

Exploring Xylazine Use and Prevention



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Presenters

Center for Injury Research & Policy – Nichole Michaels Lab



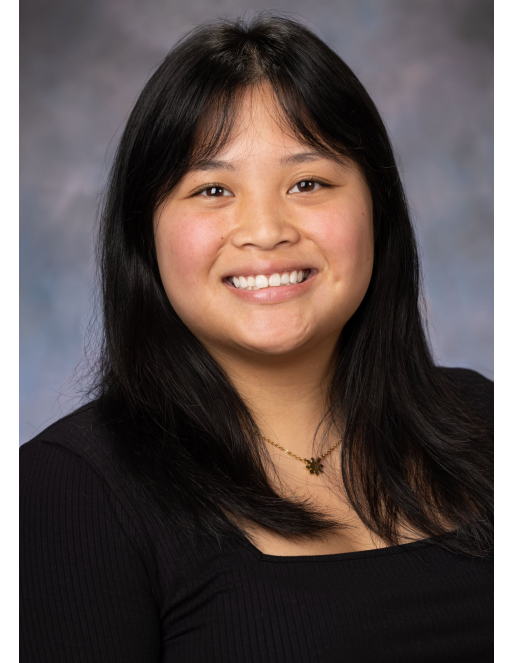
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Maddie Lewis, BS



Natalie Vargas, BS

Thank you to Ohio University's Voinovich School of Leadership and Public Service.

The presenters have no conflicts to disclose.

Objectives

Overview of xylazine use risks and prevalence in the United States

Summary of state and federal actions regarding xylazine use monitoring

Discussion of strategies to address xylazine use within communities



Re: Language

We, the presenters, do our best to acknowledge and utilize terminology that respects the dignity of people who may use substances. Published objectives for this event use the term "misuse," which our colleagues have noted carries a stigmatizing connotation. For the presentation, we want to recognize that any use of substances does not devalue people. Therefore, we refrain from using "misuse" unless referencing sources that use this term to avoid intentionally contributing to stigmatization.

Xylazine Risks and Prevalence



Risks – History & Physiological Effects

- Discovered in 1962 by Bayer, promoted as antihypertensive
- Effects on blood pressure and central nervous systems ruled out clinical use in humans*
- Began being used as tranquilizer in veterinary medicine in late 1960's
 - Current liquid concentrations for veterinary purposes – 20 mg/mL, 100 mg/mL, 300 mg/mL

Toxic concentrations in fatal cases reported from trace amounts to 16 mg/L

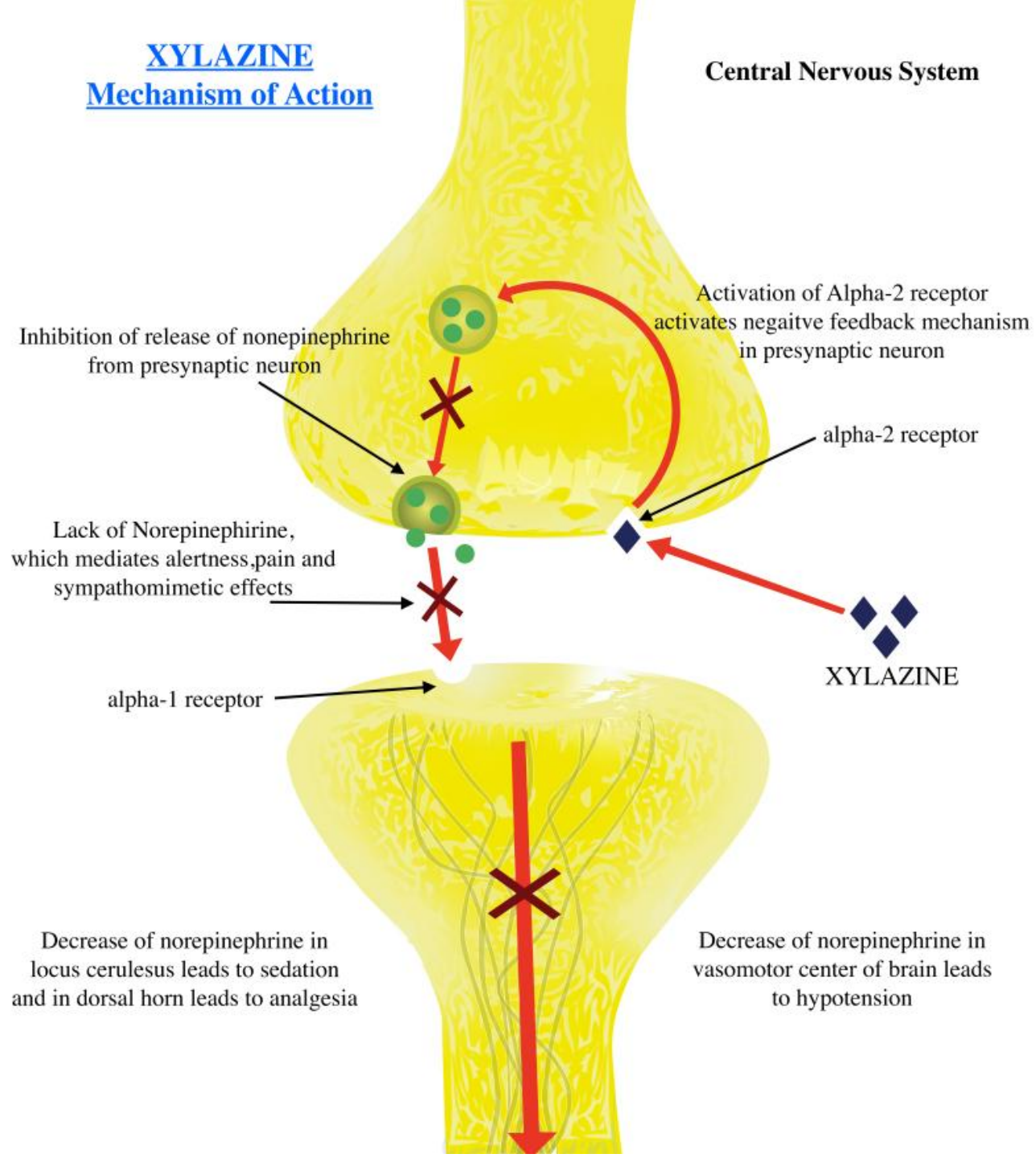
5 L (average blood in adults) x 16 mg/L = 80 mg

