

Psychotropic Drugs and Drug Overdose

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Learning Objectives

- Classify psychotropic medications into their respective categories.
- Describe the intended and adverse effects of psychotropic medications
- Classify illicit psychotropic drugs into their respective categories.
- Describe the adverse effects of illicit psychotropic drugs.
- Describe the manifestations of drug overdose.
- Describe the manifestations and management of neonatal drug addiction and withdrawal.

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Psychotropic Drugs

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Categories

- **Anesthetics-** covered in anesthesia lesson
- **Analgesics**
- **Sedative, hypnotic and anxiolytic medications**
- **Antipsychotic medications**
- **Antidepressants**
- **Central nervous system stimulants**
- **Illicit drugs**
- **Miscellaneous drugs**

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Historic Perspective

- 13000 y.a. – The betel nut in Timor.
- Before European contact – The Aborigines used pituri and Nicotiana (both nicotine).
- Before European contact – Native Americans used tobacco.
- Before European contact – Ethiopians used khat.

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Historic Perspective

- 7000 y.a. – Coca was being used in the Andes.
- 2000 y.a. - mushrooms, cactus used by indigenous Americans
- 2000 y.a. - cannabis used in China, India
- Alcohol
 - 30,000 y.a. - evidence of alcohol consumption
 - 7,000 BCE - evidence of wine production
 - 3500 BCE - evidence of beer brewery
 - 500 BCE - evidence of distilling in Pakistan
- Recent history (circa 1950s)
 - cocaine in coca cola
 - lithium in 7up

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Epidemiology

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Roots of Crisis

- Lack of training in pain management
- Lack of caution in prescribing addictive drugs
- Marketing of prescription drugs - manufacturers
- Media that encourages use and abuse
 - Cocaine
 - Up in Smoke

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Roots of Crisis

- Clinicians prescribing and dispensing drugs
- Illicit drug dealers
- Individual susceptibility
 - Pleasure seeking users
 - Addiction to pain medications
 - Genetic predisposition
 - Decreased socioeconomic status

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Scope of Crisis

- The latest 2024 estimate is 2.85% of the U.S. population misused opioids. This approximately 9,692,850 people.
- Factors
 - Young adult males are prevalent
 - Poverty increases likelihood
 - Mental illness
 - Nicotine, alcohol use
 - Dark web distribution
 - Geography - availability

Source: Substance Abuse and Mental Health Services Administration (SAMHSA). National Survey on Drug Use and Health (NSDUH), 2024.

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Consequences of Abuse

- Needle sharing, HIV
- Neonatal, pediatric exposure to drugs
- Child neglect
- Exposure to drug cutters - lethal drugs, poisons
- Malnutrition
- Physical neglect

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Consequences of Abuse

- Myocardial infarctions in young people
- Poverty
- Violence
- Crime
- Suicide
- Financial burden to healthcare system

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Analgesics

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Opiates

➤ Actions

- Bind to opioid receptors in:
 - Central nervous system
 - Peripheral nervous system
 - Gastrointestinal tract

➤ Classifications

- Pure agonists; e.g., morphine, fentanyl
- Partial agonists; e.g., loperamide
- Antagonists; e.g., naloxone
- Natural, vs., synthetic

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Opiates

- **The beneficial effects of narcotic analgesics include:**
 - Analgesia
 - Sedation
 - Euphoria
 - Relief of diarrhea
 - Relief of severe coughing
 - Replacement of some opioids to decrease withdrawal symptoms

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Opiates

- **Side effects:**
 - Respiratory depression
 - Confusion
 - Miosis- pupillary constriction
 - Constipation
 - Hypotension, bradycardia
 - Allergic reactions
 - Drug tolerance
 - Dependence, addiction
 - Coma, death from overdose

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Opiates

- **Contraindications:**
 - Head injury
 - COPD
 - Pregnancy, lactation
 - Sleep apnea
 - Addiction prone patients
 - Hypersensitivity, allergies

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Opiates

- **Drug interactions:**
 - Psychotropics
 - Alcohol
 - Sedatives, hypnotics
 - Muscle relaxants
 - Antihistamines
 - Antiemetics
 - Antiarrhythmics, antihypertensives

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Opiates

➤ Preparations:

- Butorphanol (Stadol)
- Codeine
- Fentanyl citrate (Actiq, Sublimaze, Duragesic)
- Hydrocodone with acetaminophen (Lorcet, Lortab, Vicodin)

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Opiates

➤ Preparations:

- Hydromorphone (Dilaudid)
- Meperidine (Demerol)
- Methadone (Dolophine, Methadose)
- Morphine sulfate
- Oxycodone (Oxycontin, Roxicodone)
- Oxycodone with aspirin (Percodan)
- Oxycodone with acetaminophen (Percocet)
- Tramadol (Ultram)

