
- poses a potential health risk to the test administrator
- will not show the amount, frequency or duration of drug use
- a short window of detection is a negative factor since drug use previous to that time may not be detected

What is Immunoassay? Immunoassay...

is the detection of substances based on their predictable reaction to a reagent substance

is widely used for initial laboratory and onsite urine testing in juvenile justice

can be effective with other testing modalities such as oral fluids, sweat, blood ..

Brief Review of Immunoassay Technologies

- EMIT
- FPIA
- RIA
- EIA
- FPIA
- KIMS
- LAIA

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Enzyme Multiplied Immunoassays (EMIT™)...

is an instrument based immunoassay that requires laboratory facilities.

The initial cost of the equipment is expensive but individual tests can be done for under \$2

It is one of the most commonly used methods for substance abuse screening.

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Enzyme Immunoassay (EIA)

is a technique that uses enzymes to compete with drugs in the urine for binding sites with the antibodies.

Positive tests produce a color change in the sample.

EIA can be used for onsite testing.

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Fluorescence Polarization Immunoassay (FPIA)...

is a process using a reagent that causes a fluorescent change to occur when attached to a specific drug metabolite.

This method of drug testing has proven to be powerful because it is sensitive to slight metabolic changes that produce changes in the fluorescence spectrum. ²²

Kinetic Interaction of Micro Particles in Solution (KIMS)...

uses micro particles to which the drug attaches.

If a drug is present, the particles will bind together.

KIMS measures the light transmitted through a sample.

A low level of light indicates the presence of a drug in the urine sample. ²³

Latex Agglutination Immunoassay (LAIA)...

Uses latex particles to which the drug attaches.

If drugs are present the latex remains separated because the drugs compete with the latex particles for binding sites.

If no drugs are present the particles "agglutinate" to each other. ²⁴

Immunoassays Reliability Vs. Validity

Immunoassay technology allows reliable detection of specific substances for screening purposes.

When confirmation is required of an immunoassay, it is usually followed by Gas Chromatography/Mass Spectrometry (GC/MS).

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Radioimmunoassay (RIA)...

Uses radioactively labeled drugs to compete with drugs in urine for antibody sites.

The presence of drugs in the sample is revealed through the amount of radioactivity remaining.

Care must be taken to dispose of radioactive materials.

RIA is not used for onsite testing.

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What are the appropriate uses of immunoassay tests?

1 - Immunoassay technologies are best used for initial testing or screening purposes.

2 - Onsite testing: most onsite devices are urinalysis immunoassay units equipped with reagents that detect one specific drug analyte.

3 - Positive immunoassay results are usually followed by GC/MS as a confirmatory test.

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What drugs can be detected by immunoassay tests?

Initial onsite or instrument based immunoassay tests can test for a variety of drugs and should have the capability to test for **at least five** illegal drugs or drug categories.

This may include marijuana, cocaine, amphetamines, barbiturates, opiates, PCP, benzodiazapines or other drugs of abuse currently in the area.

(Drug Testing Guidelines and Practices for Airport Screening and Police Agencies, 17-2, p 47)

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Range of costs...

Immunoassay tests can be purchased as onsite screening devices from less than \$10 to more than \$20 per device.

Instrument based immunoassay testing requires a large initial investment but single tests can be less than \$2.

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An Overview Urine Testing Technology

Part II
Chromatography

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Urinalysis Chromatography...

How does it work?

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Chromatography...

was first developed in the early 1900s

involves molecules of different
substances moving at different rates
and thereby creating distinctive patterns
that allow them to be distinguished from
one another (Tom Mazzocchi and Kim Larson, 1997)

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Chromatography...

There are several types of
chromatography that evolved over time
which are faster and more accurate than
others.

However, the "gold standard" for drug
testing today is gas chromatography
followed by mass spectrometry (GC/MS).

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Gas Chromatography (GC): ...

is a laboratory based test.

specimens, in the past, had to be taken onsite at the lab or transported to the lab for testing.

uses a separate substance (usually nitrogen) to carry the specimen from an insertion chamber to a detector or detection chamber where it can be identified by measuring the length of time it takes to move through the chromatograph column.

is considered more accurate than any of the other chromatographic methods of drug testing. 34

High Performance Liquid Chromatography (HPLC)...

is a method similar to gas chromatography, but it uses liquids, rather than gases in the instrument.