First detection of xylazine in street drugs was in Puerto Rico in 2000; "Tranq" in Philadelphia by 2007



National Center for Biotechnology Information (2025). PubChem Compound Summary for CID 5707, Xylazine. Retrieved March 3, 2025 from <https://pubchem.ncbi.nlm.nih.gov/compound/Xylazine>.

XYLAZINE Mechanism of Action



- Xylazine is an alpha-2 adrenoreceptor **agonist**
- Alpha-2 **antagonists** exist, and are used to reverse effects in veterinary practice, but not currently FDA approved for humans
 - Atipamezole (approved for dogs)
 - Idazoxan

****WARNING****

Next slide contains graphic images



Sources: [Xylazine Toxicity - StatPearls - NCBI Bookshelf](#); [Xylazine causes open wounds, making the illegal drug supply even more dangerous](#) : NPR; [Xylazine-Induced Skin Ulcers in a Person Who Injects Drugs in Philadelphia, Pennsylvania, USA | Cureus](#)

Xylazine-Induced Skin Ulcerations

Case studies report ulcers co-occurring with xylazine use

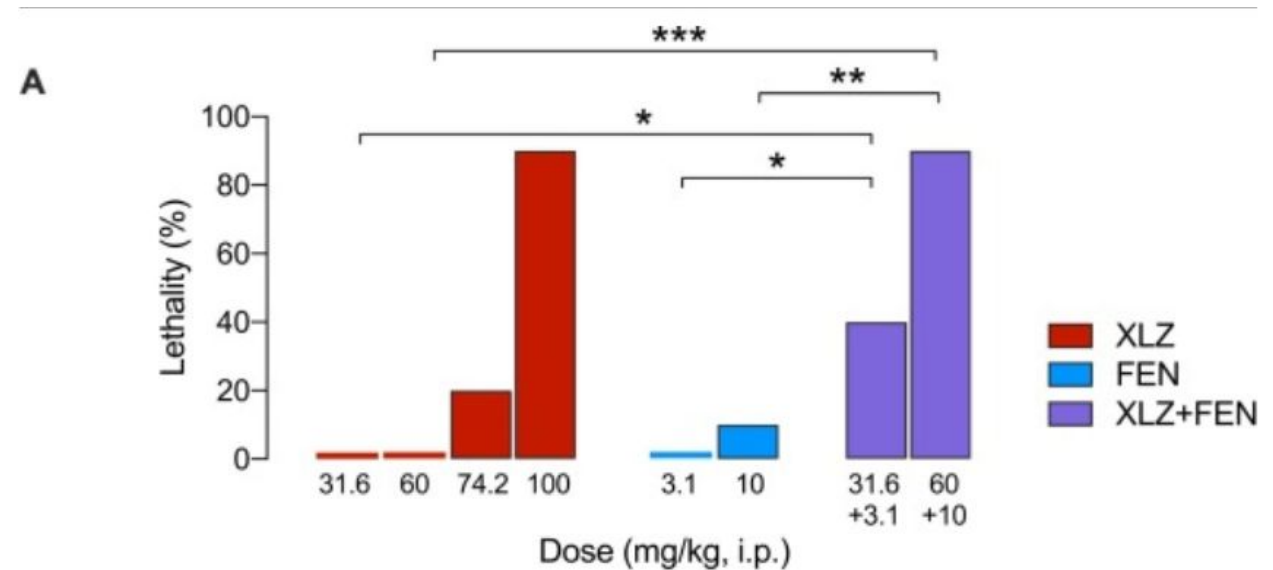
Epidemiological data is sparse, mechanisms for xylazine as the causative agent have not been proven (Reyes et al., 2012; Silva-Torres et al., 2014)