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Non-Opiate Analgesics

- **Salicylates and other NSAIDs:**
 - **Action-** prevent formation of prostaglandins and other inflammatory substances
 - **Therapeutic effects:**
 - Analgesia
 - Anti-inflammatory
 - Antipyretic

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Non-Opiate Analgesics

- **Salicylates and other NSAIDs:**
 - **Side effects:**
 - Anticoagulation - bleeding, bruising
 - Gastrointestinal distress
 - Tinnitus
 - Hypersensitivity reactions - rash, bronchoconstriction, anaphylaxis
 - Poisoning, esp. children with flavored preparations

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Non-Opiate Analgesics

- **Salicylates and other NSAIDs:**
 - **Preparations:**
 - Acetylsalicylic acid, ASA (Bufferin, Ecotrin)
 - ASA combinations (Anacin, Excedrin)
 - Ibuprofen (Motrin, Advil)
 - Naproxen (Aleve, Anaprox)
 - Indomethacin (Indocin)
 - Diclofenac (Voltaren)

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Non-Opiate Analgesics

- **Acetaminophen (Tylenol)**
 - **Therapeutic effects:**
 - Analgesia
 - Antipyretic
 - NOT anti-inflammatory
 - **Side effects - fewer than NSAIDs:**
 - Severe hepatic toxicity, esp. with ETOH ingestion
 - Renal insufficiency
 - Hypersensitivity

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Sedatives, Hypnotics, Anxiolytics

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Definitions

- **Sedative** - drug that promotes calmness
- **Hypnotic** - drug that promotes sleep
- **Anxiolytic** - drug that inhibits response to real or perceived danger
- **The same medication can have the effects of any of these three categories**

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Definitions

- **Actions - Benzodiazepines and barbiturates potentiate gamma-aminobutyric acid (GABA) at specific receptors thought to be located near GABA receptors**

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Benzodiazepines

- **Therapeutic effects (dose dependent)**
 - Calmness
 - Sleep
 - Decreased anxiety

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Benzodiazepines

- **Side effects (dose dependent)**
 - Daytime confusion, hangover
 - Risks of falls
 - Dependence, withdrawal
 - Amnesia, hallucinations
 - Sleepwalking, sleep eating
 - Respiratory depression

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Benzodiazepines

- **Interactions**
 - Alcohol
 - Antipsychotics
 - Antihistamines
 - Analgesics
 - Antiretroviral protease inhibitors;
e.g., erythromycin
 - Calcium channel blockers
 - Grapefruit juice

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Benzodiazepines

- **Agents**
 - Chlordiazepoxide (Librium) - long acting
 - Diazepam (Valium) - long acting
 - Lorazepam (Ativan) - short acting
 - Oxazepam (Serax) - short acting
 - Alprazolam (Xanax)
 - Most abused
 - Rapid onset
 - May induce euphoria

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Benzodiazepines

- **Agents**
 - Triazolam (Halcion)
 - Rapid onset
 - Amnesia
 - Hallucinations
 - Midazolam (Versed, "dazzle")
 - Preoperative sedation
 - Light anesthesia
 - Amnesia
 - DOC for short surgical procedures

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Barbiturates

- **Potent effects**
- **Mostly replaced by benzodiazepines**
- **Indications**
 - **Extreme insomnia**
 - **Seizures unresponsive less toxic, agents**
 - **Induction of anesthesia**

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Barbiturates

- **Side effects**
 - **Intoxication**
 - **Confusion**
 - **Discoordination**
 - **Respiratory depression**
 - **Dependence**

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Barbiturates

- **Agents**
 - Phenobarbital (Luminol) - manage seizures
 - Amobarbital (Amytol) - truth serum?
 - Thiopental (Pentothol)
 - Secobarbital (Seconal)
 - Methohexital (Brevital)

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Other Non-Benzodiazepines

- **Not limited to short-term use**
 - Eszopiclone (Lunesta)
 - Zolpidem (Ambien)
 - Zaleplon (Sonata)

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Antipsychotics

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Antipsychotics

- **Categories**
 - Wakefulness promoting agents
 - Antidepressants
 - Antimanic agents
 - Tranquilizers

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Wakefulness Promoting Agents

- **Indications**
 - Narcolepsy
 - Shift work sleep disorder
 - Sleep apnea
 - ADHD - adults and children

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Wakefulness Promoting Agents

- **Side effects**
 - Headache
 - Insomnia, depression
 - Anorexia
 - Hypertension
 - Tachydysrhythmias

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Wakefulness Promoting Agents

- **Agents**
 - Amphetamine mixtures (Adderall)
 - Methylphenidate (Ritalin)
 - Modafinil (Provigil)

