

Portable Spectrometers: Improving Public Health Responses to Drug Trends by Partnering with Law Enforcement



KEY POINTS

- The overdose crisis is defined by constantly shifting trends in the illicit drug market, but collecting data on these drugs at the local level can be a time-consuming process for many reasons, slowing public health responses.
- Because of this, many public health responses tend to get launched after a large number of people have already overdosed on a new drug. For example, many [public health responses to xylazine](#) are usually launched only after a growing number of people have died with it detected in their toxicology.
- By using portable spectrometers, law enforcement can analyze drugs they seize, detecting timely changes in local drug trends. This data is available almost immediately but is rarely shared with public health organizations like county health departments or first responders.
- A two-way data sharing agreement between a local law enforcement agency equipped with a portable spectrometer and a public health organization (i.e., Sheriff's Office and County Health Department) could enable a rapid, dynamic and ongoing ability to adapt to emerging drug threats, such as xylazine or other new drugs.

BACKGROUND: LACK OF TIMELY DATA LIMITS PUBLIC HEALTH STRATEGIES

The overdose crisis continues to claim a considerable number of lives in Tennessee. In 2022, the most recent year of complete data, there were [3,826 fatal overdoses and 26,211 cases of inpatient and outpatient treatment](#) for nonfatal overdoses (TDH, 2024). Though preliminary data for 2024 shows that overdose fatalities have decreased by over 20%, the total fatalities in Tennessee are still [37% higher](#) than when President Trump declared the opioid crisis to be a national emergency in October 2017 (CDC, 2024b).

Importantly, the drug trends over the past decade have shown a steady shift away from prescription opioids as the primary substance involved in overdose to a mix of synthetic opioids, stimulants and [novel psychoactive substances](#) (NPS) (Shafi, 2020). For example, the alarming and growing presence of “tranq,” or [xylazine](#), in the drug supply has significantly contributed to opioid-involved overdoses and caused a number of other significant public health concerns such as severe necrotic flesh wounds and sepsis (Kourvelas, 2023). Because of this, it is better to think of this epidemic as a [polysubstance](#) overdose crisis defined by ever-changing drug trends in combinations that are often unknown even to the user of the drugs, with health consequences extending beyond fatalities alone (CDC, 2024a).

Most overdose response initiatives from a public health perspective tend to rely on data that originates from medical examiners and autopsies (i.e., forensic centers), showing what types

of drugs are killing the most people. This and other relevant data tends to be months or even years out of date by the time it is available to those coordinating a response. This delay is caused by the considerable time taken to collect it from numerous siloed data sources (such as healthcare, EMS, outpatient treatment centers and other such sources) followed by the time needed to then categorize and analyze that data. The delay grows even longer if there are cumbersome rules of data governance and red tape, and even more so if there is not yet a formal data-sharing agreement between the organizations.

HOW LAW ENFORCEMENT AND PUBLIC SAFETY ORGANIZATIONS CAN ENHANCE PUBLIC HEALTH RESPONSES TO CHANGING DRUG TRENDS

Law enforcement has a unique advantage in catching drug trends early, through analyzing the illicit substances they seize to determine their identity, purity and potential contaminants. Typically, seized drugs are analyzed in a lab on large devices called spectrometers, but in recent years portable versions of these devices have come on the market, enabling law enforcement to identify drugs and are able to detect dangerous substances such as fentanyl, meth, NPSs, etc., without the need for bulky and expensive laboratory equipment. Their biggest advantage is the ability to detect these substances in real-time, on-scene, offering immediate data with a high degree of accuracy.

On top of generating and wirelessly [transmitting reviewable records](#) of the drug analysis results, these devices [improve the speed](#) and [reduce the costs](#) of preliminary analysis of drugs, as well as [enhancing officers' safety](#) by allowing for the identification of drugs without direct physical contact with the illicit substances directly on scene (Wilke, 2023). The companies that make the spectrometers provide responsive technical and analytical support for unknown substances and other issues; accuracy and reliability continue to improve with each new generation of devices (Wilke, 2023).

Law enforcement uses these data [to identify emerging trends](#) in the drug market, tracking drug trafficking routes and disrupting drug production at the source (Hachem et al., 2023). However, this information is not typically shared with public health agencies or other organizations outside of the realm of law enforcement or criminal justice.

However, by sharing recent drug seizure data—particularly any data that shows a sudden shift in drug trends—with health departments, recovery programs and harm reduction organizations, the public health community would be able to respond alongside law enforcement to current drug trends more effectively. This type of collaboration between public health and public safety ultimately improves early intervention strategies as well as enhances drug prevention efforts. It also enables the accurate targeting of precious resources more effectively.

CASE STUDY: PORTABLE SPECTROMETRY DATA USED TO BOLSTER NASHVILLE'S RESPONSE TO XYLAZINE

Portable spectrometers are “essential tools to our day-to-day activities,” says Sergeant Mike Hotz, who leads the Metropolitan Nashville Police Department’s Overdose Unit.