Polysubstance use and non-sterile injection confounds the data and presentation in emergencies

Clinical signs of acute xylazine toxicity: **constricted pupils, low blood pressure, slow heart rate, respiratory depression, high blood sugar, and abnormal ECG** (R. Hoffman, 2023)

Xylazine as a Drug Adulterant

- Approximately 95% of xylazine-involved overdose deaths test positive for fentanyl or analogs (Silva-Torres & Mozayani, 2024).
- Combination of xylazine & fentanyl have shown increased lethality in mice (Acosta-Mares et al., 2023)
- The clinical presentation of xylazine in human overdoses is less well-known, highlighting a gap propagated by low awareness and shortfalls in testing



Prevalence: Use, Mortality, & Detection

- Survey sample of adults evaluated for substance use treatment between July 2022 & Sept. 2023 (N = 43,947) (Jiang et al., 2024)
 - **4.4%** (n = 1,924) reported ever using xylazine
 - Among people using IMF or heroin as primary substance, **12.7%** (n = 817) reported ever using xylazine
 - **Polysubstance use higher among people reporting ever using xylazine** (57.2% v. 36.1%)
- NFLIS & state mortality reports 2019 – 2022 (Cano et al., 2024)
 - **Lack of data on mortality**; 42 states & DC reporting at least 1 xylazine-related overdose fatality
 - NFLIS reports **more than doubled in 30 states** over study period
 - Highest overall reporting and greatest change in reporting was **concentrated in northeast** (e.g. Delaware, Connecticut, Rhode Island)
 - **Ohio had 6th highest reporting rate** in 2022 (10.8 per 100k)

Mainstream Media – Careful Reporting

NATIONAL

Deadliest phase of fentanyl crisis eases, as all states see recovery

MARCH 10, 2025 · 4:12 AM ET

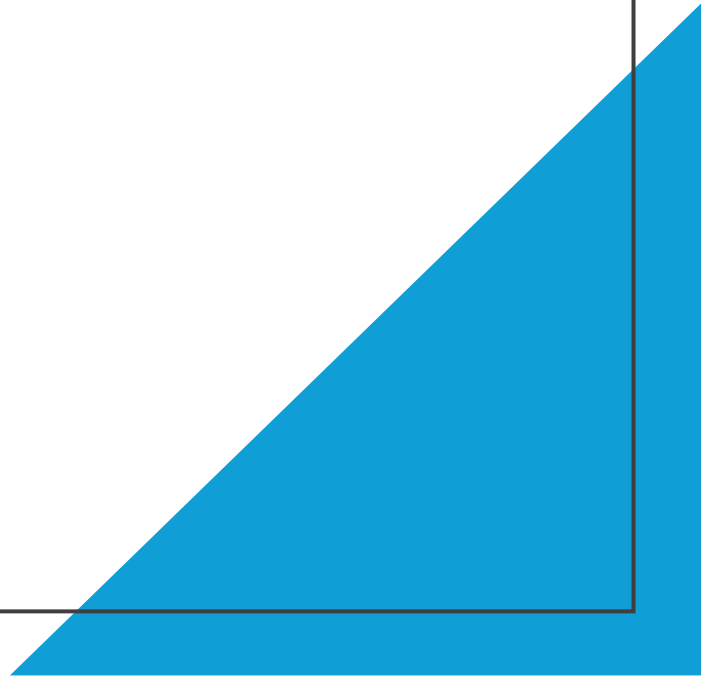
HEARD ON MORNING EDITION



Brian Mann

•"Xylazine causes severe wounds on people but it requires a large amount of it to be fatal," he said, a sharp contrast with fentanyl, which can be deadly even in tiny doses.

