Tidsskriftet Tidsskrift for Den norske legeforening

Drug and alcohol poisonings treated at Oslo Accident and Emergency Outpatient Clinic 2019–23

ORIGINAL ARTICLE

KAREN SØRBØ LARSEN

Faculty of Medicine
University of Oslo
Author contribution: design, data collection, analysis and interpretation, revision of the manuscript and approval of the submitted version
Karen Sørbø Larsen, medical student
The author has completed the ICMJE form and declares no conflicts of interest.

METTE BREKKE

Department of General Practice
University of Oslo
Author contribution: concept, design, data collection, revision of the manuscript and approval of the submitted version
Mette Brekke, specialist in general practice and professor emerita
The author has completed the ICMJE form and declares no conflicts of interest.

ODD MARTIN VALLERSNES

o.m.vallersnes@medisin.uio.no
Department of General Practice
University of Oslo
and
Oslo Accident and Emergency Outpatient Clinic
City of Oslo Health Agency
Author contribution: concept, design, data collection and interpretation, drafting and revision of the manuscript, and approval of the submitted version

Odd Martin Vallersnes, professor and consultant general practitioner
The author has completed the ICMJE form and declares no conflicts of interest.

Background

Treating patients with drug and alcohol poisoning requires knowledge of which substances are involved. We describe drug and alcohol poisonings at Oslo Accident and Emergency Outpatient Clinic (OAEOC) in the period 2019–23.

Material and method

Cases of drug and alcohol poisoning (as opposed to unique patients) treated at OAEOC between 2019 and 2023 were retrospectively retrieved from the clinic's medical record system. Diagnoses were based on the treating doctor's clinical assessment as recorded in the patient's notes. Incidence rates were calculated based on the population of Oslo municipality aged ≥ 12 years.

Results

In the period 2019–2023, OAEOC treated 18,402 cases of drug and alcohol poisoning, of which 8981 (49 %) were due to the consumption of pure ethanol. The overall incidence of drug and alcohol poisonings increased from 6.32 per 1000 inhabitants in 2019 to 6.68 in 2023, with a low point of 5.36 in 2021. The incidence of pure ethanol poisoning was 3.10 in 2019 and 3.06 in 2023, with a low point of 2.53 in 2020. Over the five-year period, the incidence of cocaine poisonings rose from 0.28 to 0.70, and ketamine poisonings from 0.01 to 0.12. The proportion of women increased from 33 % to 39 % for pure ethanol poisoning, and from 20 % to 31 % for other drug and alcohol poisonings.

Interpretation

The incidence of drug and alcohol poisonings treated at OAEOC increased from 2019 to 2023, with a temporary decline during the COVID-19 pandemic.

Main findings

Over the five-year period 2019–2023, Oslo Accident and Emergency Outpatient Clinic treated 18,402 cases of drug and alcohol poisoning, of which half were due to the consumption of pure ethanol.

From 2019 to 2023, the incidence of cocaine poisonings doubled, and ketamine poisonings increased more than tenfold.

The proportion of women treated for drug and alcohol poisoning also increased.

Substance use is associated with increased morbidity and a higher risk of premature death (1). In Norway, alcohol and illicit drug consumption are the main mortality risk factors among people aged 14–49 years (2). In 2023, Norway reported 450 alcohol-related deaths and 363 drug-related deaths, with the latter being the highest since 2001 (3). As elsewhere in Europe, alcohol and cannabis are the most commonly used substances in Norway (1, 4–6), and most fatal overdoses have been linked to opioids (3).

Over the past 20 years, nearly 1000 new psychoactive substances have emerged in Europe (4–6). In addition, substances are now often available at higher potency, in new combinations and novel routes of administration (6). Together with the dramatic increase in opioid-related deaths in North America, this has raised concerns about an increasing risk of overdoses and fatal overdoses (7).

Drug and alcohol poisoning is dangerous in itself and a marker of high-risk substance use (8, 9). The number of drug and alcohol poisonings at Oslo Accident and Emergency Outpatient Clinic (OAEOC) has increased sharply in recent decades, from 1714 cases in 2008 to 2328 in 2012 and 4021 in 2018 (10–12). Ethanol, heroin and benzodiazepines are the most frequently involved substances, and incidence rates have risen for most substances excluding heroin and benzodiazepines (12, 13).