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Gas Chromatography/Mass Spectrometry (GC/MS)...

uses two testing procedures.

combines gas chromatography with mass spectrometry which involves shattering the drug into pieces as it comes through the chromatography column, thus forming a spectrum with characteristic patterns for different types of drugs.

At this time, GC/MS is recognized as the most reliable drug test available. 36

Reliability vs. Validity of Chromatography...

GC/MS has become the "gold standard" for drug testing today. It is gas chromatography followed by mass spectrometry (GC/MS).

At this time, GC/MS is recognized as the most reliable drug test available.

It is used as a confirmation test and has been upheld in the courts.

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Chromatography...

• Appropriate use of this technology is as the follow-up or confirmatory test required by law after a positive result from an initial test or screening device.

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APPA's Guidelines for appropriate testing:

"16-22 The initial test employed by the contracted laboratory should use an immunoassay that meets the requirements of the food and drug administration for commercial distribution."

"16-23 Urine specimens identified as positive and requiring confirmation should be confirmed using gas chromatography/mass spectrometry (GC/MS), except for in approved circumstances as per APPA confirmatory guidelines."

(Drug Testing Guidelines and Practices for Juvenile Probation and Parole Agencies, p. 60)

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What can be detected through chromatography?

- Most drug analytes can be detected if collected properly during their window of detection.
- Some types of explosives can also be detected.

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Chromatography Costs

- generally range from \$5 to \$16 for each test and confirmation, and may take days (depending on mail service) for confirming results to be obtained
- up to \$100 for multiple compound identification confirmation using GC/MS

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Seven classifications of drugs

- 1. Central nervous system depressants
- 2. Cannabis
- 3. Central nervous system stimulants
- 4. Hallucinogens
- 5. Narcotic analgesics
- 6. Inhalants
- 7. Phencyclidine

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Categories with which specific drugs can be tested

- Immunoassays
- Chromatography
- Breath analysis
- Oral fluids analysis
- Sweat analysis
- Hair analysis

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Tampering with urine tests

- Ways youths may switch urine samples
- Ways youths may adulterate samples (what really works and what is just a myth)
- Ways to prevent switching and adulteration
 - » observe sample collection, take precautions regarding youth's clothing, and take precautions regarding the testing site
 - » testing for temperature, creatinine, and specific gravity of sample
 - » test strips for glutaraldehyde and nitrite

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Policy Decisions

[Note OJJDP and APPA do not endorse or recommend any particular products]

1. Onsite Vs. Offsite testing
 - Pros/Cons
 - Relative Costs
 - Immediacy of Results
2. Instrument or Non-instrument testing
 - Pros/Cons
 - Relative Costs
 - Immediacy of Results
3. Drugs to test for:
 - Patterns of use among youth in community
 - Individual youth's history
 - Costs
 - Availability of tests

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Policy Decisions Continued

[Note OJJDP and APPA do not endorse or recommend any particular products]

4. Scheduled vs. Random Testing
 - Pros/Cons
 - Effectiveness/ability for youth to manipulate results
5. Frequency of testing
6. Specimen collection (observed)
7. Chain of custody procedures and paperwork
 - Handling
 - Storage
 - Transportation
 - Testing
 - Results

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Policy Decisions Continued

[Note OJJDP and APPA do not endorse or recommend any particular products]

8. Confirmation of results
 - a. Youth admission statement
 - b. Second test/same methodology
9. Cutoff levels for tests
 - Recommend SAMSHA cutoff levels
- F. Use of Results
 - This will be the topic of the third teleconference
 1. Negative results
 2. Positive results
 3. Graduated sanctions for ongoing positive results

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SUPPLEMENTAL INFORMATION FOR TELECONFERENCE ON TECHNOLOGY FOR DRUG TESTING

Types of Psychoactive Substances

Alcohol and other drugs can be divided into seven categories based on their physiological effects. Brief summaries of the symptoms of use, overdose, and withdrawal for each category are provided in Tables 1-7¹.