Federal and State Responses to Xylazine Use



Overview of Federal Drug Regulation

CSA vs FD&C Act:

The Controlled Substances Act:

- Established to regulate substances that pose a risk of abuse or dependence
- Does not regulate all substances ex. Alcohol and Tobacco are not subject to the CSA
- Enforced by the Drug Enforcement Administration (DEA)

The Federal Food, Drug, and Cosmetic Act:

- Established to protect consumers from using unsafe or ineffective drugs
- All pharmaceutical drugs are subject to the FD&C Act
- Enforced by the U.S. Food and Drug Administration (FDA)

Drug Classification by the CSA

- Regulated substances are placed in one of five schedules based on medical use, potential for abuse, and safety or dependence liability.
- Lower schedule numbers are under greater restrictions.
- The DEA can temporarily schedule drugs if they pose an urgent threat to public safety for up to 2 years.
- Xylazine is regulated under the FD&C Act but not the CSA due to its approval for veterinary use, but not human consumption.

	 ABUSE POTENTIAL	 MEDICAL USE	 SAFETY/DEPENDENCE	 EXAMPLES
SCHEDULE I	High	⊗ Not currently accepted	Lack of accepted safety for use of the substance under medical supervision ¹	Marijuana, ² heroin, lysergic acid diethylamide (LSD), 3,4-methylenedioxymethamphetamine (MDMA), peyote ³
SCHEDULE II	High	✓ Currently accepted	Abuse may lead to severe psychological or physical dependence ⁴	Cocaine, methamphetamine, oxycodone, fentanyl, ⁵ Adderall ⁶
SCHEDULE III	Less than the substances in Schedules I and II	✓ Currently accepted	Abuse may lead to moderate or low physical dependence or high psychological dependence ⁷	Ketamine, anabolic steroids, testosterone, Tylenol with codeine ⁸
SCHEDULE IV	Low potential for abuse relative to the substances in Schedule III	✓ Currently accepted	Abuse may lead to limited physical dependence or psychological dependence relative to the substances in Schedule III ⁹	Xanax, Valium, Ambien ¹⁰
SCHEDULE V	Low potential for abuse relative to the substances in Schedule IV	✓ Currently accepted	Abuse may lead to limited physical dependence or psychological dependence relative to the substances in	Cough medicines with codeine, certain anti-diarrheal medicines, FDA-approved drugs containing the marijuana extract cannabidiol (CBD) ¹²

Note. From the Congressional Research Services Report (p.7), 2025. The Controlled Substances Act (CSA): A Legal Overview for the 119th Congress.

Dear Colleague,

The United States Food and Drug Administration (FDA) is communicating with you about serious risks associated with xylazine exposure for management.

There are no approved uses of xylazine for humans. FDA is aware of the illicit drug supply and in drug overdoses; however, drugs may not be aware of xylazine's presence in their supply. Xylazine is often identified in combination with heroin and fentanyl. Stimulants (cocaine) have also been combined with xylazine. Reports from individuals suggest that xylazine-containing products may be sold under the name *sleep-cut*, *Philly dope* and *zombie drug*. There have been reports of xylazine with *speedball* (i.e., an opioid used with a stimulant) and other individual components of the mixture.

FDA alerts health care professionals of risks to patients exposed to xylazine in illicit drugs

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[11-8-2022] Health care professionals should be cautious of possible xylazine inclusion in fentanyl, heroin, and other illicit drug overdoses, as naloxone may not be able to reverse its effects. FDA is aware of increasing reports of serious side effects from individuals exposed to fentanyl, heroin, and other illicit drugs contaminated with xylazine.

Xylazine is FDA-approved for use in animals as a sedative and pain reliever. Xylazine is



Federal Responses to Xylazine Use

Awareness & Education:

- ✓ Sept '21 – The CDC shared information on the detection of xylazine and its role in drug overdoses throughout the country.
- ✓ Oct '22 – The DEA published a report on the threat of xylazine mixed with illicit drugs.
- ✓ Nov '22 – The FDA alerted healthcare professionals to patient exposure to xylazine in illicit drugs.
- ✓ Mar '23 – The DEA issued a public safety alert about the threat of fentanyl mixed with xylazine

Regulation:

- ✓ Mar '23 – The House of Representatives introduced the Combating Illicit Xylazine Act.
- ✓ Apr '23 - The Office of National Drug Control Policy designated fentanyl adulterated with xylazine an emerging threat to the country.
- ✓ Jul '23 – The Biden Administration presented a plan to address the emerging threat.
- ✓ Dec '23 – The TRANQ Research Act was signed into law by the President.
- ✓ Feb '25 – Congressman Jimmy Panetta reintroduced the Combating Illicit Xylazine Act.