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Antidepressants

- **Categories**
 - Tricyclics - delayed effects
 - Monoamine oxidase inhibitors (MAOI)
 - Selective serotonin reuptake inhibitors (SSRI)
 - Current favorite
 - Fewer adverse effects
 - Selective norepinephrine reuptake inhibitors (SNRI)
 - Heterocyclics

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Antidepressants

- Specific mechanisms vary, but most increase brain norepinephrine or serotonin levels
- Serotonin functions
 - Mood regulation
 - Sleep
 - Eating
 - Reduces depression
 - Regulates anxiety

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Antidepressants

- Side effects - dependent on category
 - Anticholinergic effects - tricyclics
 - Drowsiness
 - Sexual dysfunction
 - Appetite dysfunctions
 - Insomnia
 - Anxiety

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Antidepressants

- **Agents**
 - Amitriptyline (Elavil) - tricyclic
 - Phenelzine (Nardil) - MAOI
 - Fluoxetine (Prozac) - SSRI
 - Sertraline (Zoloft) - SSRI
 - Duloxetine (Cymbalta) - SNRI
 - Bupropion (Wellbutrin) - heterocyclic
 - Citalopram (Celexa)- SSRI
 - Trazodone (Desyrel, Oleptro) (SARI)

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Antimanic Agents

- **Actions are uncertain**
- **Indication** - severe fluctuations in mood extremes; i.e, bipolar disorder
- **Therapeutic effects**
 - Reduce acute episodes of mania to a more manageable level
 - Relieve symptoms such as agitation, inappropriate behavior, and sleep problems
 - Prevent symptom relapses and hospitalization.

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Antimanic Agents

- **Side effects**
 - Gastrointestinal distress
 - Tremors
 - Cardiac dysrhythmias
 - Drowsiness
 - Thirst

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Antimanic Agents

- **Agents**
 - Lithium (Lithobid)
 - Carbamazepine (Tegretol)
 - Valproate (Depakote)

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Antipsychotic Agents

- **Indications**
 - Delusions
 - Hallucinations
 - Combativeness
 - Also...
 - Hiccups (Thorazine)
 - Nausea, vomiting (Compazine)

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Antipsychotic Agents

- **Side effects**
 - Postural hypotension
 - Anticholinergic effects
 - Spasms
 - Abnormal extremity, facial
 - Movements (tardive dyskinesia)

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Antipsychotic Agents

- **Agents**
 - Chlorpromazine (Thorazine)
 - Prochlorperazine (Compazine)
 - Haloperidol (Haldol)

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Stimulants, Illicit & Miscellaneous Drugs

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Stimulants

- **Agents**
 - **Amphetamines**
 - Dexamphetamine (Dexadrine)
 - Benzamphetamine (Benzadrine)
 - Adderall
 - **Methylphenidates**
 - Ritalin
 - Daytrana

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Stimulants

- **Indications**
 - ADHD (Adderall, Ritalin)
 - Narcolepsy modafinil (Provigil)
- **Side effects**
 - Insomnia
 - Irritability
 - Psychosis
 - Anorexia
 - Dependence

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Amphetamines

- **Action - facilitates release of dopamine**
- **Indications**
 - Narcolepsy
 - ADHD
 - Obesity
 - Combat

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Amphetamines

- **Side effects**
 - Tolerance - requires increased dosages
 - Anorexia
 - Agitation
 - Crying
 - Delusions of persecution

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Amphetamines

- **Side effects - incredibly dangerous**
 - False or unusual sense of well-being
 - Feeling of unreality
 - Tooth decay (meth mouth)
- **Meth labs frequently explode**
- **Meth labs pose environmental hazards**



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Illicit Drugs

- **Agents:**
 - Cocaine
 - Crack cocaine
 - Heroin
 - Methamphetamine (meth)
 - Ecstasy
 - Hallucinogens
 - Marijuana (in some states)
 - Inhalants

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Illicit Drugs

- **Agents:**
 - Alcohol and alcohol-based products (when sold to minors)
 - Prescription drugs (when sold without a prescription)
 - Fentanyl, acetyl fentanyl, carfentanyl, furanyl fentanyl
 - Amphetamines - without prescription
 - Barbiturates - without prescription
 - Bath salts
 - Phencyclidine (PCP)

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Street Drugs / Names

- **Benzodiazepines - blues, nerve pills**
- **Ativan - candy, downers**
- **Halcion - candy downers**
- **Clonopin - K, super valium**
- **Cocaine - coke, blow, snow**

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Street Drugs / Names

- **Crack cocaine - rocks, hard nuggets**
 - Extremely powerful and addictive stimulant
 - Effects are felt almost immediately
 - Heightened alertness
 - Euphoria, loss of appetite
 - Increased sociability