Juvenile justice personnel working with youth should be familiar with the characteristic symptoms of substance use in each category. Knowing the symptoms can help practitioners discern which drugs the youth should be tested for. Some of the overdose and withdrawal symptoms can be life threatening. Recognition of these and quick action could be necessary when working with youth.

¹ These tables are based on information in *Drug Recognition Techniques Training Program Participant Manual* developed by the American Probation and Parole Association, 1988.

Table 1

CENTRAL NERVOUS SYSTEM (CNS) DEPRESSANTS

Substances in this Category

- Alcohol
- Barbiturates (e.g., phenobarbital, pentobarbital, Seconal)
- Benzodiazepenes (e.g., Xanax, Valium, Librium)

Symptoms of CNS Depressant Use

- drunken behavior (may be accompanied by odor of alcohol)
- slurred, thick speech
- disorientation
- poor coordination
- reduced social inhibitions
- slowed reflexes
- sluggishness, sleepiness
- impaired judgment and concentration
- wide variety of emotional effects, such as euphoria, depression, suicidal tendencies, and laughing or crying for no apparent reason
- decreased heart rate and blood pressure
- shallow respiration

Symptoms of CNS Depressant Overdose

- extreme drowsiness (may pass out)
- slowed heartbeat
- shallow respiration
- cold, clammy skin
- possible death from respiratory failure

Symptoms of CNS Depressant Withdrawal

- restlessness
- muscle weakness
- dizziness
- nausea and vomiting
- confusion
- insomnia
- agitation
- unpleasant hallucinations
- tremors
- possible convulsions and delirium

Rohypnol is a type of benzodiazepine that has received notice recently. It is approximately ten times more potent than Valium. It is often taken illicitly with other drugs, such as alcohol or marijuana to enhance intoxication. Used with heroin, it enhances the euphoric effect; taken with cocaine or crack, it mellows or eases down the user from the high. It can be ingested orally, snorted, or injected. Physical dependence and the need for medically supervised withdrawal can result from long-term use. This drug has been associated with sexual assaults when used to render the victim powerless to resist. In 1996, Congress passed the Drug-Induced Rape Prevention and Punishment Act in response to growing use of this drug (Schmidtlein, 1998).

Table 2

CANNABIS

Substances in this Category

- Marijuana
- Hashish

Symptoms of Cannabis Use

- interference with person's ability or willingness to pay attention or divide attention properly
- drowsiness
- relaxed inhibitions
- impaired perception of time and distance
- disorientation
- body tremors
- bloodshot eyes
- odor of marijuana
- possibly slightly dilated pupils
- increased heart rate and blood pressure

Symptoms of Cannabis Overdose

- paranoia and possible psychosis
- sharp personality changes, especially in adolescents
- lung damage
- chronic bronchitis
- acute anxiety attacks
- chronic reduction of attention span

Symptoms of Cannabis Withdrawal

- irritability
- restlessness
- decreased appetite
- sleep disturbance
- general depression
- sweating
- tremors
- nausea and vomiting
- diarrhea

Marijuana is the illicit substance, other than alcohol, most widely used by youth. Recent research has shown that marijuana use often is addicting for adolescents, contrary to long-held opinions. In research conducted by the University of Colorado School of Medicine and reported in *Justice Bulletin* (Study Finds. . ., 1998), 80 percent of male youth and 60 percent of female youth were dependent on marijuana. Researchers thought marijuana use is as addictive as tobacco or alcohol use. They found the average time between initial use of marijuana and progression to monthly use was one year. Youth in the study said they continued using marijuana even after they were aware it was causing them problems. Many said they used larger amounts for longer periods than intended. About one-third said they wanted to cut down on use of marijuana but were unsuccessful. Eighty-five percent of the marijuana-dependent youth said it interfered with school and work and endangered them while driving. Getting, using, and getting over the effects of marijuana were activities in which 77 percent of the youth said they spent a great deal of time. Withdrawal symptoms were experienced by many of the youth, including, fatigue, weakness, anxiety, restlessness, irritability, and difficulty sleeping. Some youth said they began using marijuana again to relieve these withdrawal symptoms.