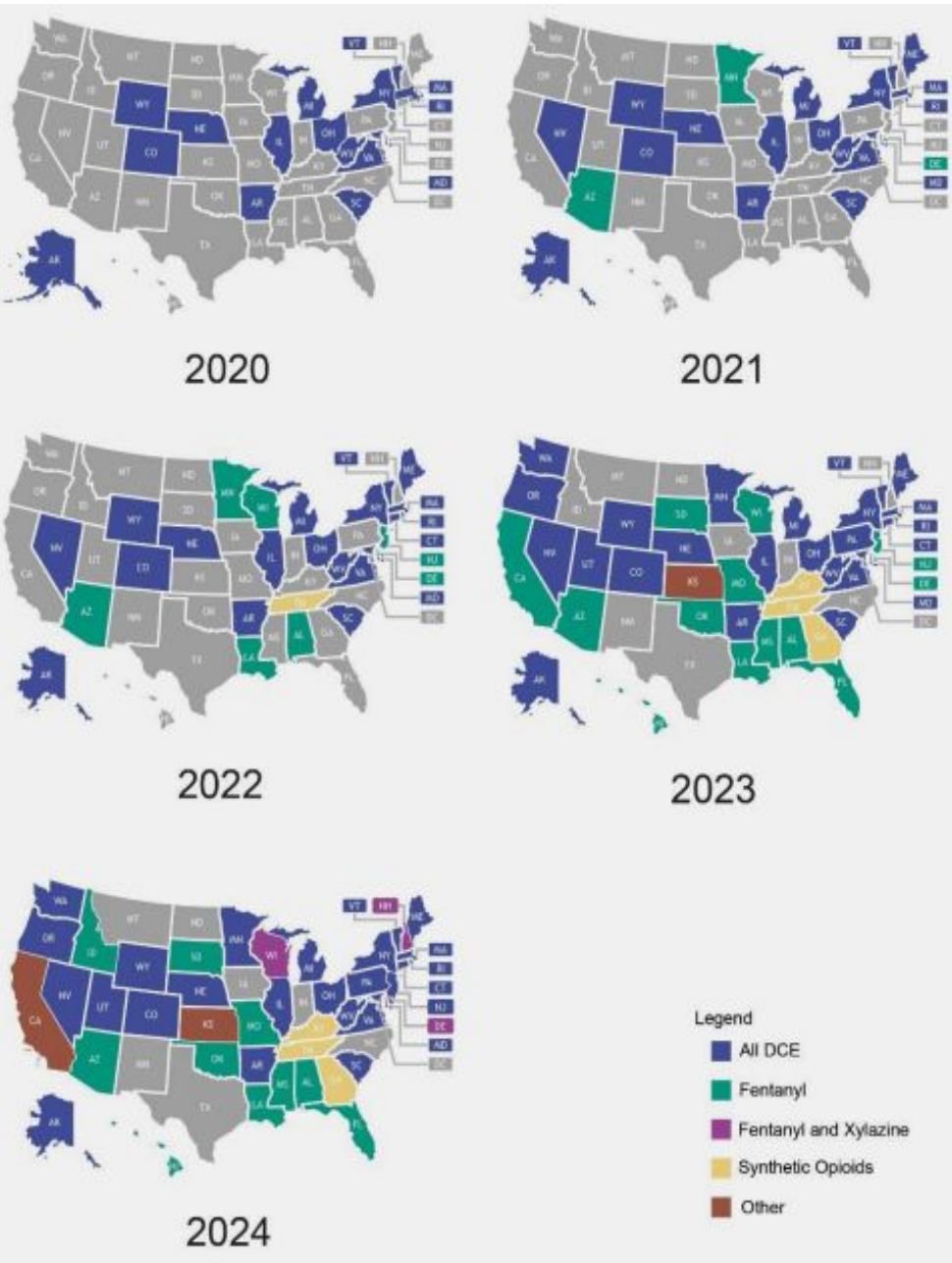
Responses in Other States

Regulation:

- Mar '23 - **West Virginia** passed legislature to classify xylazine as a Schedule IV drug.
- Apr '23 – **Pennsylvania** submitted a notice of intent to classify xylazine as a schedule III drug temporarily.
- Jul '24 – **Indiana** made xylazine possession a Class A misdemeanor and increased the penalty level.
- Aug '24 - The Network for Public Health Law found that 20/50 states allow all forms of drug-checking equipment (DCE) to be sold, given away, or possessed.

Programs & Initiatives:

- Jul '21 – **Rhode Island** launched a pilot program to open and operate prevention centers.
- Oct '21 – **Maryland** established a state-wide drug-checking program, Rapid Analysis of Drugs (RAD).
- **New Jersey's** Harm Reduction Centers teach safe injection practices and offer wound care treatment by trained nurses.