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Street Drugs / Names

- **Adderall - speed, study guides**
- **Ritalin - vitamin R, kiddie coke**
- **Bath salts - flaccica, ivory wave**
- **Desomorphine - croc, zombie drug**
 - Powerful synthetic - illegal drug labs
 - Contamination causes infections
 - Anabolic steroids (roids)

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Street Drugs / Names

- **Bath salts - flaccca, ivory wave**
 - Was OTC until recently - head shops
 - Bath salts are relatively new to current streets.
 - Current bath salts are synthetic cathinones, a chemical found in the khat plant that east Africans have chewed for thousands of years.
 - Khat is a mild stimulant; but, synthetic cathinones are more powerful than cocaine.
 - Salts are sometimes used to cut other drugs

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Excited Delirium & Stimulant-Induced Hyperthermia

- **Rhabdomyolysis**
- **Metabolic acidosis**
- **Hyperkalemia**
- **Cardiac dysrhythmias**
- **And potential sudden cardiac arrest**
- **Management**
 - Rapid sedation — usually with benzodiazepines
 - Aggressive cooling measures
 - Oxygenation and airway support
 - Continuous cardiac monitoring

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Street Drugs / Names

- **Xanax - zany, zany bar**
- **Midazolam - dazzle**
- **Marijuana - pot, weed, dope**
- **Gamma hydroxybutyrate, GHB - liquid**
 - **Depressant**
 - **Home drug labs - drain cleaner, etc.**
 - **Date rape drug**

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Street Drugs / Names

- **Flunitrazepam (Rohypnol) - roofies, forget me**
 - **Powerful benzodiazepine**
 - **Illegal in U.S.**
 - **Club, date rape drug**
- **MDMA - mollies, ecstasy, X**
 - **Raves, parties, clubs**
 - **Produces euphoria, increased sexuality, confidence**
 - **Can cause hyperthermia, death**

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Street Drugs / Names

- **Mescaline - buttons, mescal**
 - Hallucinogenic from San Pedro cactus
 - Native American ceremonials
 - Synthetic from illegal labs
- **Psilocybin mushrooms - shrooms**
 - Hallucinogenic from mushrooms
 - Used for thousands of years

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Street Drugs / Names

- **Phencyclidine PCP - angel dust**
 - Produces hallucinations and psychoses
 - Normal dose mimics schizophrenia
 - Increases violent behavior, dangerous
- **Psilocybin mushrooms - shrooms**
 - Hallucinogenic from mushrooms
 - Used for thousands of years

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Street Drugs / Names

- **Fentanyl, acetyl fentanyl, carfentanyl, furanyl fentanyl**
 - Opioid analgesic - extremely potent psychotropic effects
 - Absorbed through multiple routes
 - Currently - many deaths from overdose
 - Commonly mixed with other drugs

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Street Drugs / Names

- **Fentanyl**
 - 50-100 times stronger than morphine
 - Prescribed for
 - Post-operative pain
 - Breakthrough pain, as for cancer

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Street Drugs / Names

- **Carfentanil**
 - 10,000- 100,000 stronger than morphine
 - Used for sedation of large animals
 - No indications for humans
- **Acetyl fentanyl, furanyl fentanyl, benzylfentanyl - no legitimate uses**
 - Acetyl fentanyl banned from import in 2016
 - Foreign drug manufacturers developed other forms to avert the ban
 - "Whack a mole" trafficking

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Prescription Drugs Subject to Abuse

- **Agents**
 - Opioids - oxycontin, fentanyl
 - Amphetamines
 - Steroids
 - Dextromethorphan
 - Loperamide (Imodium)

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Prescription Drugs Subject to Abuse

- **Dextromethorphan - (Robitussin, Nyquil)**
 - antitussive, safe at recommended dosages (15-30 mg per 4 hours)
 - AKA - robo, skittles
 - Abuse > 100 mg
 - Effects of abuse
 - Euphoria
 - Hallucinations
 - Behavioral disorders, causing accidents
 - Overdosage management - Narcan appears to have benefit

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Prescription Drugs Subject to Abuse

- **Dextromethorphan - (Robitussin, Nyquil)**
 - Plateaus of abuse
 - 100-200 mg - stimulation
 - 200-400 mg - hallucinations, euphoria
 - 300-600 mg - hallucinations, euphoria, perceptual distortions, impaired motor functioning and coordination
 - 600 mg - extreme sedation, dissociative effects

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Prescription Drugs Subject to Abuse

- **Loperamide (Imodium)**
 - Antidiarrheal agent
 - Action - opiate agonist
 - General side effects
 - drowsiness
 - dry mouth
 - constipation – sulfhemoglobinemia (rare)
 - At extremely high dosages, produces euphoria similar to heroin, as well as addiction

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Prescription Drugs Subject to Abuse

- **Loperamide (Imodium)**
 - Reasons for abuse - why?
 - Availability as OTC medication
 - Very low cost
 - Cost has increased since discovery by drug abusers
 - Sometimes chosen to lessen withdrawal symptoms

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Case Example

- **On ED arrival:**
 - Unresponsive
 - No palpable pulse
 - Monitor shows wide complex tachycardia
 - Defibrillation performed
- **Post-ROSC ECG:**
 - Markedly prolonged QT interval

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What's Happening Physiologically?

