CCENDU Bulletin

An Update on Xylazine in the Unregulated Drug Supply: Harms and Public Health Responses in Canada and the United States

Summary

- The purpose of this bulletin is to inform public health professionals, policy makers and people who use drugs about the presence and harms of xylazine in the unregulated supply. This is to align action with evidence and centre public health goals.
- Xylazine is a veterinary tranquilizer present in the unregulated drug supply in Canada and the United States. Prevalence is relatively low in many places but varies by region and over time.
- Xylazine typically co-occurs with opioids, benzodiazepines or both and to a lesser degree stimulants. Most xylazine exposure results from this co-occurrence, meaning it is unintended.
- The combination of xylazine with opioids, benzodiazepines or both increases the risk of drug poisoning and complicates response protocols due to prolonged sedation. Naloxone should be used in suspected opioid poisoning, but it will not reverse the effects of xylazine nor benzodiazepines.
- Xylazine exposure is associated with morbidity, particularly skin ulcers and infections. However, in Canada, no drug toxicity deaths have been attributed directly to xylazine as of the end of April 2023. Substance-related mortality continues to be driven by unregulated opioids, particularly fentanyl.
- There are practical, public health–focused actions and tools to mitigate the risks and harms of xylazine exposure. These include supportive healthcare and harm reduction strategies, drug checking, and raising awareness about xylazine and the toxic drug supply.
- Responses should also recognize xylazine as one of many contaminants in the unregulated drug supply and address the unpredictability and toxicity of the supply more broadly.

Background

- The Canadian Community Epidemiology Network on Drug Use (CCENDU) and National Drug Early Warning System (NDEWS) are community-based networks that collect information on emerging substance use trends in Canada and the United States, respectively.
- CCENDU and NDEWS previously published a Drug Alert on Xylazine[1] with information up to April 2022 about the presence of and concerns with xylazine in the drug supply. Key messages included:
  - Xylazine is a veterinary tranquilizer found as an adulterant in the unregulated drug supply, creating unintentional exposure among people who use drugs (PWUD).
  - Combining xylazine with opioids, benzodiazepines or both (which also continue to be present in the unregulated drug supply)[2] can increase the risk of toxicity events.
  - Naloxone can reverse the effects of opioids but not the additional effects of xylazine or benzodiazepines.

- This update was prompted by a recent surge in attention and concern about xylazine in the media (see Appendix A), among public health professionals[3–6] and at the highest levels of government in the United States.[7,8]
- Discussions of xylazine often do not include the broader context of the toxic and unpredictable unregulated drug supply, of which xylazine is only one component. They also often do not include practical guidance for addressing risks and harms.
- For this reason, the Canadian Centre on Substance Use and Addiction partnered with the Public Health Agency of Canada and NDEWS to update the data landscape, assess concerns among community partners, and highlight public health-based solutions to mitigating the harms associated with xylazine exposure.

Data Trends and Local Responses, Canada

An information request about xylazine was sent to CCENDU networks and partners in April 2023. For detailed data trends and reports see Appendix B.

*Health Canada Drug Analysis Service**

Key Information

Xylazine is present in the unregulated drug supply in Canada. Prevalence is generally low but increasing. Prevalence varies by region and regional patterns shift over time. Xylazine commonly co-occurs with opioids, nonmedical benzodiazepines (NMBs) or both and to a lesser degree stimulants. This results in unintended exposure to xylazine among PWUD.

Details

- Among the 90,701 samples of seized drugs analyzed by Health Canada Drug Analysis Service (HC DAS) between May 2022 and April 2023, 13,957 (15.4%) were positive for fentanyl and 1,331 (1.5%) were positive for xylazine.
- HC DAS has identified xylazine in 10 provinces and territories as of March 2023, starting in 2019 (Figure 1). Ontario has the highest number of identifications, followed by British Columbia, Alberta and Quebec. Prominence has shifted from west to east over time and is now greatest in Ontario.
- Xylazine presence in the unregulated supply is low but increasing. While 2022 had the highest number of identifications, based on data for Q1, 2023 is on track to have similar or higher identification levels (Figure 1).
- Xylazine is rarely identified alone. Samples that contain xylazine typically also contain fentanyl (up to 99% of xylazine-containing samples between May 2022 and April 2023) or both fentanyl and NMBs (up to 52% of xylazine-containing samples in that period) (see Figure 2 and Appendix B).
- Xylazine is increasingly present in the unregulated opioid supply. The proportion of fentanyl samples that also contained xylazine increased from 1.4% in January 2020 to 9.0% in April 2023, with a peak near 12.0% in June 2022. Between May 2022 and April 2023, xylazine was also identified in 0.3% of samples containing methamphetamine and in 0.2% of samples containing cocaine.

* Health Canada Drug Analysis Service analyzes samples seized and submitted by law enforcement agencies in Canada. As xylazine is not a controlled substance, its testing and reporting in enforcement-submitted samples is not systematic nor complete. Dates displayed in figures are the month in which samples were analyzed and reported by HC DAS. HC DAS results featured in this bulletin may differ from other data presented by HC DAS due to differences in how the data were analyzed and displayed.