States with Laws permitting free DCE. From The Network for Public Health Law [Legality of Drug Checking Equipment in the United States - Network for Public Health Law](#)

Responses in Other States, cont.,

- Good Samaritan Laws with protections from arrest in conjunction with Naloxone Access Laws were associated with a 7% lower rate for all overdose fatalities (Hamilton et al., 2021)
- Implementing point-of-care drug checking services can increase awareness and engage at-risk individuals in prevention, harm reduction, treatment, and rapid care for xylazine-related wounds (Park et al., 2024)
- Post-overdose outreach programs that provided or referred overdose survivors to social services potentially helped survivors and their families meet concrete needs, thereby reducing overdose (Simeon et al., 2023)
- Collaborative planned response to xylazine (Olsen et al., n.d.)
 - PWUD emphasized the importance of police/EMTs being educated that naloxone does not reverse overdose and expressed interest in receiving Xylazine test strips

Overview of Regulation by the State of Ohio

- 3/29/23: Governor Dewine signed an executive order directing the State of Ohio Board of Pharmacy to immediately classify xylazine as a schedule III controlled substance
- Veterinary practices can still obtain xylazine if they obtain a license to do so and can prescribe it to clients (to give to animals)
- Classification will inhibit clinical research, and can deter those seeking care for xylazine use due to fear of arrest (even if use was unintentional)
- In Florida, Xylazine was made illegal in 2018, yet there was a 1127% increase in xylazine-involved overdose deaths from 2020-2021 (Zagorski et al., 2023)

Governor DeWine Authorizes Emergency Classification of Xylazine as Schedule III Controlled Substance

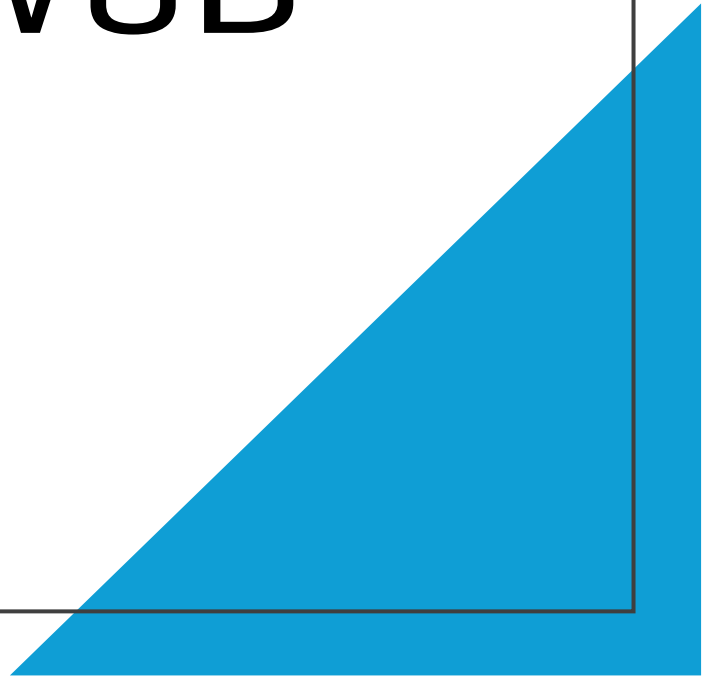
March 29, 2023



Alex Krotulski, PhD, Associate Director at the Center for Forensic Science Research and Education (CFSRE):

“History has repeatedly shown that the scheduling of drugs or related substances opens the door for new replacements, those of which are sometimes more potent, more harmful, and more difficult to track. The adulteration of fentanyl with xylazine is occurring deliberately to improve the effects of fentanyl. If xylazine was removed from the drug supply, it would almost certainly be replaced by another drug, possibly a benzodiazepine, which could lead to worse overdose outcomes and health implications.”

Snapshot of Xylazine Awareness and Attitudes among PWUD in Ohio



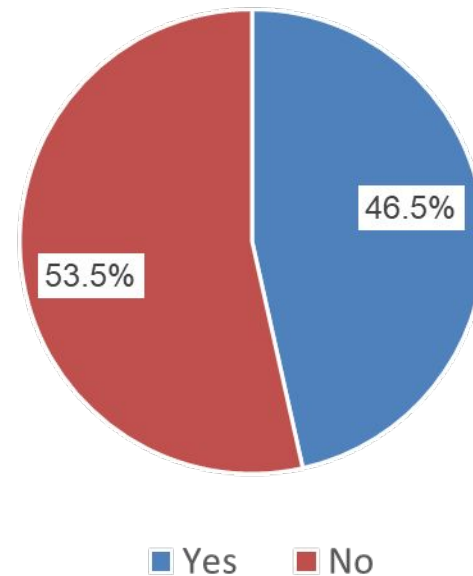
Xylazine awareness and attitudes among people who use drugs in Ohio, 2023-2024

- Total participants: 630
- Median age: 42 years (range: 19-77 years)
- Male: 59.1%
- Race and ethnicity:
 - White, European American, or Middle Eastern: 65.1%
 - Black or African American: 24.5%
 - Not Hispanic or Latino: 95.5%
- Currently experiencing homelessness: 39.8%
- Recruitment county urbanicity:
 - rural: 21.4%; urban: 78.6%