- **At extremely high doses, loperamide**
 - Blocks cardiac sodium channels → Wide QRS
 - Blocks potassium channels (hERG) → QT prolongation
- **Consequences:**
 - Ventricular tachycardia
 - Torsades de pointes
 - Ventricular fibrillation
 - Sudden cardiac arrest

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Rhythm Recognition & Toxicity Awareness

- **Immediate RT Priorities:**
 - Recognize wide complex tachycardia
 - Identify prolonged QT post-ROSC
 - Assist with airway and ventilation
 - Monitor end-tidal CO₂ during resuscitation
- **Clinical Pearls:**
 - OTC does NOT mean safe
 - Suspect toxicity in unexplained dysrhythmias
 - Ask about high-dose anti-diarrheal use
 - Loperamide abuse often linked to opioid withdrawal

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CNS Drug Overdose & Withdrawal

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Opioid Overdose

➤ Signs

- Marked confusion, delirium, or acting drunk
- Frequent vomiting
- Pinpoint pupils (miosis)
- Extreme sleepiness
- Cyanosis
- Respiratory arrest
- Pulmonary edema
- Coma, death
- Complicated by polydrug use; e.g. cutters, alcohol

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Opioid Overdose

➤ Management

- Naloxone (Narcan)
- Nalmafene - greater duration of action
- Ventilatory support
- Circulatory support

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Opioid Overdose Triad

- **CNS depression**
- **Respiratory depression**
- **Miosis**

- **Management**
 - **Airway**
 - **Breathing**
 - **Circulation**
 - **Naloxone (Narcan)**
 - **Nalmafene - greater duration of action**

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Case Example

- **Vital Signs**
 - **HR: 52 bpm**
 - **BP: 92/58 mmHg**
 - **RR: 6 breaths/min**
 - **SpO₂: 82% on room air**
 - **Pupils: pinpoint**

- **CNS depression**
- **Respiratory depression**
- **Miosis**

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Assessment & Immediate Actions

- **Airway**
 - Reduced protective reflexes
 - Snoring
- **Breathing**
 - RR 6/min
 - Shallow tidal volume
 - Rising ETCO₂ suspected
- **Circulation**
 - Bradycardia
 - Hypotension

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Clinical Course

- **After Naloxone (0.4 mg IV)**
 - RR increases to 14/min
 - Patient awakens
 - SpO₂ improves to 96%
- **10 Minutes Later**
 - Increasing somnolence returns
 - RR falls to 8/min
 - ETCO₂ rising again

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Benzodiazepine Overdose

- **Signs**
 - Respiratory depression - apnea
 - Cyanosis
 - Confusion and disorientation.
 - Tremors.
 - Profoundly altered mental status.
 - Stupor
 - Coma
- Complicated by polydrug use; e.g. alcohol

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Benzodiazepine Overdose

- **Management**
 - Airway, ventilatory support
 - Flumazenil
 - benzodiazepine overdose only - not for routine use

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Case Example

- **Assessment**
 - Unresponsive to verbal stimuli
 - Responds minimally to painful stimuli
 - Snoring respirations
 - Respiratory rate: 8/min
 - SpO₂: 86% on room air
 - Blood pressure: 104/60
 - Heart rate: 62
 - Pupils: normal size and reactive

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What's Happening Physiologically?

- **Mechanism**
 - Benzodiazepines enhance GABA
 - Alcohol enhances GABA and inhibits glutamate
 - Combined effect = profound CNS suppression
- **Clinical Pattern**
 - Decreased mental status
 - Loss of airway tone
 - Hypoventilation
 - Normal pupils
 - High aspiration risk

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RT Management & Flumazenil Caution

- **Immediate Priorities**
 - Position airway (jaw thrust, head tilt if appropriate)
 - Suction if needed
 - Insert oral or nasal airway
 - Begin BVM ventilation with 100% oxygen
 - Prepare for intubation if no improvement
- **Reversal?**
 - Flumazenil is NOT routine

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Cocaine Overdose

- **Signs**
 - Mydriasis - dilated pupils
 - Tachycardia
 - Hypertension
 - Hyperthermia
 - Nausea and vomiting