Table 3

CENTRAL NERVOUS SYSTEM (CNS) STIMULANTS

Substances in this Category

- Cocaine
- Amphetamines/Methamphetamines

Symptoms of CNS Stimulant Use

- restlessness (cannot stand or sit still)
- talkativeness
- bruxism (grinding teeth)
- excitation
- impaired ability to perceive time and distance
- euphoria
- confusion
- exaggerated reflexes
- possible body tremors or rigidity
- possible nasal irritation/scarring
- dry mouth
- dilated pupils
- elevated heart rate, blood pressure, and body temperature
- rapid breathing

Symptoms of Central Nervous System Stimulants Overdose

- paranoia
- panic
- extreme confusion
- sudden aggressiveness
- convulsions
- hallucinations
- faintness (may pass out into coma)
- dramatically increased heartbeat and possible heart arrhythmia
- cardiac arrest
- possible death from sudden respiratory failure

Symptoms of Central Nervous System Stimulants Withdrawal

- weakness
- poor thinking ability
- exhaustion
- restless sleep
- depression
- various aches and pains
- possible increased appetite
- apathy

Concern about abuse of and addiction to methamphetamine has grown recently. Its use has been noted especially in western areas of the country, and recently has increased in the South and Midwest (Mathias, 1998). Methamphetamine is a potent, highly addictive stimulant that often is manufactured for illicit distribution. The effects of methamphetamine can last six to eight hours, much longer than the effects of cocaine. Symptoms of methamphetamine use include violent behavior, anxiety, confusion and insomnia. Some users display psychotic symptoms such as paranoia (which may include homicidal and suicidal thoughts), hallucinations, delusions, and mood disturbances. Withdrawal signs include depression, anxiety, fatigue, paranoia, aggression, and intense craving for the drug. Prolonged exposure to methamphetamine may result in damage to the dopamine-producing cells in the brain. Other complications of methamphetamine use include cardiovascular problems, elevated body temperature, convulsions, damage to blood vessels and skin abscesses when the drug is injected, and possible lead poisoning. Use of methamphetamine during pregnancy may result in prenatal complications, premature delivery, congenital deformities, and irritability and other behavior problems in the infant. HIV transmission also is a risk for those who inject the drug (Mathias, 1998; Leshner, 1998a; Leshner, 1998b).

Table 4

HALLUCINOGENS

Substances in this Category

- Peyote cactus
- Psilocybin mushroom
- LSD
- MDMA
- Other chemical substances

Symptoms of Hallucinogen Use

- hallucinations
- nausea
- body tremors
- disorientation
- paranoia
- difficulty in speech
- perspiring
- piloerection ("goose bumps") -- (LSD)
- decreased muscular coordination
- rapid mood change -- (mescaline)
- dilated pupils
- increased heart rate, blood pressure, and body temperature
- rapid breathing

Symptoms of Hallucinogen Overdose

- extreme panic and agitation from "bad trip," possibly leading to suicide or accidental death
- severe and sometimes permanent psychosis from experiences of a "bad trip"
- organic brain damage from prolonged use, possibly leading to impaired memory, reduced attention span, mental confusion, and impaired ability to deal with abstract concepts

Symptoms of Hallucinogen Withdrawal

- Physical dependence has not been shown to develop.

Table 5

NARCOTIC ANALGESICS

Substances in this Category

- Heroin
- Morphine
- Demerol
- Fentanyl

Symptoms of Narcotic Analgesic Use

- cold skin
- droopy eyelids
- constipation
- low, raspy speech
- facial itching
- dry mouth
- poor motor coordination
- "on the nod" (eyelids droopy, head slumped forward, chin resting on chest)
- possible flaccid muscle tone
- constricted pupils, little or no pupil reaction to light
- injection sites
- decreased heart rate, blood pressure, and body temperature
- slowed reflexes and slow, shallow breathing

Symptoms of Narcotic Analgesic Overdose

- slow and shallow breathing
- clammy skin
- possible convulsions
- possible coma
- possible death from severe respiratory depression