Michaels et al., 2024

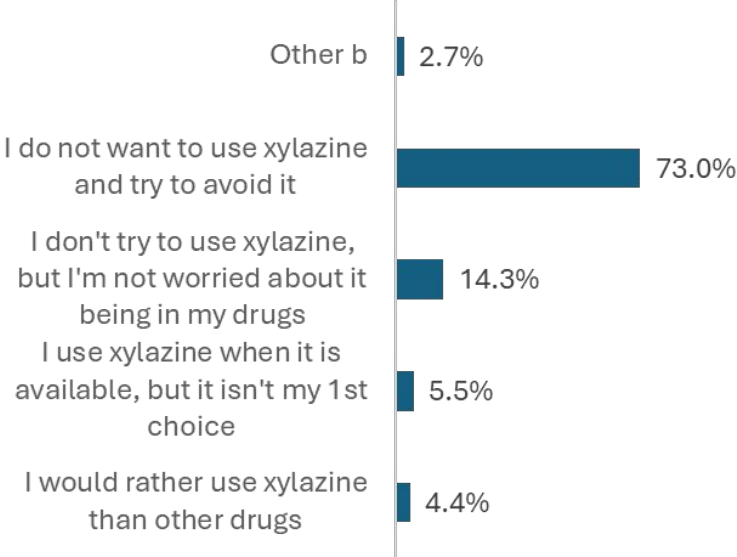
Xylazine awareness among PWUD (n=630)

Before today, had you ever heard of xylazine being present in street drugs? (Xylazine is also known as tranq, tranq dope, Philly dope, sleep cut, or zombie drug.)



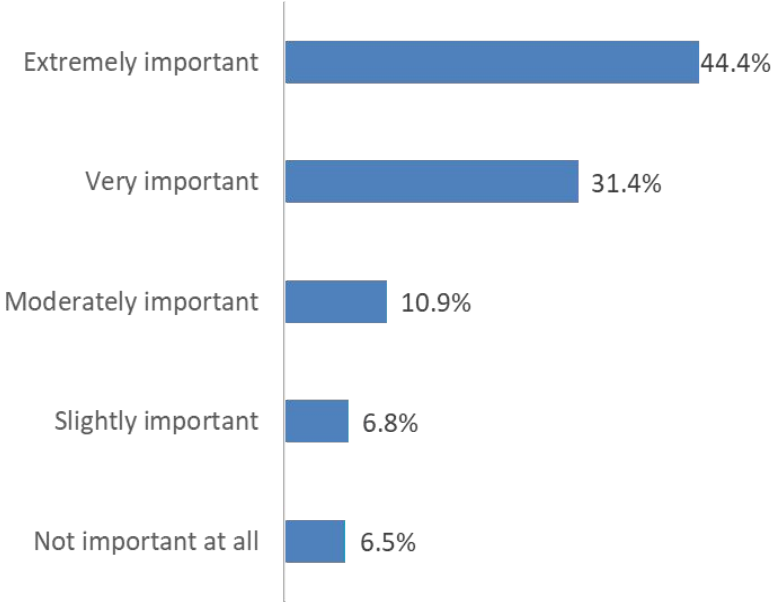
Xylazine attitudes among PWUD with xylazine awareness (n = 293)

How do you feel about using xylazine?



^bIncluded responses "NA", "Not sure," etc.

How important is it to know if xylazine is in your drugs?