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Cocaine Overdose

- **Signs**
 - Otherwise healthy young person with myocardial infarction
 - Chest pain
 - Tremors
 - Anxiety
 - Delirium
 - Paranoia, violent behavior
- **Complicated by polydrug use**

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Cocaine Overdose

- **Management**
 - Avoid beta-blocker monotherapy
 - Benzodiazepines for agitation
 - Phentolamine, hydralazine, nitroglycerin for hypertension
 - Cooling blankets for hyperthermia
 - Monitor, treat for MI, cardiac arrest

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Case Example

- **History:**
 - Sudden onset crushing substernal pain
 - Radiates to left arm
 - Diaphoresis
 - Used cocaine 1 hour prior
- **Vital Signs:**
 - BP: 210/118
 - HR: 132
 - RR: 24
 - SpO₂: 93% on room air
 - ECG: ST elevation in inferior leads

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Mechanism of Injury

- **Cocaine causes:**
 - Intense sympathetic stimulation
 - Increased heart rate and blood pressure
 - Coronary vasoconstriction
 - Increased myocardial oxygen demand
 - Platelet activation and thrombosis

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RT Management & Critical Pearl

- **Immediate Priorities:**
 - Oxygen to maintain $\text{SpO}_2 \geq 94\%$
 - Continuous cardiac monitoring
 - Prepare for potential respiratory compromise
 - Assist with airway if mental status declines
- **Pharmacologic Considerations:**
 - Benzodiazepines → reduce sympathetic surge
 - Nitroglycerin → relieve vasospasm
 - Treat hypertension carefully
- **Avoid early beta-blocker monotherapy**

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Amphetamine Overdose

- **Behavioral signs**
 - Agitation that may be severe
 - Hyperactivity that may be severe
 - Hostility
 - Gross psychosis
 - Paranoia
 - Ideation of suicide, homicide

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Amphetamine Overdose

- **Clinical signs & symptoms**
 - Pupillary dilation
 - Diaphoresis
 - Chest pain
 - Hypertension
 - Hyperthermia
 - Skin flushing
 - Stroke
- All signs exaggerated and/or confused by polydrug use

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Amphetamine Overdose

- **Management - as indicated**
 - Restraints - chemical and physical
 - Airway management
 - Cardiac interventions; such are antidysrhythmics
 - Antihypertensives
 - Cooling blankets

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Case Example

- **On arrival:**
 - Combative and physically aggressive
 - Incoherent speech
 - Profuse diaphoresis
 - Temperature: 104.6°F (40.3°C)
 - HR: 160
 - BP: 198/110
 - RR: 32
 - SpO₂: 95% on room air
- Police report suspected methamphetamine use.

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What's Happening Physiologically?

- **Mechanism**
 - Amphetamines → massive dopamine & norepinephrine release
- **Result:**
 - Extreme sympathetic activation
 - Hyperthermia
 - Severe tachycardia
 - Hypertension
 - Increased metabolic demand
- **Result:**
 - Rhabdomyolysis
 - Metabolic acidosis
 - Hyperkalemia
 - Dysrhythmias
 - Sudden cardiac arrest

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Immediate Priorities Sedation, Cooling, Airway Risk

- **Sedation:**
 - Rapid Sedation
 - Benzodiazepines first-line
 - May require repeated dosing
 - Consider advanced sedation if uncontrolled
- **Cooling:**
 - Cooling blankets
 - Ice packs to groin/axilla
 - Cold IV fluids
 - Evaporative cooling
- **Airway Risk:**
 - High oxygen demand
 - Risk of exhaustion
 - Risk of sudden collapse
 - Prepare for intubation

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Drug Abuse and Children

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Epidemiology

- 9.6% of pregnant women in U.S. (2022) used illicit drugs
- Abuse is most prevalent in unmarried young women with decreased SES
- Substances subject to abuse
 - Nicotine
 - Alcohol
 - Opiates
 - Cocaine
 - Amphetamines
 - Benzodiazepines

Source: SAMHSA, 2022 National Survey on Drug Use and Health (NSDUH), 2023 report.

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Consequences for Children

- Pediatric patients – including adolescents
 - Accidental ingestion
 - Addiction - older children
 - Parental neglect
 - Behavioral problems
 - Insomnia
 - Anorexia

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Consequences for Children

- **Neonatal patients**
 - **Congenital anomalies**
 - **Meconium aspiration**
 - **Lack of prenatal care**
 - **Decreased birth weight**
 - **Overdose at birth**
 - **Withdrawal**

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Clinical Signs of Withdrawal

- **Typically occur within 1-5 days of age**
- **Excessive high-pitched cry**
- **Irritability, tremors**
- **Poor sleep**
- **Increased tone and Moro reflex**
- **Poor feeding**
- **Seizures**

