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STUDY
SUMMARY



Study of syringes collected in Estonian harm reduction services for drug residues 2025

A study of syringe residues provides insight into which psychoactive substances are used by people who inject drugs in different regions of Estonia. This chemically objective information helps to:

- gain a comprehensive overview of the regional drug market,
- support early warning systems for users, and
- improve the planning of harm reduction (including overdose prevention) and treatment activities.

Methodology

To gain an overview of the drugs being used, **the contents of used syringes** collected from people who inject drugs were chemically analyzed. The analysis was carried out using liquid chromatography coupled with a quadrupole time-of-flight mass spectrometer. The analyses were performed by **the Estonian Forensic Science Institute**. The syringe residue analysis methodology has been in use in Estonia since 2021. Similar methods are also applied in other European cities participating in the international **ESCAPE project** (European Syringe Collection and Analysis Project).

Sample

The sample was based on syringes collected within the framework of Estonian harm reduction services. A total of **349 syringes were randomly selected** and collected in May and June 2025. It was important that the syringes were visually intact and appeared to have been used recently. The participating services included five from Tallinn, two from Kohtla-Järve, three from Narva, two from Tartu, and one each from Rakvere, Maardu, Pärnu, and Paide. From services with smaller client bases, at least 15 syringes were selected, and from larger ones, at least 30 syringes.