Figure 1: Xylazine identification by DAS by region or province

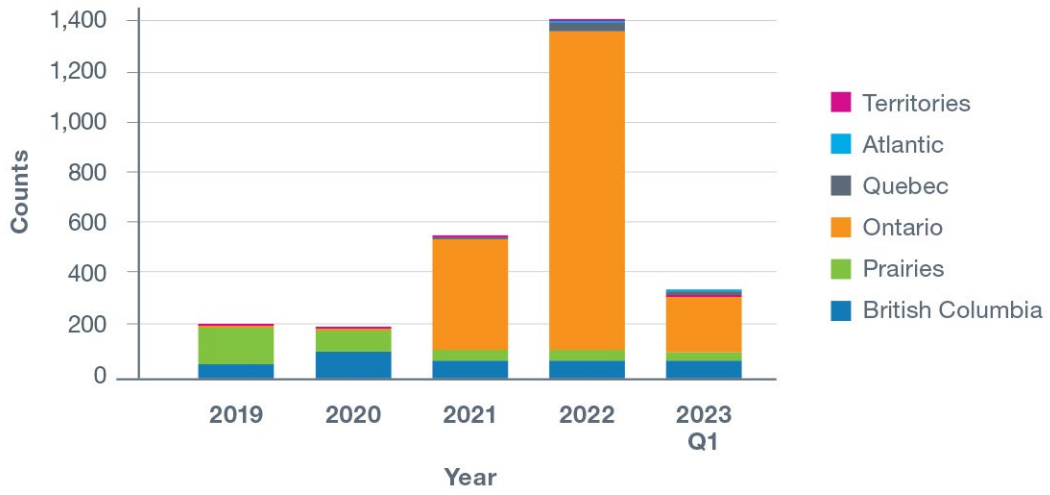
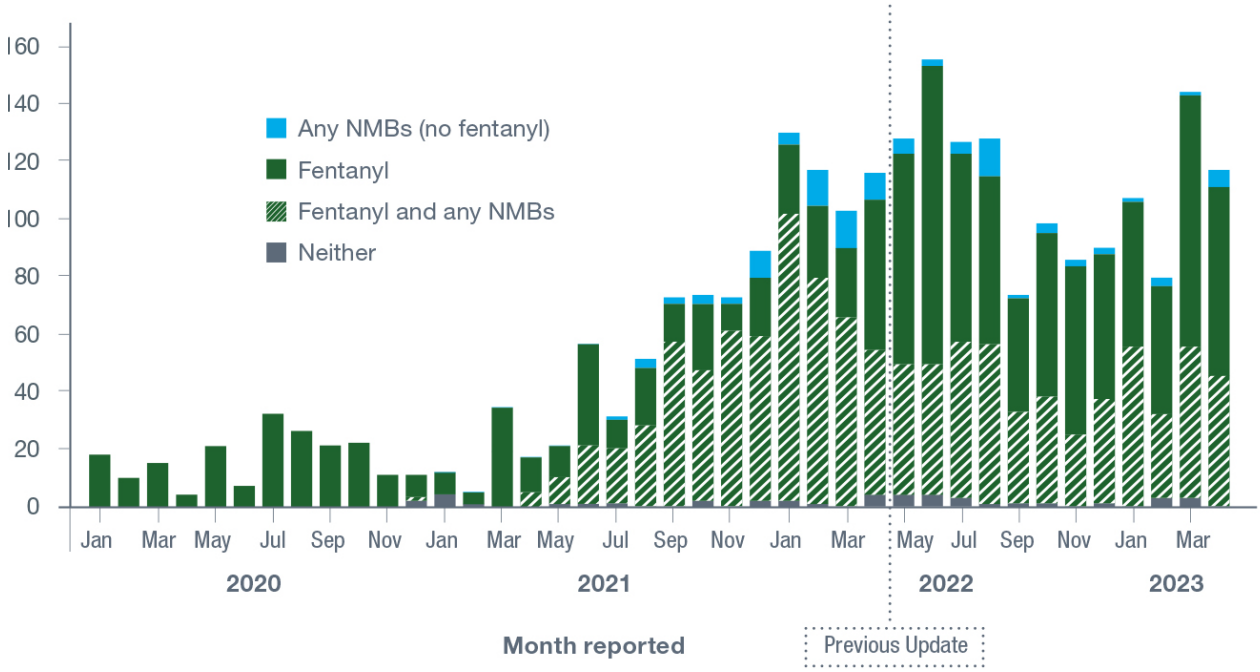


Figure 2: Counts (*n*) of samples containing xylazine and co-occurrence with fentanyl and nonmedical benzodiazepines (NMBs) reported by month



Drug Checking†

Key Information

In British Columbia and Toronto, drug checking confirms the presence of xylazine in the drug supply, primarily in samples expected to be opioids. Its presence is mostly unexpected by clients, meaning it is not being sought intentionally.

Details

- Among British Columbia drug checking services co-ordinated by the British Columbia Centre on Substance Use (BCCSU), xylazine is detected in low frequencies and almost always co-occurs with opioids. Xylazine has also been detected in non-opioid drugs, including benzodiazepines, ketamine, MDMA and crack cocaine, but this has been rare. Although overall xylazine detection is low, there is an increasing trend, with 0.03% of expected opioid samples testing positive for xylazine in 2019, 0.05% in 2020, 0.5% in 2021, 1.4% in 2022, and 2.0% so far in 2023.
- Using different drug checking technologies, Substance Drug Checking in Victoria reported xylazine prevalence in expected opioid samples to be 1.7% in 2021, 6.8% in 2022 and 3.0% so far in 2023. Prevalence peaked at 18.3% in June 2022. There was high co-occurrence of xylazine, opioids and NMBs, with none of the samples containing xylazine only. Xylazine has also been detected in a small number of samples expected to be cocaine, benzodiazepines and caffeine, all of which were negative for the expected substance.
- Toronto's Drug Checking Service has found that xylazine presence in samples expected to be fentanyl has varied since 2020. As of the end of April 2023, it was detected in 11% of these samples, following a peak of about 26% in June of 2022. Xylazine has also been detected in 1% of samples that were not expected to be fentanyl, including benzodiazepines and other opioids. It has not been detected in any expected stimulant, psychedelic or dissociative samples.

Reports from CCENDU Sites‡

Key Information

CCENDU sites confirm the presence of xylazine in the drug supply. They also link xylazine exposure to health risks, including drug poisoning events when combined with opioids and NMBs, and skin infections. Targeted responses focus on wound care and supportive care for drug poisoning events.

Details

- Five CCENDU sites responded to the April 2023 information request, representing the provinces of British Columbia, Quebec and Nova Scotia, and the cities of Winnipeg, Man., and Toronto, Ont. For detailed reports see Appendix B.
- All sites confirmed xylazine presence through DAS, drug checking or toxicology analyses. Prevalence varied by region. Overall, xylazine prevalence was considered low, especially relative to other contaminants in the drug supply,[9] particularly NMBs.
- All sites reported co-occurrence of xylazine with other substances, typically opioids.

---

† Drug checking involves testing samples of drugs from the unregulated supply or residue from used equipment for their contents. Information for this section was provided by BCCSU Drug Checking, Substance Drug Checking and Toronto's Drug Checking Service. For detailed reports, see Appendix B.

‡ For a description of the network and a list of all CCENDU sites, visit the CCENDU web page.

- Concerns reported by sites were primarily around wounds and challenges with wound care, prolonged sedation and associated risks, appropriate use of naloxone, and the need for timely and accurate information.
- Targeted responses reported by sites included:
  - Creation of resources on prolonged sedation (e.g., Basics, Beyond Basics, Responding) and wound care (e.g., Meet People Where They Are, A Harm Reduction Guide to Wound Care).
  - Issuing alerts and public health advisories, as reported by Winnipeg (alerts from health authorities and harm reduction agencies), Toronto (alerts from the City of Toronto) and Quebec (Montreal public health alert).
  - In Quebec and Nova Scotia, xylazine is now included in post-mortem toxicology analyses.
  - The Quebec Urine Analysis Project (PSADUQ) also detects xylazine (among many other substances) in urine samples to help determine exposure among people using harm reduction services.
- More general responses include availability of harm reduction services, such as drug checking and supervised consumption services, and low-barrier, community-driven processes for communicating emerging harms, such as email and Twitter.

