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Program Evaluation and Research Unit

Drug Adulterants



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By the end of this module, you will be able to do the following:

- Define drug adulterants
- List common opioid adulterants
- Discuss the surveillance for adulterants in Pennsylvania
- Explain the basics of xylazine
- List the signs of use, treatment, and physical effects of xylazine









Substances in the Drug Supply

- Chemical contaminants
- Microbiological contaminants
- Diluents
- Substitutes



Categories of Substances

Chemical contaminant	Biological contaminant	Substitute	Original drug (⚗)	Diluent (☆)	Adulterant (💊)
					



Drug Adulterants

- Are pharmacologically active
- Often added in illicit noncommercial laboratories
- Come from a wide range of pharmacological categories
- Add complexity to the opioid crisis



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Common Opioid Adulterants

- Acetaminophen
- Aminopyrine
- Diltiazem
- Diphenhydramine
- Dipyrone
- Levamisole
- Phenacetin
- Quetiapine
- Cocaine
- Acetyl codeine
- Noscapine
- Papaverine



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Fentanyl

- Synthetic opioid
- 50 to 100 times more potent than heroin
- Often found in the illicit opioid supply
- More intense withdrawal symptoms



Surveillance for Adulterants

- Approaches to tracking drug trends
- Drug case submissions vs. drug samples vs. drug exhibits



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Drug Chemistry

- Liquid chromatograph machine positives and negatives
- Presence of fentanyl, acetyl fent, etc. in drug case submissions within Allegheny County
- Drug trends by county
- Mx908 drug spectrometer



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Xylazine Overview

Katie Holler, MPH



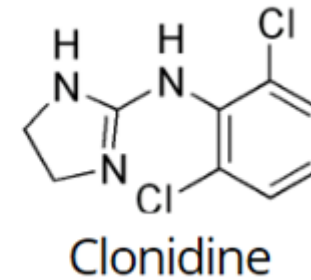
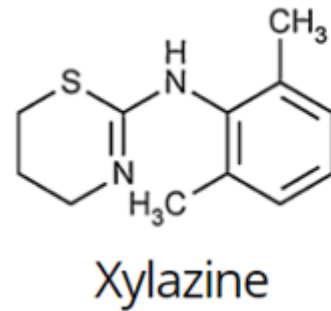
Xylazine Basics

- **Veterinary tranquilizer** often used with large animals such as horses
- **Non-narcotic** and **non-opioid**
- Sedative, and muscle relaxant
- **Not approved** for **human use**
- Commonly referred to as **‘tranq’** or **‘tranq-dope’**



Xylazine Basics (continued)

- Originally created as a **blood pressure medication** for humans
- **Failed clinical trials** in the 1960s: too much sedation
- **Similar** chemical structure as **clonidine** compounds



Entry Into the Drug Market

- Xylazine was originally detected in the drug market in the **United States territory of Puerto Rico**
- Obtained through **veterinary routes**
- People who inject drugs report using it as **early as 2000**
- Underfunding and limited resources of Puerto Rico's public health structure: **unable to address the issue**



US Drug Market

- Mid to late 2010s: emerged in the US drug market
 - **Philadelphia** was a primary market
- Mid 2010s: public health practitioners and harm reductionists began to see it as a **common additive** to the street opioid supply
- By late 2010s: appeared commonly in tandem with fentanyl
 - People who use drugs report it was “**difficult to obtain real heroin**”¹



Xylazine Prevalence Increases

A 2022 study found that...