Symptoms of Narcotic Analgesic Withdrawal

- Within approximately 4-6 hours after the last injection of heroin: chills, muscle and joint aches, nausea, insomnia
- After approximately 8-12 hours: dilated pupils, sweating, goose bumps, hyperactive reflexes, possible vomiting, yawning, runny nose, tearing eyes (may look like common cold or flu)
- After approximately 14-24 hours: intensified above symptoms plus gooseflesh, slight tremors, and loss of appetite
- After approximately 24-36 hours: insomnia, vomiting, diarrhea, weakness, depression, hot-cold flashes, elevated blood pressure
- Within about 2-3 days, withdrawal symptoms peak: muscular and abdominal cramping, elevated temperature and severe tremors, twitching (especially of the legs, referred to in expression "kicking the habit"), extreme nausea,

Table 6

INHALANTS

Substances in this Category

- household substances
- aerosols
- felt tip markers
- deodorants
- insecticides
- frying pan lubricants
- plastic cement
- airplane glue
- lighter fluid
- fingernail polish remover
- gasoline

Symptoms of Inhalants Use

Glue and similar volatile solvents:

- confusion, disorientation
- slurred speech
- inebriation similar to alcohol intoxication
- bizarre thoughts
- dizziness and numbness
- euphoria and grandiosity
- floating sensation
- distorted perceptions of time and distance
- possible hallucinations
- poor coordination
- increased heart rate and blood pressure

Gasoline and similar petroleum products:

- confusion, disorientation
- slurred speech
- nausea and excessive salivation
- drowsiness and weakness
- lightheadedness
- sensation of spinning, moving, floating
- distorted space perception
- visions of altered shapes and colors
- fear, guilt, and loneliness
- increased heart rate and blood pressure

Symptoms of Inhalants Overdose

- depression of central nervous system (may reach the point where respiration ceases)
- heart failure
- nausea and vomiting
- unconsciousness (unconscious user may drown in his/her own vomit)

Symptoms of Inhalants Withdrawal

- hallucinations
- headaches
- chills
- stomach cramps

Table 7

PHENCYCLIDINE (PCP)

Substances in this Category

- PCP

Symptoms of PCP Use:

- slow, slurred speech
- disorientation
- loss of memory
- agitation, excitement
- blank stare
- passivity (but user may turn abruptly violent if confronted with a threatening situation)
- non-communicativeness
- muscle rigidity
- loss of a sense of personal identity
- sensory distortions
- auditory hallucinations
- feeling of extreme heat, profuse perspiring
- increased pain threshold
- repetitive speech
- cyclic behavior
- incomplete verbal responses
- poor coordination
- possible chemical odor
- increased heart rate, blood pressure, and body temperature

Symptoms of PCP Overdose

- bizarre, violent, self-destructive behavior
- deep coma, lasting up to 12 hours
- seizures and convulsions
- respiratory depression
- possible cardiac problems

Symptoms of PCP Withdrawal

- depression
- insomnia
- muscle aches
- tremors
- nausea

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IMPLEMENTING DRUG TESTING IN THE JUVENILE JUSTICE SYSTEM
Technology for Drug Testing
 November 17, 1998
Participant Evaluation of Teleconference

Please give brief reactions/comments indicating your thoughts about the following.

1. Through this teleconference I learned the following new content, or different ways of looking at things:

2. What will you take from this teleconference to apply in your work?

3. The best aspects of this teleconference were:

4. The teleconference could be improved by:

5. What additional help or training do you need related to this topic?

6. Suggestions or comments:

Please mail or fax this form to:
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Fax (606) 244-8001

Please evaluate the presenters of this teleconference by placing a mark (X) in the column that corresponds with your rating of each area.

Kevin Jackson & Saralyn Borrowman	Outstanding	Above Average	Average	Below Average	Poor
Knowledge and organization of content					
Presentation methods					
Responsiveness to participants					

Please rate the following aspects of this teleconference by placing a mark (X) in the column that corresponds with your rating of each area.

	Outstanding	Above Average	Average	Below Average	Poor
Organization of the teleconference session					
Quality of the teleconference (overall rating)					
Content (current, relevant, and useful information)					
Effectiveness of instruction (Presenter's skills and organization)					
Opportunities to ask questions					
Handout materials (outline, visual aids)					
Supplemental materials (workbook, reference books)					

The length of the teleconference in relation to the content covered was:
 about right too long too short