Estonian harm reduction service in numbers*



3 564
users



77 331
visits



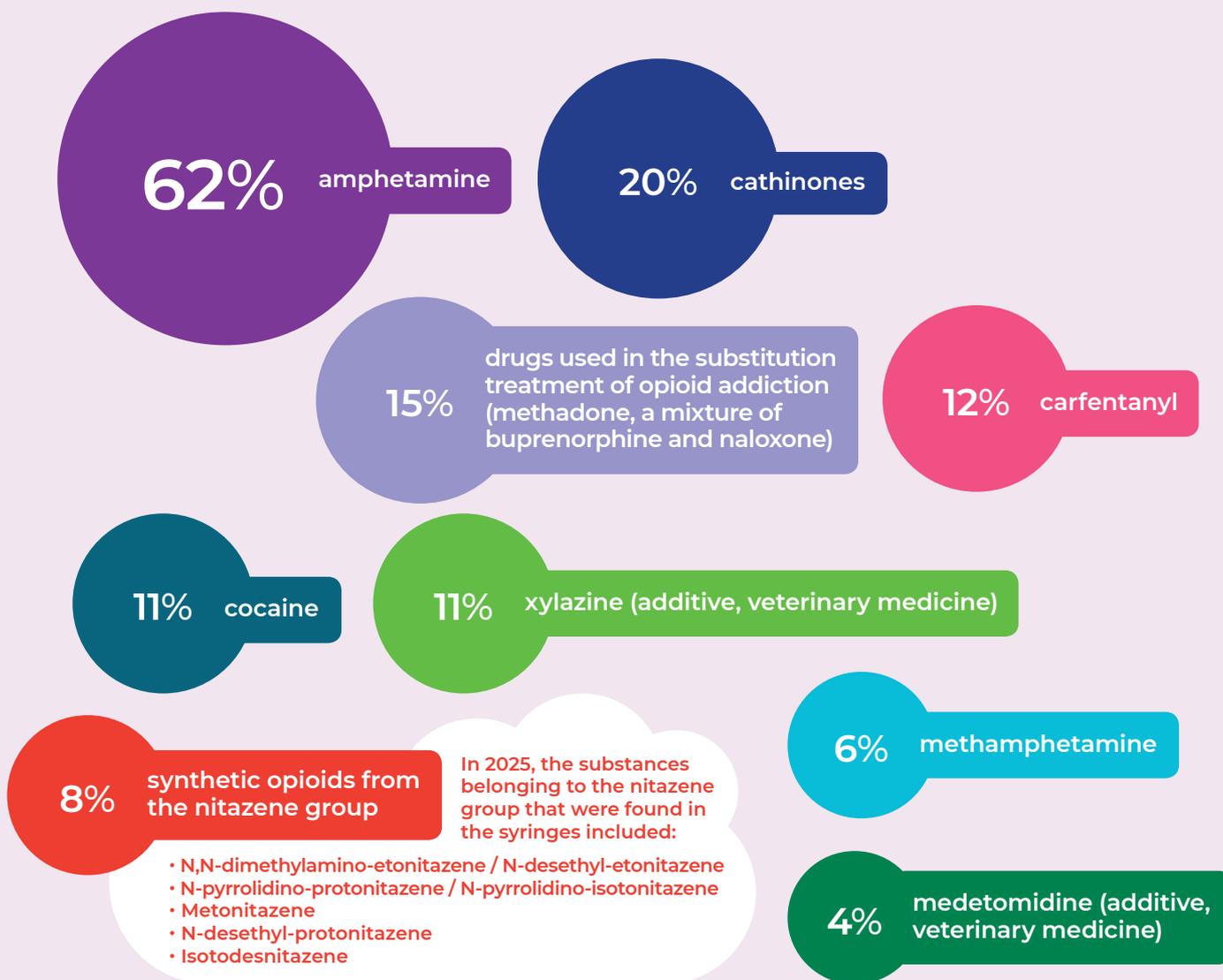
33
service provision sites



1 759 036
sterile syringes
distributed

* Data presented as the end of 2025.

The main drugs/groups of drugs used in total syringe sample (n=349)



Dangerous Substance Combinations in 2025

- In **Ida-Viru County**, the most common dangerous combination found in syringes was a mixture of carfentanil, diphenhydramine, and xylazine.
- In **Harju County, particularly in Tallinn**, combinations of nitazenes with medetomidine and promethazine were more frequently detected.
- As an example of a particularly dangerous case, one syringe identified at a **harm reduction center in Tallinn** contained carfentanil, N,N-dimethylamino-etonitazene / N-desethyl-etonitazene, cocaine, and the additives diphenhydramine, xylazine, and promethazine.

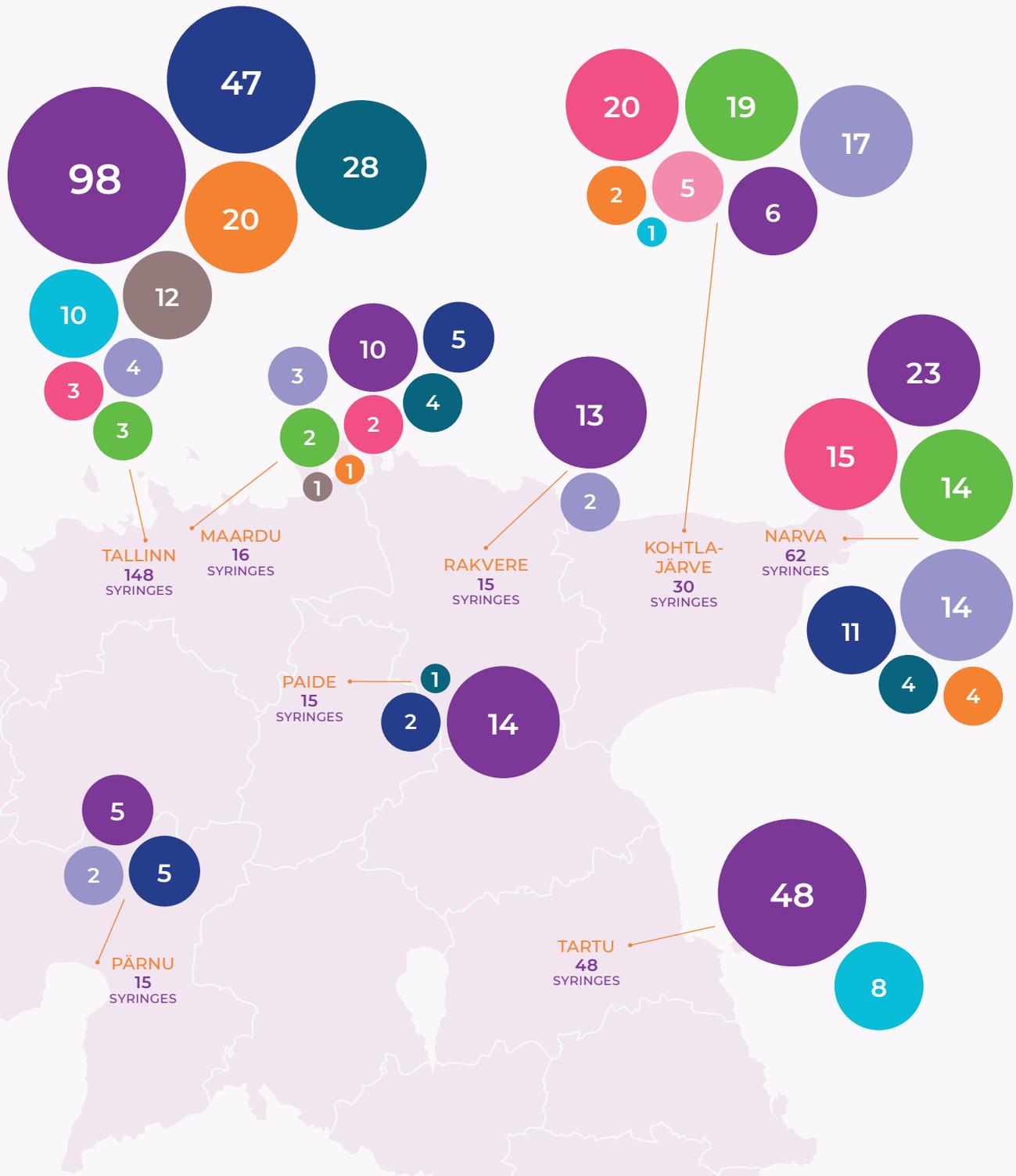
The Dangers of Veterinary Drugs in Drug Mixtures