Data Trends and Local Responses, United States

An information request about xylazine was sent NDEWS networks and partners in April 2023. For detailed data trends and reports see Appendix B.

National Data

Key Information

Xylazine is increasingly found in the drug supply and linked to harms in the United States.

Details

- Fentanyl mixed with xylazine has been found in drug seizures in 48 states as of March 2023.[10] Forensic laboratory identifications of xylazine increased between 2020 and 2021, particularly in the South (193%) and West (112%).[11] During that time, drug toxicity deaths in which xylazine was detected increased by 1,127% in the South, 750% in the West, 516% in the Midwest and 103% in the Northeast.
- The White House Office of National Drug Control Policy (ONDCP) designated fentanyl combined with xylazine an emerging national threat in April 2023.[7] ONDCP is convening an interagency working group to develop a national response plan that includes testing, treatment and supportive care protocols, comprehensive data systems including information on drug sourcing and supply, strategies for supply reduction, and rapid research.

Reports from NDEWS Sites§

Key Information

NDEWS sites confirm the presence of xylazine in the drug supply and link it to drug poisoning events in combination with opioids and NMBs.

Details

- Eight NDEWS sites responded to the April 2023 information request, including four from the South (i.e., Florida, Texas and the cities of Atlanta, Ga., and Washington, D.C.), two from the West (i.e., San Francisco, Calif., and Seattle, Wash.), and two from the Midwest (i.e., Chicago, Ill., Duluth, Minn., and St. Louis, Mo.). For detailed reports, see Appendix B.
- All sites in the South and Midwest confirmed xylazine presence through forensic toxicology. In many of these regions, prevalence was high, with xylazine identified in about one-third of fentanyl-involved deaths in Florida and one-third of medical examiner reports in St. Louis.
- In the West, the presence of xylazine was either unconfirmed or reported at low rates. The Seattle site reported that among deaths, police evidence testing and crime lab cases, less than 1% each involved xylazine.
- Most of the sites reported co-occurrence of xylazine with other substances, typically opioids.

*Reports from the National Survivors Union***

Key Information

Peer-based community networks are also identifying xylazine and linking it to drug poisoning events in combination with opioids and NMBs, as well as skin infections. Regional patterns are consistent with those reported by NDEWS.

Details

- Drug checking services in the South (i.e., North Carolina) have detected xylazine in both opioid and stimulant samples.
- In the Midwest, drug checking services in Chicago are reporting xylazine and benzodiazepines in the opioid supply. This is consistent with reports from Detroit, where “benzodope” (a combination of opioids and NMBs) and xylazine have been common in the opioid supply. Seizures and breathing problems from NMBs and xylazine have become a common part of drug toxicity events.
- One organization in the Northeast (i.e., Berkshires, Massachusetts) reported that xylazine was involved in 80% of opioid toxicity cases in the region. In a nearby region (i.e., Hampden County), drug checking detected xylazine, but service providers did not report seeing xylazine lesions. These differences could relate to different drug supply routes.
- As a targeted response, some of the organizations bought xylazine test strips (see below) and were testing them for sensitivity and reliability.

§ For a list of all NDEWS sites visit the NDEWS web page.

** The National Survivors Union is a national network of PWUD and sex workers that collaborates with NDEWS. Information provided by sites includes trends identified by network members and may not include precise estimates.

Tools for a Public Health Response††

This section presents practical, community-based, public health–focused actions and tools that can help address the risks and harms associated with xylazine exposure. Resources for taking action are listed later in this bulletin.

Drug Checking

Key Information

Drug checking provides valuable information about the presence of xylazine in the unregulated drug supply. Access is limited by precarious funding and technology constraints. Benefits to PWUD are also limited by a lack of alternatives for sourcing drugs even if they are aware of the presence of xylazine and other contaminants.

Details

- Drug checking plays an important role in monitoring and communicating trends in the drug supply in or near real time. Drug checking services can provide local prevalence estimates for the many adulterants present in the unregulated supply, including xylazine.[12] This can inform substance use, harm reduction and healthcare planning.[13,14]
- Despite its potential, access to drug checking is limited. In Canada it is limited to a few provinces and territories, and mostly urban areas. Services are also constrained by the limits of the technologies available in community settings.[15] To maximize the benefits of drug checking, sustainable funding is needed to scale-up services and use sensitive and reliable equipment.
- Xylazine test strips have recently come on the market in the United States and may offer a more affordable and accessible way to detect it in the unregulated drug supply. The strips performed well in a preliminary laboratory-based validation experiment[16] but had limitations (e.g., cross-reactivity with other substances) that make additional field testing essential.[17] In addition, because the strips were developed for testing biological specimens (e.g., urine) rather than samples of drugs, their effectiveness for drug checking will not be assessed by Health Canada.‡‡
- PWUD may use their drugs regardless of drug checking results as they have no alternatives for sourcing their drugs than the toxic, unregulated supply. This limits the benefits of drug checking and suggests that solutions need to go beyond awareness of what is in the drug supply to making it more predictable.

†† Information for this section was provided by members of Canada's National Drug Checking Working Group, clinical specialists and PWUD. We are extremely grateful for their expertise and insights.

‡‡ Test strips that are designed to test biological specimens, like urine, are considered medical devices in Canada, which means they are assessed by Health Canada to determine their safety, effectiveness and quality before being authorized for sale. When test strips are used to check substances or residue on used drug equipment, as is the case with drug checking, they are considered consumer products and are not assessed.

Medical Care and Harm Reduction

Key Information

Medical care and harm reduction strategies exist for those who have been exposed to xylazine. It is important to increase the capacity of healthcare and harm reduction workers to address complex drug poisoning events, use naloxone appropriately and manage withdrawal. It is also important to facilitate early recognition of wounds related to xylazine exposure and to provide access to and clear guidance on delivery of wound care for different populations.