In January 2024, Sgt. Hotz used his department’s portable spectrometer to analyze a seizure of over 120,000 pills, discovering that they contained a mixture of fentanyl, xylazine and acetaminophen. Such pills posed a significantly heightened risk of fatal overdose, as well as other medical consequences including necrotic skin ulcerations, liver damage and other major concerns that complicate non-fatal overdose survival. Importantly, xylazine does not respond to naloxone, so with this and other concerns, the public health response needed to adapt—quickly—before the consequences took form. Not long after, Sgt. Hotz detected xylazine in the cocaine supply too, which further complicated response efforts.

Using this spectrometry information, Sgt. Hotz and SMART’s Middle Tennessee Substance Use Response Consultant Trevor Henderson shared the data with numerous governmental bodies, emergency departments, harm reduction organizations and other community stakeholders in Davidson and surrounding counties, and these stakeholders rapidly marshaled resources to purchase and distribute xylazine test strips and wound care kits, and educational materials were developed and disseminated (Kourvelas, 2024b).

Unfortunately, public health organizations did not have data showing that xylazine had appeared in Nashville in significant numbers, because it was appearing in only small numbers from fatal toxicology data. This allowed the extent of the growth of this substance in the drug market to hide in plain sight. Furthermore, it’s difficult to get xylazine toxicology on living patients because “it metabolizes really fast, and it becomes undetectable very quickly,” says Hotz. However, by using the data from a large quantity of newly-seized pills, Hotz was able to draw attention to the increased threat to the community from this drug.

Detecting the xylazine with the spectrometer and sharing that data with local public health organizations “has saved some lives and saved some people from having their limbs amputated,” says Hotz, referring to xylazine’s link to severe, necrotic skin ulcers.

The portable spectrometer “enables us to take the data that was in front of my face about new emerging novel substances and head out on the streets,” helping law enforcement to spearhead a new public health and harm reduction response in real time.

Without timely identification of drug combinations in our communities, healthcare providers and emergency services may not be able to intervene appropriately, and we could be addressing yesterday's crisis and wasting resources. This is crucial as drug trends are constantly changing, and new drugs enter the market frequently. This dynamic reinforces the need for increased drug type surveillance through tools such as portable spectrometers, paired with data-sharing agreements with public health entities. This ability to enhance coordination through real-time data bridges the gap between public health and public safety.

DRUG CHECKING INITIATIVES GROWING MORE COMMON ACROSS THE UNITED STATES

Such a collaboration between law enforcement and public health through the sharing of spectrometry data of seized drugs fits into the [growing trend of drug checking initiatives](#) across the United States. Using data from hospitals, clinics, harm reduction services (who can collect data from the use of [fentanyl test strips and other drug checking equipment](#) by their clients), states or communities can lead a multi-partner drug surveillance system that can catch changes in the drug supply and more rapidly respond. Some areas also have drug checking programs wherein people who use drugs can have theirs tested anonymously, such as the [Street Drug Analysis Lab](#) run by the University of North Carolina at Chapel Hill.

Similarly, [Overdose Fatality Review](#) (OFR) teams, which review fatality case data from multi-disciplinary perspectives including law enforcement, healthcare, forensics, harm reduction and more, is another comparable strategy for data-sharing partnerships between otherwise siloed organizations with the specific goal of reducing overdose deaths.

CONCERNS OVER TOUCHING FENTANYL

There are ongoing reports that spectrometers are being purchased with the [goal of protecting law enforcement officers](#) from “touching” fentanyl. There is no evidence that simply touching fentanyl can cause an overdose—only ingestion and inhalation can. If this were the only reason for purchasing a spectrometer, then yes, this would be a shortsighted perspective of what these tools are capable of and how they play a role in an effective local overdose response strategy.

That being said, there are valid concerns of law enforcement and first responder safety from being exposed to fentanyl or other mystery substances by way of accidental ingestion or inhalation. Fentanyl and its analogues are exceptionally potent, and it is indeed possible that, for example, small amounts could end up on a person's finger and make its way to their mouth. While such incidents are very rare, they still do occur nevertheless. It could be argued that spectrometers play a role in helping to reduce this risk, but at minimum, the concern over

accidental exposure is better addressed by ensuring that officers and first responders carry naloxone on their persons while in the line of duty.

As outlined in this brief, there are many good reasons for the purchasing of spectrometers, first and foremost being the identification of new drugs entering a region and the sharing of that data with local public health organizations would enhance an area's overdose response strategy.

SUMMARY

Portable spectrometers play a crucial role in boosting the speed, accuracy and cost-effectiveness of illicit drug analysis. Their ability to rapidly identify substances highlights the urgent need for more enhanced drug surveillance and strengthened public health responses. By detecting illicit drugs on scene, this new technology not only strengthens the current surveillance efforts but also bridges the gap between law enforcement and public health agencies. In the state of Tennessee, where addressing substance abuse is a high priority issue, integrating portable spectrometers into existing surveillance partnerships between public health and law enforcement would significantly improve the timely identification of emerging drug trends as well as enhance the responsiveness of interventions.

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POLICY BRIEF AUTHORS:

Jeremy C. Kourvelas, MPH, CPM, UT SMART Initiative

Leah Eldred, UT SMART Initiative

Trevor Henderson, UT SMART Initiative

Sgt. Mike Hotz, Metro Nashville Police Department Overdose Unit