Xylazine and medetomidine are non-opioid sedatives and muscle relaxants used in veterinary medicine. Xylazine has no approved use in human medicine, and its administration can cause severe skin ulcers and profound drowsiness. These substances are added to synthetic opioid mixtures because they are inexpensive and enhance as well as prolong the short-term effects of synthetic opioids. This combination is highly dangerous to health and can be fatal.

Special attention should also be paid to the use of the opioid antidote naloxone. Since xylazine and medetomidine are not opioids, **naloxone does not reverse their effects in cases of overdose.**

Most frequently detected drugs and number of syringes analyzed by region (absolute numbers)*

* Syringes can contain several psychoactive substances



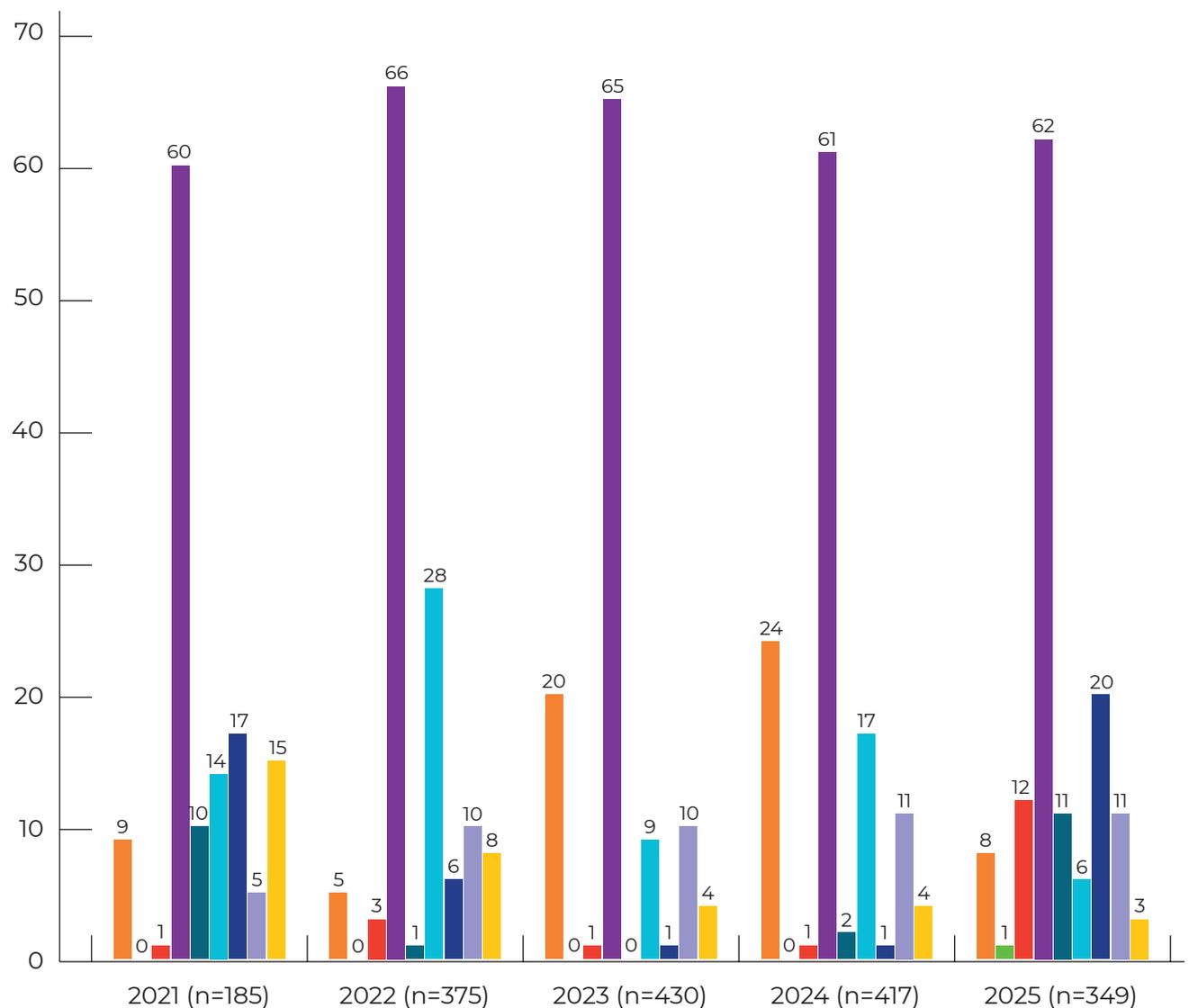
- Amphetamine
- Cocaine
- Spirochlorphine
- Nitazenes
- Xylazine
- Methamphetamine
- Carfentanil
- Medetomidine
- Methadone
- α-PVP