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Diagnosis of Withdrawal

- **Maternal history**
- **Neonatal, maternal urine testing**

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Management of Withdrawal

- **Patient oriented care**
 - **Swaddling**
 - **Rocking**
 - **Noise prevention**
 - **Breast feeding, when appropriate**
- **Medications**
 - **Methadone, buprenorphine**
 - **Phenobarbital for non-opiates**
 - **Clonidine (Catapres, Capvay - alpha adrenergic receptor agonist)**

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Case Example

- **History:**
 - Born at 38 weeks
 - Limited prenatal care
 - Maternal history of opioid use
- **Current Findings:**
 - High-pitched, inconsolable cry
 - Tremors at rest
 - Increased muscle tone
 - Poor feeding
 - Frequent loose stools
- **Vital Signs:**
 - HR: 168
 - RR: 64
 - Temp: 99.8°F
 - SpO₂: 97% on room air

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What's Happening Physiologically?

- **In utero**
 - Chronic opioid exposure
 - Fetal neuroadaptation
- **After birth:**
 - Sudden discontinuation
 - Autonomic overactivity
 - Common NAS Signs
 - High-pitched cry
 - Irritability
 - Tremors
 - Poor sleep
 - Feeding difficulty
 - Vomiting / diarrhea
 - Tachypnea

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Monitoring & Supportive Care

- **Respiratory Considerations:**
 - Monitor respiratory rate and effort
 - Assess for apnea
 - Watch for aspiration risk during feeding
 - Continuous pulse oximetry if indicated
- **Supportive Measures:**
 - Swaddling
 - Low-stimulation environment
 - Gentle rocking
 - Frequent, small feedings
- **If Symptoms Severe:**
 - Medication-assisted therapy (e.g., morphine, methadone)
 - Gradual taper

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Recognizing Toxidromes at the Bedside

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Pattern → Likely Cause

CNS depression + miosis	Opioids
Agitation + hyperthermia + clonus	Elevated
Agitation + dry skin + wide QRS	Anticholinergic (TCA)
Severe agitation + hyperthermia + acidosis	Stimulants
Bradycardia + hypotension + sedation	CNS depressants

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Why This Matters to RTs

- Toxicology labs take time
- Overdose management is physiologic
- Airway decisions happen early
- Ventilatory failure precedes lab confirmation

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Mechanisms of Death in Psychotropic Overdose

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Mechanisms of Death in Psychotropic Overdose

- **Hypoventilation → Hypercapnia → Hypoxia → Arrest**
 - **Opioids blunt respiratory drive**
 - **CO₂ rises**
 - **Acidosis worsens**
 - **Hypoxia follows**

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Mechanisms of Death in Psychotropic Overdose

- **Sedation → Loss of airway reflexes → Aspiration → ARDS**
 - Depressed gag reflex
 - Vomiting common
 - Chemical pneumonitis
 - Secondary respiratory failure

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Mechanisms of Death in Psychotropic Overdose

- **Ion channel blockade → Electrical instability → Arrest**
 - TCAs → Sodium channel block → Wide QRS
 - Loperamide → QT prolongation
 - Stimulants → Catecholamine surge

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Mechanisms of Death in Psychotropic Overdose

- **Hyperthermia → Rhabdomyolysis → Acidosis → Collapse**
 - Increased VO_2
 - Increased CO_2 production
 - Muscle breakdown
 - Multisystem failure

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Mechanisms of Death in Psychotropic Overdose

- **Withdrawal → Autonomic instability → Respiratory stress**
 - Neonatal abstinence
 - Alcohol withdrawal
 - Severe sympathetic activation
 - Oxygen demand exceeds supply

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Challenge Scenarios

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Scenario #1

- 28-year-old male found unresponsive at home
- Slow respirations: 6/min
- SpO₂: 82% on room air
- Pupils pinpoint
- Empty alprazolam (Xanax) bottle nearby
- Strong odor of alcohol

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What's Happening Physiologically?

- **Opioids** → suppress medullary respiratory drive
- **Benzodiazepines** → enhance GABA → sedation
- **Alcohol** → CNS depressant → synergistic effect
- **Combined** → profound CNS and ventilatory suppression

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Why Naloxone May Only Partially Reverse

- **Naloxone** reverses opioids only
- **Does NOT** reverse benzodiazepines
- **Does NOT** reverse alcohol
- **Respiratory depression** may persist
- **Patient** may remain obtunded

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Airway Risk & Aspiration

- Depressed gag reflex
- Vomiting common in overdose
- High aspiration risk
- Hypoxia worsening
- Consider early intubation

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Key Lessons

- Polydrug overdoses are common
- Naloxone may not fully restore consciousness
- Ventilation comes before reversal
- Protect the airway early
- Continuous monitoring required

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Scenario #2

- 32-year-old on SSRI for depression
- Recently started tramadol for back pain
- Agitated
- Temp 103.5°F
- Tachycardic
- Inducible clonus

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Serotonin Syndrome: What's Happening?