Details

- There are no reversal agents for xylazine poisoning, but because xylazine typically co-occurs with opioids, naloxone is still essential. Xylazine does not impact the ability of naloxone to reverse the opioid effects. However, xylazine itself is not an opioid, so it is not responsive to naloxone. This is the case for NMBs as well. This can lead to prolonged sedation related to xylazine, NMB or both, even after the opioid effects have been reversed.
- It is important for people who might encounter a drug toxicity event to be aware of prolonged sedation caused by xylazine and how to provide supportive care. This includes knowing to check for adequate breathing, appropriate naloxone dosing and consequences of using too much naloxone.
- Prolonged sedation caused by non-opioid substances like xylazine, and benzodiazepines requires additional resources. People experiencing prolonged sedation need to be monitored longer. To avoid vulnerabilities created by prolonged sedation (e.g., injury, assault, theft), some PWUD use alone, which significantly increases their risks of drug toxicity poisoning and other harms.
- Xylazine can cause skin ulcers and extensive wounds involving tissue death, possibly because of its effect on blood vessels.[10] Standard wound care should be applied, including topical and oral or injected antibiotics. However, getting wound care and antibiotics can be challenging outside of hospital settings for PWUD, and protocols should be developed to support those who can not or do not want to receive hospital care.
- PWUD who stop using or seek treatment for opioid use could experience xylazine withdrawal if the opioids they were using also contained xylazine. This withdrawal can be treated with medications that have similar effects to xylazine (e.g., clonidine, dexmedetomidine). Benzodiazepines, antipsychotic agents and phenobarbital have also been used to manage symptoms. The optimal approach still needs to be developed.

Information and Learning Materials

Key Information

There is high demand for timely, credible information and development of learning materials to help address the risks and harms of xylazine exposure. This includes information not only about xylazine itself but also about the broader context of the toxic drug supply.

Details

- Some PWUD have expressed interest in information about what xylazine is, how to recognize the health effects and how it may affect the high experienced, as well as training on wound care. Healthcare and service providers have expressed interest in training on how to identify and prepare for the effects of ongoing xylazine exposure.

- There is a need for information on how to respond to drug poisoning events that involve opioids combined with xylazine, NMBs or other substances that cause prolonged sedation. This includes helping people know when they have used enough naloxone and guard against over administration of naloxone without benefit.
- Some harm reduction professionals and PWUD have expressed a need for the public to better understanding the toxic unregulated drug supply to help contextualize xylazine-related harms. As there is no quality control in the unregulated market, the introduction of new adulterants is constant, rapid and unpredictable.[18,19] This makes xylazine one of many substances that increase risks and harms to PWUD and likely to be replaced by other contaminants over time. It also makes it difficult for harm reduction services to keep up or get ahead of new adulterants. Raising awareness of these broader dynamics can help develop thoughtful responses to xylazine and future adulterants.

Summary and Implications

Key Information

The presence of xylazine in the unregulated drug supply is concerning but not new or surprising. There are tools and actions that can be taken to address the risks and harms associated with xylazine exposure. It is also important to understand xylazine in the context of the unregulated drug supply, where contaminants are common and always changing.

Details

- Xylazine exposure is associated with morbidity, particularly severe skin ulcers and infections. These skin infections can present not only at the site of injection but also anywhere on the body, including on people who do not inject.
- In Canada, no drug toxicity deaths have been attributed directly to xylazine as of the end of April 2023. Substance-related mortality continues to be driven by unregulated opioids, particularly fentanyl, with co-occurring xylazine and NMBs presenting additional challenges.
- There is regional variability in xylazine prevalence and concerns are often driven by specific regions (e.g., Ontario in Canada and the American South). Drug checking, toxicology analyses and other methods (e.g., potentially wastewater analysis) should be used to determine xylazine presence in local drug supplies.
- Responses should emphasize healthcare and harm reduction strategies that directly support people who have been exposed to xylazine or who are at higher risk of exposure. This includes wound care as well as protocols for addressing drug toxicity events and withdrawal involving opioids with co-occurring xylazine and NMBs. Responses should also include the development of resources with accurate messaging, including about the effectiveness of naloxone and its appropriate use.
- Responses should also include efforts to improve the predictability of the unregulated drug supply, since the constant appearance of new co-occurring substances is at the root of risks and harms to PWUD rather than any one substance. Safer supply programs have shown success in achieving predictability and positive health outcomes.[19,20] These programs should continue to be evaluated and should be expanded as part of the response to the presence of xylazine and future adulterants.

Resources

General Information

- Xylazine (BC Centre for Disease Control [BCCDC])
- Xylazine: A frank scope of "tranq-dope" (Substance Drug Checking)
- Spotlight: The emergence of Xylazine in Canada (HC DAS)
- Xylazine — Medical and Public Health Imperatives (New England Journal of Medicine)
- Xylazine (National Harm Reduction Coalition)
- What You Should Know About Xylazine (Centers for Disease Control and Prevention Injury Center)

Poisoning Response

- Responding to Opioid Poisoning with Prolonged Sedation (BCCDC)

Wound Care

- A Harm Reduction Guide to Wound Care (BCCDC)
- Meet People Where They Are (BCCDC)
- Tranq Update – Wound Care 101 (Everywhere Project)
- Xylazine Wound Care: A Guide (NEXT)

CCENDU will continue to monitor the situation regarding xylazine in Canada. If you have any questions, comments, information to contribute or corrections to the information contained in this bulletin or wish to subscribe and receive updates as new information becomes available, please contact CCENDU@ccsa.ca.

For more information on CCENDU and to review previous CCENDU Alerts and Bulletins please visit www.CCENDU.ca

References

1 Canadian Centre on Substance Use and Addiction & Canadian Community Epidemiology Network on Drug Use (2022). *Xylazine* [CCENDU Drug Alert]. Ottawa, Ont.: Canadian Centre on Substance Use and Addiction. https://www.ccsa.ca/xylazine-ccendu-drug-alert

2 Canadian Centre on Substance Use and Addiction & Canadian Community Epidemiology Network on Drug Use (2021). *Risks and harms associated with the nonmedical use of benzodiazepines in the unregulated drug supply* [CCENDU Bulletin]. Ottawa, Ont.: Canadian Centre on Substance Use and Addiction. https://www.ccsa.ca/risks-and-harms-associated-nonmedical-use-benzodiazepines-unregulated-drug-supply-canada-ccendu

3 Moore, K. M., & Huyer, D. (2023, Feb. 28). [Letter about increase in xylazine and benzodiazepine in the unregulated drug supply.] Toronto, Ont: Office of Chief Medical Officer of Health and Office of Chief Coroner. https://www.ottawapublichealth.ca/en/resources/CMOH-and-Chief-Coroner-Memo-Drug-Supply_February-28-2023-002.pdf

4 United States Food and Drug Administration. (2022, Nov. 8). FDA alerts health care professionals of risks to patients exposed to xylazine in illicit drugs. Silver Springs, MD: Author. https://www.fda.gov/drugs/drug-safety-and-availability/fda-alerts-health-care-professionals-risks-patients-exposed-xylazine-illicit-drugs