Comparison Across Study Years

Over the years, **amphetamine** has remained the dominant substance found in syringes. Since 2021, **nitazenes** have also been consistently detected, with their prevalence peaking between 2022 and 2024. In 2025, the proportion of nitazenes

decreased; however, the emergence of new substances from the nitazene group among injectable drugs is a cause for concern. In addition, a potent synthetic opioid, **spirochorphine**, belonging to the orphine group, was also detected.

Main psychoactive substances found in syringes in 2021–2025 (%)



Conclusions

- **Amphetamine** continues to be the most commonly injected drug in Estonia.
- Syringes containing only one psychoactive substance accounted for 29% of the sample. The remaining syringes contained multiple narcotic substances and/or additional psychoactive or pharmaceutical additives.
- Among **the additives**, the most common were **caffeine** (n=116) in stimulant samples, and the veterinary medicines **xylazine** (n=38) and **medetomidine** (n=13) in synthetic opioid samples, as well as the antihistamines **diphenhydramine** (n=48) and **promethazine** (n=17).
- Compared with 2024, the proportion of syringes containing nitazenes has **decreased**. The injection of nitazenes is most common in Harju County and Ida-Viru County.
- Over the years, several different nitazenes have been detected in Estonia. In 2025, the most prevalent nitazene was **N,N-dimethylamino-etonitazene / N-desethyl-etonitazene**. The mixture of protonitazene and metonitazene, which was more common in previous years, was no longer detected in the 2025 samples. Substances belonging to the nitazene group are extremely dangerous synthetic opioids for users.
- In **Kohtla-Järve**, the synthetic opioid **spirochlorphine**, belonging to the orphine group, was detected in five syringes. **Orphines** represent a potentially new and dangerous group of synthetic opioids that could, in the future, emerge on the drug market as an alternative to fentanyl and nitazenes.
- Compared with the period 2022–2024, the proportion of syringes containing **carfentanil** increased sharply. While in 2024 carfentanil was detected only in a few syringes, by 2025 it was found in **12% of all syringes** analyzed. Most of these originated from syringes collected **at harm reduction centers in Ida-Viru County**.
- The injection of **α-PVP (cathinone)** has risen dramatically over the past year – from 3% of syringes in 2024 to 20% in 2025.
- The misuse of opioid substitution treatment medications, **methadone** and the **buprenorphine/naloxone** combination, has remained stable. Altogether, **15% (n=51)** of analyzed syringes contained one of these medications. **Methadone** was detected most frequently (n=40), while the buprenorphine/naloxone combination was found in ten syringes. The injection of opioid substitution medications is more common in **Narva** and **Kohtla-Järve**.
- Various **pharmaceuticals** were also detected in syringes, although this was not a widespread phenomenon. In addition to diphenhydramine and promethazine, small numbers of syringes contained diazepam, procaine, pregabalin, tizanidine, or lidocaine.
- In 2025, a **new psychoactive substance, the synthetic cannabinoid AB-MDMSBA**, was identified in three syringes collected from two harm reduction centers in Tallinn. The substance appeared in combination with N,N-dimethylamino-etonitazene, medetomidine, promethazine, and either α-PVP or cocaine.