- Overdose data from 10 jurisdictions, representing all four major US census regions, **demonstrated xylazine as an increasing presence**
- Highest prevalence observed in **Philadelphia** (26% in 2020), followed by **Maryland** (19% in 2021) and **Connecticut** (10% in 2020)
- These numbers may be higher, but **testing is not standard practice**
- Xylazine typically is an **additive** and is **not sold on its own**

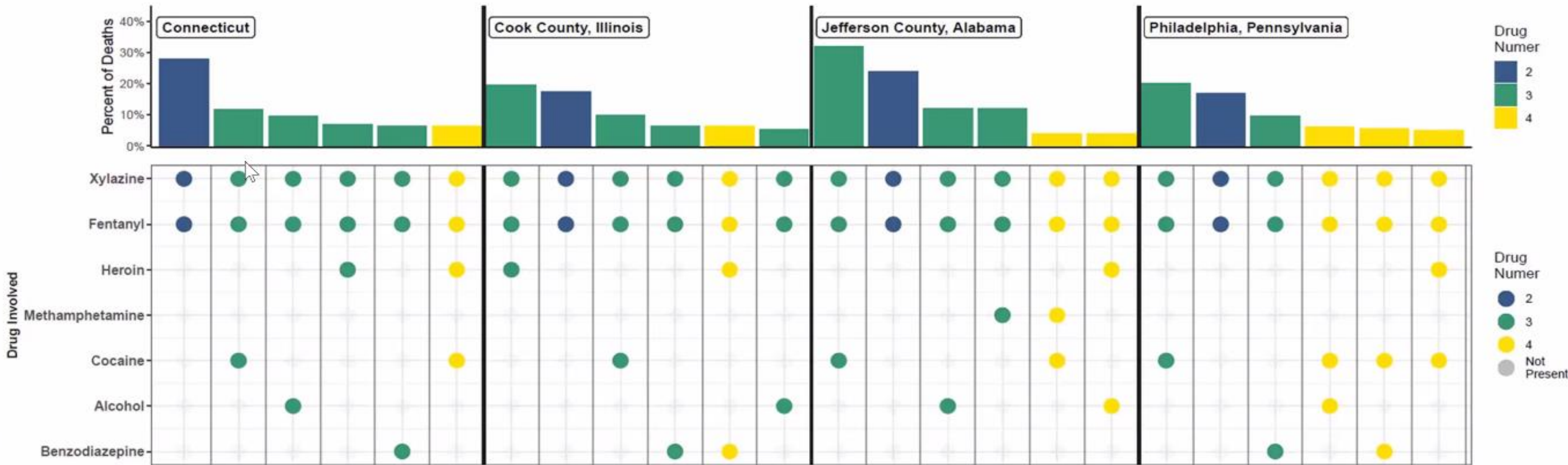


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Xylazine (almost) never shows up alone



Philadelphia Street Opioid Supply

“In 2021, **91% of samples** of purported heroin or fentanyl from Philadelphia **also contained xylazine**, making it the **most common** adulterant in the drug supply.”

- Health alert from the **Philadelphia Department of Public Health**



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Xylazine Effects

- Profound **sedation**
- **Central nervous system** depression
- Blunted response to **airway occlusion** (similar to other sedatives)
- **Synergistic** effect with opioids



Xylazine Effects (continued)

- Time to effect: **1-2 minutes**
- Often a heavy **30-minute nod**
 - Not all people experience this
- Duration of drug effects: up to **4 hours**
- Sedation can **last for hours**
 - Important to **reposition every 2 hours** to avoid compression wounds
 - Can lead to **blood clots** or **deep vein thrombosis**



Perspective on Use

- Some **seek out** xylazine
 - Gives **fentanyl ‘legs’**
 - Fentanyl is a quick acting opioid: xylazine extends effects
 - Makes opioids **more affordable**
- Many use **unknowingly**
 - Individuals **do not know** xylazine is present in their **drug supply**
 - Dangerous **wounds** often **alert them** to its presence
 - Many people who use opioids **try to avoid it**, but it is getting more difficult



Signs of Use

- **Quick and heavy nod off**
 - Difficult to wake from
 - Creates **safety concerns** if in a public place
- **Skin lesions: not associated with injection site**
 - Large, difficult to heal, and often see necrosis (black areas of dead tissue)
 - Can be very dangerous and **medical care is highly recommended**
 - Mechanics of the **wounds are not understood**