5 United States Food and Drug Administration. (2023, June 8). Import alert 68-20. Silver Springs, MD: Author. https://www.accessdata.fda.gov/cms_ia/importalert_1179.html

6 United States Drug Enforcement Administration. (n.d.). Public safety alert. DEA reports widespread threat of fentanyl mixed with xylazine. Washington, D.C.: Author. https://www.dea.gov/alert/dea-reports-widespread-threat-fentanyl-mixed-xylazine

7 United States Food and Drug Administration. (2023, Feb. 28). FDA takes action to restrict unlawful import of xylazine [News release]. Silver Springs, MD: Author. https://www.fda.gov/news-events/press-announcements/fda-takes-action-restrict-unlawful-import-xylazine

8 White House. (2023, April 12). Biden-Harris administration designates fentanyl combined with xylazine as an emerging threat to the United States [Press release]. Washington, D.C.: Author. https://www.whitehouse.gov/ondcp/briefing-room/2023/04/12/biden-harris-administration-designates-fentanyl-combined-with-xylazine-as-an-emerging-threat-to-the-united-states

9 Payer, D. E., Young, M. M., Maloney-Hall, B., Mill, C., Leclerc, P., Buxton, J., the Canadian Community Epidemiology Network on Drug Use, & the National Drug Checking Working Group. (2020). *Adulterants, contaminants and co-occurring substances in drugs on the illegal market in Canada: An analysis of data from drug seizures, drug checking and urine toxicology*. Ottawa, Ont.: Canadian Centre on Substance Use and Addiction. https://www.ccsa.ca/adulterants-contaminants-and-co-occurring-substances-drugs-illegal-market-canada-analysis-data-drug-report

10 Gupta, R., Holtgrave, D. R., & Ashburn, M. A. (2023). Xylazine — Medical and public health imperatives. *New England Journal of Medicine, 388*(24), 2209–2212. https://doi.org/10.1056/NEJMp2303120

11 U.S. Department of Justice-Drug Enforcement Administration. (2022, October). *The growing threat of xylazine and its mixture with illicit drugs: DEA joint intelligence report.* https://www.dea.gov/sites/default/files/2022-12/The%20Growing%20Threat%20of%20Xylazine%20and%20its%20Mixture%20with%20Illicit%20Drugs.pdf

12 Aasen, J., Sage, C. & Meeson, J-S. (2022). Chapter Three: Drug checking- technologies and procedures. In *The Manual.* The Drug Resource And Education Project. https://dredproject.ca/chapter-3

13 Maghsoudi, N., Tanguay. J., Scarfone, K., Rammohan, I., Ziegler, C., Werb, D. & Scheim, A.I. (2022). Drug checking services for people who use drugs: A systematic review. *Addiction*, 117, 532–544. https://doi.org/10.1111/add.15734

14 McDonald, K., Thompson, H., & Werb, D. (2023, May 31). *10 key findings related to the impact of Toronto's Drug Checking Service*. Toronto, Ont.: Centre on Drug Policy Evaluation. https://drugchecking.cdpe.org/wp-content/uploads/dlm_uploads/2023/05/TDCS-key-findings-related-to-impact-v3.pdf

15 The Drug Resource and Education Project. (n.d.). https://dredproject.ca

16 Krotulski, A. J., Shinefield, J., DeBord, J., Teixiera da Silva, D., & Logan, B. K. (2023). *Evaluation of xylazine test strips (BTNX) for drug checking purposes*. Willow Grove, PA: Centre for Forensic

Science Research and Education, United States. https://www.cfsre.org/images/content/reports/drug_checking/Evaluation_of_BTNX_Xylazine_Test_Strips_for_Drug_Checking_230322.pdf

17. Health Canada. (2023). Limitations of test strips to check illegal drugs for dangerous substances. https://recalls-rappels.canada.ca/en/alert-recall/limitations-test-strips-check-illegal-drugs-dangerous-substances

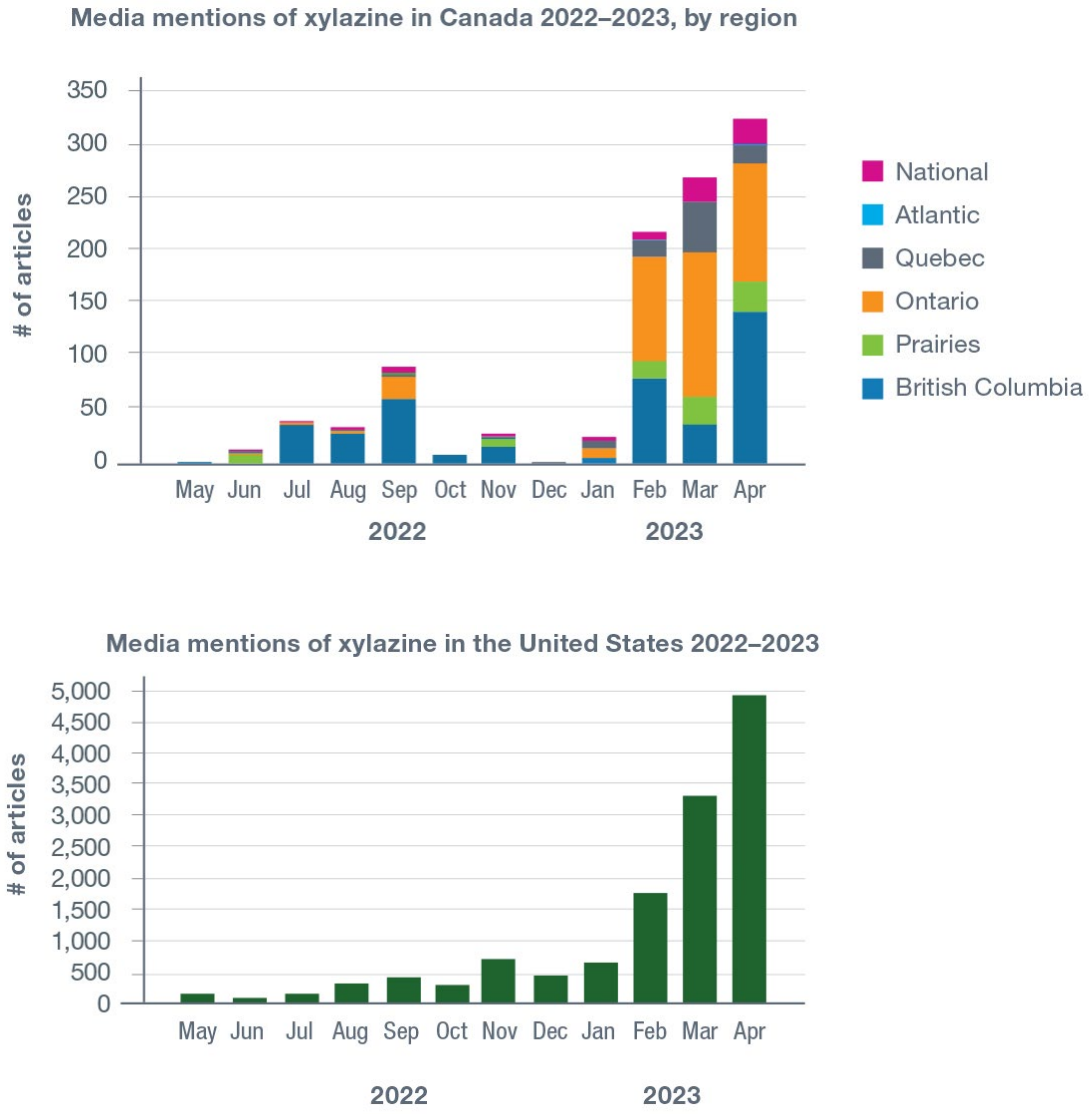
18 United Nations Office on Drugs and Crime. (2022). *Current NPS threats: Volume V*. Vienna, Austria: Author. https://www.unodc.org/documents/scientific/Current_NPS_Threats_V.pdf