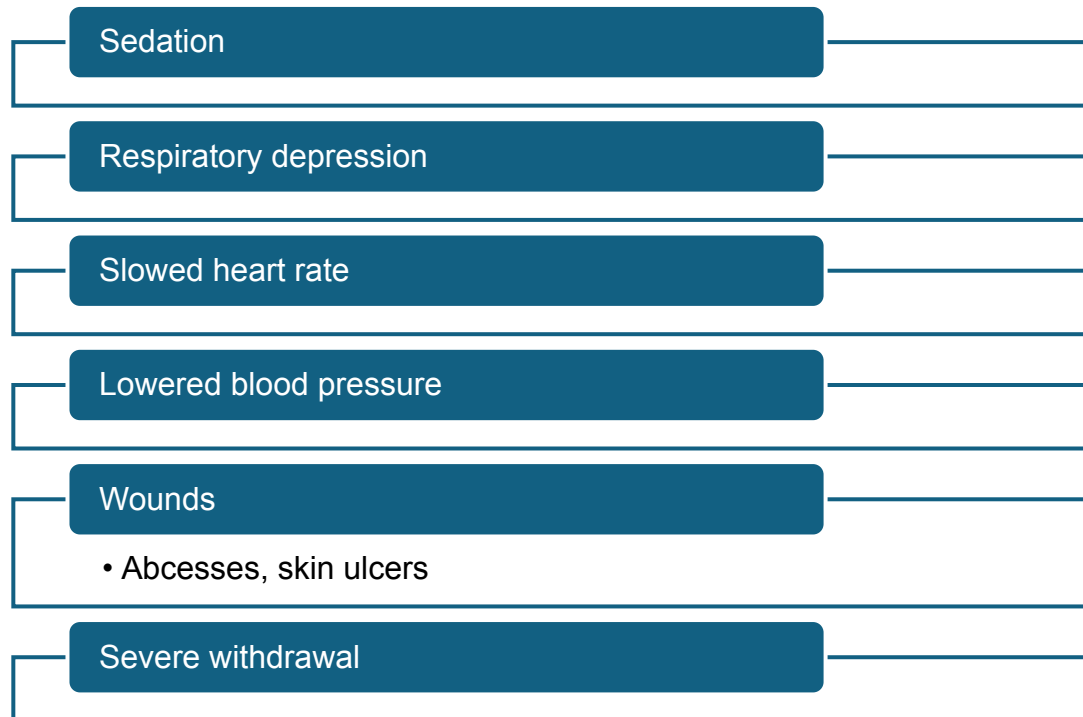
Strategies to Address Xylazine Use

HARM REDUCTION SERVICES



Xylazine

Effects and symptoms



Responding to an overdose

- Call 911
 - May instruct to begin CPR
- Administer naloxone
- Administer rescue breaths
 - 1 breath every 5 seconds
- Stay with the person until EMS arrives
- Monitor person's breathing



Increasing Community Awareness

- Need for increased xylazine awareness among PWUD
 - Reduce stigma
 - Encourage safe practices
- Preparation of pamphlets and other educational materials alongside existing harm reduction programs
 - Highlight effects and symptoms
 - Community resources
- Include first responders and other health providers
 - Initiate conversations with patients
 - Facilitate referrals
 - Keep xylazine in mind when responding to overdoses



Recommendations for Safe Use

- Never use alone
 - 877-696-1996
- Use in a safe environment
- Always carry naloxone
- Treat wounds
- Reduce risk of infection (rotating injection sites, sterile needles)
- Test substance, if services are available

Basic Wound Care



Keep wounds **clean, moist, and covered**



Gently rinse wounds every 2-3 days



Apply barrier ointment (ex. Petroleum jelly) and double-wrap with gauze followed by bandage dressing, changing daily



Avoid cleaning with alcohol or hydrogen peroxide as they may dry out the wound.



Always seek medical advice if wounds become infected or change in appearance

- Increased pain
- Loss of mobility
- Red or black swollen skin
- Blood or pus present
- Exposed bone
- Skin tissue falling off



Oregon Health Authority,
2024

Advocacy



- Expansion of overdose prevention services
 - Drug checking and xylazine test strips
- Good Samaritan Laws
- Increased access to medication for opioid use disorder and naloxone
- Evidence-based drug education and treatment
 - Specialized responses to xylazine-involved overdoses and xylazine-associated skin and soft tissue infections for first responders, clinicians, and others involved in the care of PWUD

(Harvey et al., 2023)



Key Points

- Evidence is not conclusive – we need more research and information on xylazine's effects on humans and the causes of wounds related to using the drug.
- Xylazine is not safe for humans and can have dangerous effects when used by itself or in combination with other drugs.
- Most of the federal and state responses to xylazine use have been policy-related – specifically scheduling the drug.
- States should continue to explore new evidence-based approaches to address this issue, including increased harm reduction services.
- In overdose cases, xylazine should be considered among possible substances to have caused the overdose.
- Although naloxone does not reverse the effects of xylazine, it should still be administered because of high polysubstance occurrence.

CIRP – Dr. Michaels' Lab

Evaluating the impact of fentanyl test strip use among rural and urban populations



Evaluation of a novel intervention to prevent polysubstance overdoses involving illicit stimulants



Opioids and child abuse and neglect study

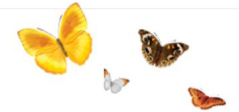


Social support and social networks in family treatment courts



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Nichole Michaels Lab



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Nichole L. Michaels, PhD, is a Principal Investigator in the Center for Injury Research and Policy at the Abigail Wexner Research Institute at Nationwide Children's Hospital and an Assistant Professor in the Department of Pediatrics at The Ohio State University College of Medicine. Dr. Michaels' primary research interests include: identifying and evaluating practices for drug overdose harm reduction and the treatment of individuals with substance use disorders; developing prevention strategies for child abuse and neglect; and understanding the links between substance use disorders and child maltreatment. She is also active in public policy, and is a strong advocate for

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Learn more about our lab: [Nichole Michaels Lab](#)

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Thank You!

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