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Signs of Use (continued)

- **Hypoglycemia:** drop in blood sugar
 - Fatigue syndrome
- **Anemia/low blood iron**
 - **May** bind to hemoglobin and reduces ability to transport oxygen
 - Weakness, fatigue, confusion, feeling cold
- **Naloxone resistant overdose**
 - Xylazine and fentanyl are combination products
 - Naloxone works on opioids, but the person may not wake up due to xylazine



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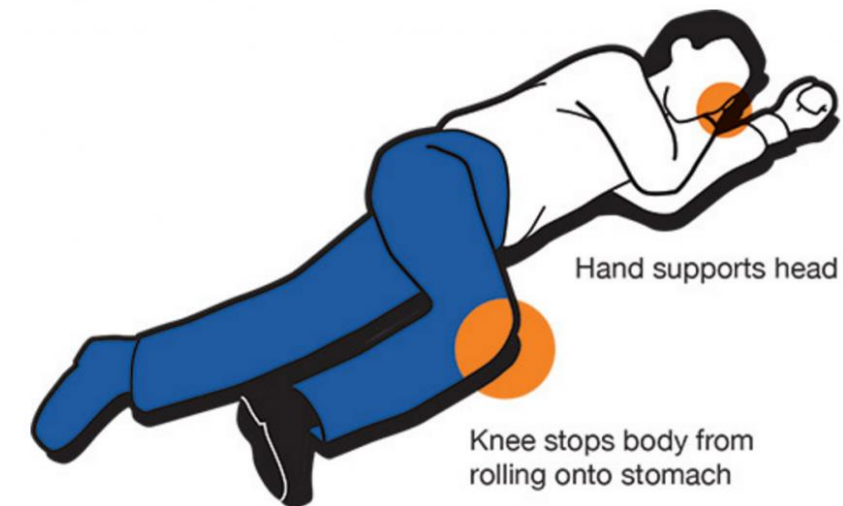
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Bystander Response to a Suspected Overdose

- **Call 911**
- **Administer naloxone**
 - Naloxone will work on opioids paired with xylazine
- **Jaw-thrust maneuver (open airways)**
- **Rescue breathing**
- If stable: **recovery** position
- Give **second naloxone dose** after **2 minutes** if no improvement

The Recovery Position

Keep the Airway Clear



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Diagnostic Testing for Xylazine

- Typically not available for **point of care** or **hospital urine immunoassay**
 - Need to **send out sample** for results
- Detect xylazine in **serum** and **urine**:
 - Thin layer chromatography (TLC)
 - Gas chromatography mass spectrometry (GC-MS)
 - Liquid chromatography mass spectrometry (LC-MS)



Xylazine Withdrawal & Treatment

- Not well defined but **similar to clonidine and dexmedetomidine withdrawal**
 - High blood pressure, fast heart rate, excess sweating, anxiety, and agitation
- Treat like **sedative withdrawal** (benzo/alcohol)
- If **overlaps with opioid withdrawal**: focus on treating opioid withdrawal
- Severe wounds will often need **intensive treatment**



Overview



Known

- Added to opioids (especially fentanyl) to **'give it legs'**
- Heavy **sedative** effect
- Creates severe **wounds**
- Increasingly present in **eastern US drug markets**
- Contributes to overdoses but **not responsive** to naloxone



Unknown

- **Presence in US markets**
 - Not part of standard toxicology
 - Not listed as cause of death
- **Mechanism** of soft tissue infection, hypoglycemia, and anemia



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Recommendations

- Increase community awareness on **overdose signs** and how to **respond**
- Encourage the **carrying** and **use of naloxone**
- Promote safe drug use practices, including the **Never Use Alone**
Hotline: 800-484-3731
- Encourage **testing** for xylazine
 - Toxicology reports or send to centralized laboratories with capacity
 - Testing of seized drugs by law enforcement
- Increase **awareness of the signs of xylazine use**



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