19 National Safer Supply Community of Practice. (2023). Safer supply evaluations. https://www.nss-aps.ca/safer-supply-evaluations

20 National Safer Supply Community of Practice. (2023). Prescribed safer supply programs: Emerging evidence. https://www.nss-aps.ca/evidence-brief

Appendix A: Media Coverage and Online Mentions

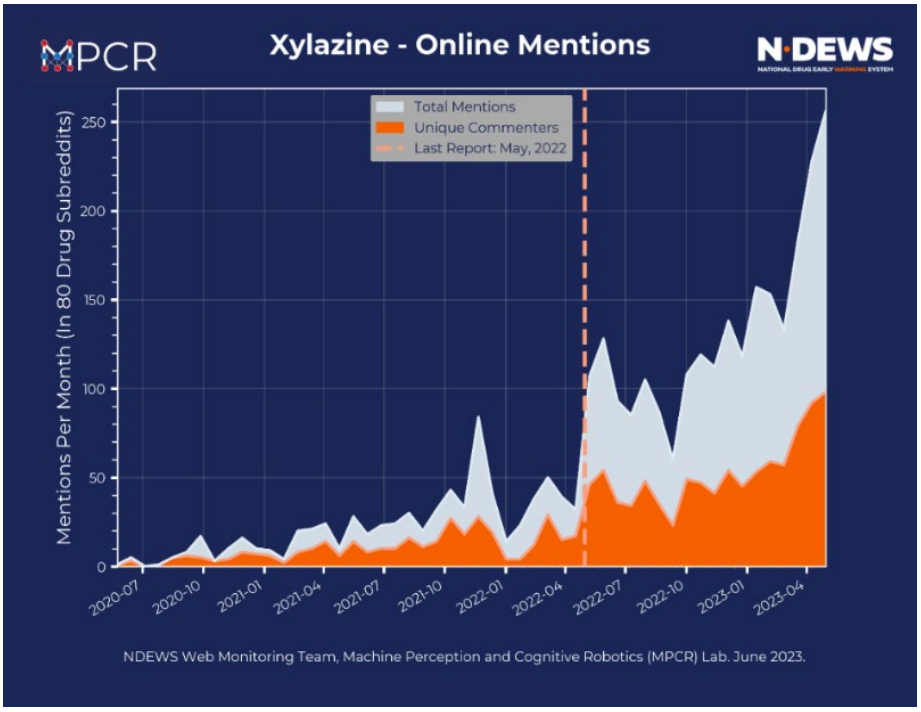
Figure A1 Number of news articles about xylazine in the Canadian and American press between May 2022 and April 2023



The National Drug Early Warning System (NDEWS) monitors online mentions of psychoactive substances on Reddit, a social media platform with more than 430 million active users worldwide. Detection of novel psychoactive substances (NPS) in drug subreddit discussions is predictive of subsequent emergence in toxicology data and other real-world signals.[1]

In the 2022 CCENDU Alert, NDEWS reported that discussion of xylazine on Reddit had increased sharply from about 20 mentions in January 2022 to nearly 150 mentions in May 2022. Since then, mentions have continued to climb, reaching 260 in April 2023 (Figure A2).

Figure A2 Reddit mentions of xylazine as measured by NDEWS through April 2023



Appendix B: Detailed Data Trends and Local Responses

Health Canada Drug Analysis Service (HC DAS) Data

Health Canada Drug Analysis Service (HC DAS) analyzes samples seized and submitted by law enforcement agencies in Canada. As xylazine is not a controlled substance, its testing and reporting in enforcement-submitted samples is not systematic nor complete. Dates displayed in figures are the months in which samples were analyzed and reported by HC DAS.

Tables B1 and B2 show co-occurrence of xylazine, opioids and nonmedical benzodiazepines in samples analyzed by HC DAS between May 2022 and April 2023.

Table B1. Xylazine-containing samples in which fentanyl,[a] nonmedical benzodiazepines (NMB) or both were also identified, May 2022 to April 2023

Month	Xylazine + fentanyl % (*n*)	Xylazine + fentanyl + NMBs % (*n*)
May 2022	93.0 (118)	35.4 (45)
June 2022	96.1 (148)	29.2 (45)
July 2022	93.0 (117)	43.0 (54)
August 2022	89.0 (113)	43.3 (57)
September 2022	97.3 (71)	43.8 (33)
October 2022	93.0 (91)	35.7 (42)
November 2022	98.0 (83)	29.4 (36)
December 2022	93.3 (83)	37.1 (38)
January 2023	99.1 (105)	51.8 (58)
February 2023	92.4 (73)	36.7 (30)
March 2023	95.8 (137)	35.0 (55)
April 2023	95.0 (110)	38.8 (45)
Total	**94.4 (1,249)**	**40.7 (538)**

[a] Or its analogues (e.g., carfentanil, flurofentanyl, bromofentanyl and acetylfentanyl).

In our 2022 alert,[1] when xylazine was detected in a sample between January 2020 and May 2022, it co-occurred with fentanyl 90% to 98% of the time. It was detected with both fentanyl and a nonmedical benzodiazepine (NMB) 57% to 61% of the time.