- Serotonin Excess
 - SSRI + tramadol → ↑ serotonin
 - Neuromuscular hyperactivity
 - Autonomic instability
 - Mental status changes
- Key findings:
 - Hyperthermia
 - Clonus
 - Agitation
 - Tachycardia

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Contrast to: TCA Overdose

- **Scenario B: Tricyclic Antidepressant (TCA) Overdose**
 - History of amitriptyline
 - Altered mental status
 - Dry, flushed skin
 - Urinary retention
 - Tachycardia
 - Wide QRS on ECG

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Key Differences at the Bedside

Feature	Serotonin	Anticholinergic (TCA)
Skin	Diaphoretic	Dry
Neuromuscular	Conus, hyperreflexia	Normal tone
Bowel sounds	Increased	Decreased
ECG	Usually normal QRS	Wide QRS
Temp	Elevated	Elevated

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Why this Matters to RTs

- **Respiratory & Metabolic Consequences**
 - Hyperthermia → ↑ metabolic rate
 - ↑ CO₂ production
 - Lactic acidosis
 - Increased ventilatory demand
 - May require aggressive ventilation

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Scenario #3

- **Term infant, 38 weeks gestation**
- **Born to mother on chronic opioid therapy**
- **24 hours after birth:**
 - High-pitched cry
 - Tremors
 - Tachypnea (RR 70–80/min)
 - Poor feeding

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Why Does This Happen?

- **Pathophysiology**
 - Opioids cross the placenta
 - Fetal brain adapts to chronic exposure
 - After delivery → abrupt opioid withdrawal
 - CNS becomes hyperactive

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Why is the Respiratory Rate High?

- **Respiratory Physiology in NAS**
 - CNS hyperexcitability
 - Increased sympathetic activity
 - Increased metabolic demand
 - Increased CO₂ production
 - Tachypnea as compensation

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Why Do These Babies Fatigue?

- **Energy & Oxygen Demand**
 - Constant tremors → continuous muscle activity
 - High metabolic rate
 - Poor feeding → limited caloric intake
 - Increased work of breathing
 - Risk of fatigue & desaturation

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The Emotional & Clinical Takeaway

- **Neonatal Abstinence Syndrome**
 - Withdrawal, not intoxication
 - Hypermetabolic state
 - High oxygen demand
 - Risk of respiratory fatigue
 - Requires supportive care & sometimes pharmacologic therapy

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Scenario #4 Speedball

- 29-year-old male found unconscious in apartment
- Friends report cocaine use earlier
- Empty alprazolam blister pack nearby
- RR: 8/min
- HR: 132
- BP: 168/96
- SpO₂: 88% on room air
- Pupils mid-size

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Competing Physiology

- Cocaine:
 - Massive catecholamine release
 - Tachycardia
 - Hypertension
 - Increased oxygen demand
 - Risk of dysrhythmia
- Benzodiazepine:
 - CNS depression
 - Sedation
 - Blunted airway reflexes
 - Hypoventilation

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Why This Is Dangerous

- Stimulant increases oxygen demand
- Depressant decreases oxygen delivery
 - Tachycardia + hypertension → ↑ myocardial demand
 - Hypoventilation → ↑ CO₂, ↓ O₂
 - Acidosis increases dysrhythmia risk
 - Risk of sudden arrest

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Management Priorities

- Airway assessment
- Ventilatory support
- Continuous cardiac monitoring
- Treat agitation carefully
- Avoid excessive catecholamine stimulation

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Death

- **Stimulants kill by:**
 - Oxygen demand
 - Dysrhythmia
 - Hyperthermia
- **Depressants kill by:**
 - Hypoventilation
 - Sedation
 - Aspiration

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Summary & Review

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Summary & Review

- **Historical perspective - abuse is not new**
- **Psychotropic drug categories**
- **Epidemiology of drug abuse**
- **Consequences of drug abuse**
- **Analgesics**
 - **Opiates**
 - **Non-opiates**
- **Sedatives, hypnotics, tranquilizers**
- **Antipsychotics, antidepressants**
- **Stimulants**

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Summary & Review

- **Illicit drugs**
 - **Prescription drugs**
 - **Street drugs, names**
 - **OTC medications**
- **Drug overdose**
 - **Opiates**
 - **Benzodiazepines (zams)**
 - **Cocaine**
 - **Amphetamines**

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Summary & Review

- **Drug abuse and children**
 - **Pediatric patients**
 - **Neonates**

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Summary & Review

- **Recognizing toxidromes at the bedside**
- **Challenge scenarios**
- **Why patients die**

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Final Thought

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The End



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