Table B2. Fentanyl-containing[a] samples in which xylazine, nonmedical benzodiazepines (NMB) or both were also identified, May 2022 to April 2023

Month	Fentanyl + xylazine % (*n*)	Fentanyl + xylazine + NMBs % (*n*)
May 2022	9.8 (118)	3.7 (45)
June 2022	12.0 (148)	3.6 (45)
July 2022	11.8 (117)	5.4 (54)
August 2022	8.9 (113)	4.5 (57)
September 2022	7.1 (71)	3.3 (33)
October 2022	7.7 (91)	3.6 (42)
November 2022	6.9 (83)	3.0 (36)
December 2022	8.9 (83)	4.1 (38)
January 2023	8.0 (105)	4.4 (58)
February 2023	7.34 (73)	3.0 (30)
March 2023	9.8 (137)	4.0 (55)
April 2023	9.0 (110)	3.7 (45)
Total	**8.9 (1,249)**	**4.0 (538)**

[a] Or its analogues (e.g., carfentanil, flurofentanyl, bromofentanyl and acetylfentanyl).

In our 2022 alert,[1] the proportion of fentanyl-containing samples that also contained xylazine increased from 1.4% in January 2020 to 6.9% in May 2022. The proportion of fentanyl samples containing both xylazine and an NMB increased from 0% to 4.5% during the same period.

Drug Checking Data

Table B3 shows drug checking results from three sources: Drug checking services across British Columbia co-ordinated by British Columbia Centre on Substance Use, Substance Drug Checking in Victoria and Toronto's Drug Checking Service. Note that results are not directly comparable between services because they use different technologies and reporting methods.

Table B3. Xylazine identification in expected opioid/down and fentanyl samples, by month.

Month	Expected opioid/ down samples containing xylazine, BCCSU,[a] *n*	Total expected opioid/ down samples, BCCSU,[a] *n*	% positive for xylazine, BCCSU[a]	Expected opioid/ down samples containing xylazine, Substance Drug Checking,[b] *n*	Total expected opioid/ down samples, Substance Drug Checking,[b] *n*	% positive for xylazine, Substance Drug Checking[b]	Average xylazine concentration wt/wt%, Substance Drug Checking,[b] %, (*n*)	Expected fentanyl samples containing xylazine, Toronto's Drug Checking Service,[c] *n*	Total expected fentanyl samples, Toronto's Drug Checking Service,[c] *n*	% positive for xylazine, Toronto's Drug Checking Service [c]
May-22	8	831	1.0	22	243	9.05	3.06 (22)	16	106	15.1
Jun-22	8	834	1.0	44	241	18.26	1.92 (44)	24	92	26.1
Jul-22	9	605	1.5	32	209	15.31	2.27 (31)	5	92	5.4
Aug-22	6	558	1.1	20	247	8.10	0.98 (20)	4	99	4.0
Sep-22	13	628	2.1	15	280	5.36	6.74 (15)	13	107	12.1
Oct-22	11	802	1.4	9	241	3.73	19.96 (8)	8	146	5.5
Nov-22	17	810	2.1	7	304	2.30	1.85 (7)	9	152	3.8
Dec-22	20	613	3.3	7	259	2.70	3.57 (7)	9	169	5.9
Jan-23	20	755	2.6	11	330	3.33	9.10 (11)	15	153	9.8
Feb-23	12	827	1.5	13	356	3.65	8.48 (12)	16	135	11.9
Mar-23	23	1,060	2.2	9	468	1.92	1.64 (9)	14	117	12.0
Apr-23	18	1,026	1.8	16	470	3.40	6.24 (16)	11	122	9.0
Total or average	**165**	**9,349**	**1.8**	**165**	**9,349**	**1.76**	**5.5 (202)**	**144**	**1,490**	**9.7**

[a] Xylazine detection estimates from the British Columbia Centre on Substance Use (BCCSU) were reported as a proportion of any expected opioid/down sample across drug checking sites.

[b] Xylazine detection estimates from Substance Drug Checking were reported as a proportion of any expected opioid/down sample at their site.

[c] The number of xylazine detections from Toronto's Drug Checking Service were reported as a proportion of expected fentanyl samples.

Table B4. Xylazine identification by services in British Columbia by year

Year	Expected opioid/down samples containing xylazine, BCCSU, *n*	Total expected opioid/down samples, BCCSU, *n*	% positive for xylazine, BCCSU	Expected opioid/down samples containing xylazine, Substance Drug Checking, *n*	Total expected opioid/down samples, Substance Drug Checking, *n*	% positive for xylazine, Substance Drug Checking
2019	1	2,921	0.03	—	—	—
2020	2	3,862	0.05	—	—	—
2021	30	5,755	0.5	14	808	1.7
2022	114	7,996	1.4	183	2,709	6.8
2023 Q1	73	3,668	2.0	49	1,624	3.0

— = not available

Table B5. Co-identification of xylazine with opioids and nonmedical benzodiazepines provided by Substance Drug Checking, Q3 2021 to Q1 2023

Year	Expected opioid/down samples containing xylazine, *n*	Samples containing xylazine + opioids (no NMBs),% (*n*)	Samples containing xylazine + opioids + NMBs, % (*n*)	Samples containing xylazine + NMBs (no opioids), % (*n*)	Xylazine only, % (*n*)
2021 Q3	14	7.1 (1)	78.6 (11)	14.2 (2)	0 (0)
2022	183	30.1 (55)	69.9 (128)	0 (0)	0 (0)
2023 Q1	49	10.2 (5)	89.8 (44)	0 (0)	0 (0)

Reports from CCENDU and NDEWS Sites

Table B6. Reports from CCENDU Sites (Canada)

CCENDU site	Local situation	Targeted responses
British Columbia	• Health Canada Drug Analysis Service (DAS) detected xylazine in 204 samples from British Columbia between May 2022 and March 2023; 198 of those also contained opioids. This represented 1% to 3% of all samples and 4% to 9% of opioid-positive samples. • Xylazine detection by toxicology and drug checking providers in British Columbia is relatively low. Nonmedical benzodiazepines (NMBs) are more common than xylazine in expected opioid samples. However, while xylazine prevalence is low in comparison with other substances in the supply, it is increasingly being detected, primarily in opioids. • Levels of concern about xylazine are mixed. Among those expressing concern, it is largely about wounds that are not healing and can appear in locations other than injection sites. Some people who use drugs (PWUD) report negative experiences in the healthcare system related to wound care. There are also concerns about the impact of prolonged sedation (e.g., victimization, theft). • Not all PWUD know xylazine is in the drug supply, what it is or what it does, and there is interest in learning more. Some report trying to get their substances from trusted sources but not decreasing their substance use due to xylazine presence. • Not all service or healthcare providers know about xylazine and its possible consequences, and there is interest in more timely information to improve their care and to share with PWUD. Some healthcare providers are concerned about inappropriate use of naloxone (e.g., ongoing administration after the maximum benefit has been reached) and the impacts on the person being attended to.	• The BC Centre for Disease Control has created resources to address prolonged sedation (Basics and Beyond Basics and Responding) and wound care (harm reduction and guide). • Drug checking and supervised consumption services are available across the province. • Free, real-time text messaging services to receive toxic drug alerts or share information about toxic drugs in the community is also available in some communities.
Winnipeg, Man.	• The Office of the Chief Medical Examiner in Winnipeg reported three instances of xylazine detection (two in August and one in October 2022). In all cases the deaths were linked to multiple drugs. Several news outlets (e.g., CBC, CTV) reported on these deaths in March 2023. • DAS identified the first xylazine-containing sample from Manitoba in June 2022.	• Alerts have been issued from health authority and harm reduction agencies. • Information to raise awareness among the public is available online.

Toronto, Ont.	• Community members are reporting that people are sedated for longer periods, putting them at risk if they are not monitored. • A report from the Ontario Coroner's Office showed that in 2022, about 3% of opioid-related deaths had xylazine detected, suggesting it is present but not in extremely high numbers of fatal opioid toxicities.	• Toronto Public Health continues to address the drug toxicity crisis through key actions in the Toronto Overdose Action Plan. • Public communication about xylazine is ongoing through various channels (e.g. social media, drug alerts, including on the City of Toronto website). • Toronto's Drug Checking Service releases up-to-date information on detection of adulterants, including xylazine.
Quebec	• DAS has identified xylazine in 36 samples from Quebec (primarily in Montreal region) between May 2022 and April 2023. It was always found in association with fentanyl (77%) or benzodiazepines (50%). • GRIP Drug Checking has never identified xylazine to date. • In the Quebec Urine Analysis Project (PSADUQ), data collected from Sept. 1 to Oct. 23, 2022, showed that 14 participants (1.3% of the 1,068 total participants) had xylazine detected in their urine, of which 13 were in Montreal. In all cases, fentanyl or its analogues were also detected. Twelve of these participants (86%) reported use of fentanyl in the three days preceding the urine sample.	• In Montreal, a public health alert was issued on March 9, 2023, based on the PSADUQ results. The warning has been covered by numerous media outlets. • Since the 2022 CCENDU Bulletin, xylazine analyses have been included by provincial specialized toxicological laboratories in Quebec, including post-mortem toxicology analyses. No deaths involving xylazine have been reported as of the end of April 2023.
Nova Scotia	• There were no drug toxicity deaths involving xylazine reported by the Nova Scotia Medical Examiner Service between May 2022 and April 2023. There were two drug toxicity deaths involving xylazine reported between January 2000 and April 2022. These deaths were multidrug toxicity in nature, involved fentanyl or a fentanyl analogue, and contributed to 9% of toxicity deaths involving nonpharmaceutical opioids. • DAS identified xylazine in one sample from 2020. The sample was also positive for fentanyl. • There have been no reports from the local mental health and addictions treatment teams in Nova Scotia regarding xylazine.	• Xylazine is covered in the post-mortem toxicology testing panel used in investigation of suspected drug toxicity deaths. • Nova Scotia Health maintains a low-barrier, community-driven process for communicating unexpected drug use-related harms observed in the community via email and Twitter.

Table B7. Reports from NDEWS Sites (United States)

NDEWS site	Local situation
Atlanta, Ga.	• Xylazine has been present in the unregulated drug supply for well more than a year, most commonly found mixed with fentanyl. Due to the high rate of co-occurrence, it is difficult to say if adverse events are related to xylazine, fentanyl or another opioid in the mixture.
Chicago, Ill.	• The Cook County Medical Examiner reported 50 deaths involving xylazine between Sept. 1, 2022, and Dec. 31, 2022. All deaths also involved fentanyl. Death records for the following months are not yet complete. • People who use heroin, fentanyl or both increasingly are aware of the presence of xylazine. Some believe the drug is responsible for serious injection wounds.
Florida	• Xylazine has been identified in many decedents in the state. In all instances, the decedent ingested fentanyl. Xylazine is identified in about one-third of fentanyl-involved deaths.
San Francisco, Calif.	• There were five deaths in early 2023 involving xylazine and none since then. None of the drug samples in the community testing program have contained xylazine.
Seattle, Wash.	• In 2022, in King County, there was one death involving xylazine in combination with other drugs and three cases of police evidence testing that were positive for xylazine. Two of the three crime lab cases also involved fentanyl. Those cases represent less than 1% of the events in each data source.
Texas	• According to the Drug Enforcement Administration's National Forensic Laboratory Information System, the number of submissions containing xylazine increased from 50 in 2021 to 123 in 2022.
Washington, DC	• Xylazine is being used and causing drug toxicity deaths.
St. Louis, Mo.	• Xylazine is mixed with some of the fentanyl being used, appearing in about 30% of medical examiner reports.

Targeted responses

- While no local targeted responses were reported, the White House Office of National Drug Control Policy (ONDCP) officially designated fentanyl adulterated or associated with xylazine as an emerging threat to the United States in April 2023. This means the administration will take steps to publish a whole-of-government response that includes evidence-based prevention, treatment and supply reduction.
- ONDCP is convening an interagency working group to inform the development of the national response plan. The response will include work on xylazine testing, treatment and supportive care protocols, comprehensive data systems (including information on drug sourcing and supply), strategies to reduce illicit supply of xylazine and rapid research (such as work on the interactions between xylazine and fentanyl).

Prepared by the CCSA in partnership with the
Canadian Community Epidemiology Network on Drug Use (CCENDU)

The Canadian Community Epidemiology Network on Drug Use (CCENDU) is a nation-wide network of community level partners who share information about local trends and emerging issues in substance use and exchange knowledge and tools to support more effective data collection.

ISBN 978-1-77871-096-4

Canadian Centre on Substance Use and Addiction

CCSA was created by Parliament to provide national leadership to address substance use in Canada. A trusted counsel, we provide national guidance to decision makers by harnessing the power of research, curating knowledge and bringing together diverse perspectives.

CCSA activities and products are made possible through a financial contribution from Health Canada. The views of CCSA do not necessarily represent the views of the Government of Canada.