Acute treatment of drug and alcohol poisoning relies on clinical diagnosis, as rapid tests are not accurate enough and the turnaround time for specific toxicology analyses is too long to inform treatment. In addition to information obtained from the patient and their companion, effective treatment requires knowledge of clinical presentations (toxidromes) (14) and an understanding of which substances are likely to have been taken. The pattern of substance use changes rapidly, and continuously updated information is therefore needed on which substances are implicated in poisonings, in addition to population surveys on drug use, data on fatal overdoses, wastewater analyses and police seizure statistics (15).

Purpose

The aim of the study was to present trends in drug and alcohol poisonings treated at OAEOC in the period 2019–2023.

Material and method

This was a retrospective observational study using data from patient records at the Department of Emergency General Practice, part of OAEOC, covering the period 1 January 2019 to 31 December 2023. Inclusion criteria and variable sets developed by the European Drug Emergencies Network (Euro-DEN) were used (16, 17). Data were collected by ten medical students, each responsible for a six-month period, under the supervision of the last author.

OAEOC is a 24-hour primary care service for all residents and visitors in Oslo and, prior to the COVID-19 pandemic, handled approximately 200,000 consultations annually in the Department of Emergency General Practice and

trauma unit combined. OAEOC manages the majority of drug and alcohol poisonings in Oslo, including many cases that elsewhere in Norway would have been referred to hospital (18).

We included all cases of drug and alcohol poisoning, defined as the toxic effect of a psychoactive substance taken with the intention of achieving intoxication. Cases in which the substance had been taken with suicidal intent, for medical purposes, or involuntarily were excluded. We did not record whether the same patient was treated repeatedly. Cases were identified by reviewing presentation records in OAEOC's electronic medical record system. Records were examined if the reason for contact (free-text field) in the presentation record suggested a drug and alcohol poisoning. Data recorded included year and month of presentation, age, sex, mode of arrival (ambulance or other), substances taken, observation time and further measures. Substance diagnosis was made and documented by the treating doctor, based on clinical examination and information provided by the patient, police, ambulance personnel and/or companions. Toxicology testing is not performed for drug and alcohol poisonings at OAEOC. Amphetamine and methamphetamine were combined into a single category.

Incidence rates were calculated based on the number of Oslo residents aged ≥ 12 years for each year of the study (19). Ninety-five per cent confidence intervals were estimated using the formula ($e^{\ln \text{incidence} - 1.96}$, $e^{\ln \text{incidence} + 1.96}$). Chi-square tests, and Fisher's exact test where appropriate, were used to compare proportions. The Kruskal-Wallis test was used to compare continuous variables. Analyses were performed in IBM SPSS versions 29 and 30, with statistical significance set at $p < 0.05$.

The project was conducted as a quality assurance study. The processing of anonymised personal data was carried out in accordance with Articles 6(1) and 9(2) of the General Data Protection Regulation (GDPR) and did not require patient consent. The project was approved by Oslo local authority's data protection officer.

Results

Between 2019 and 2023, OAEOC treated 18,402 cases of drug and alcohol poisoning, of which 8981 (49 %) were due to the consumption of pure ethanol. The median age was 35 years (interquartile range 25–47, age range 11–95), and 69 % of cases involved men. No patients died at the clinic.

Over the study period, the proportion of women treated for pure ethanol poisoning increased from 33 % to 39 %, while the proportion of women treated for other drug and alcohol poisonings rose from 20 % to 31 % (Table 1). The increasing proportion of women was observed for heroin, benzodiazepines, gamma-hydroxybutyrate (GHB) and other/unspecified opioids, and was particularly pronounced for methylenedioxymethamphetamine (MDMA) (Table 2).

Ethanol was the most frequently taken substance, accounting for 11,919 cases (65 %), followed by heroin (3020; 16 %), benzodiazepines (2250; 12 %) and amphetamine/methamphetamine (1978; 11 %) (Table 2). The proportion of young adults (20–30 years) was highest for cocaine (55 %), MDMA (53 %) and ketamine (52 %), while the proportion under 20 years was highest for MDMA (23 %) and cannabis (16 %).

The overall incidence of drug and alcohol poisoning increased from 6.32 per 1000 inhabitants (95 % confidence interval 6.12–6.52) in 2019 to 6.68 (6.48–6.89) in 2023, with a low point of 5.36 (5.18–5.54) in 2021 (Figure 1).

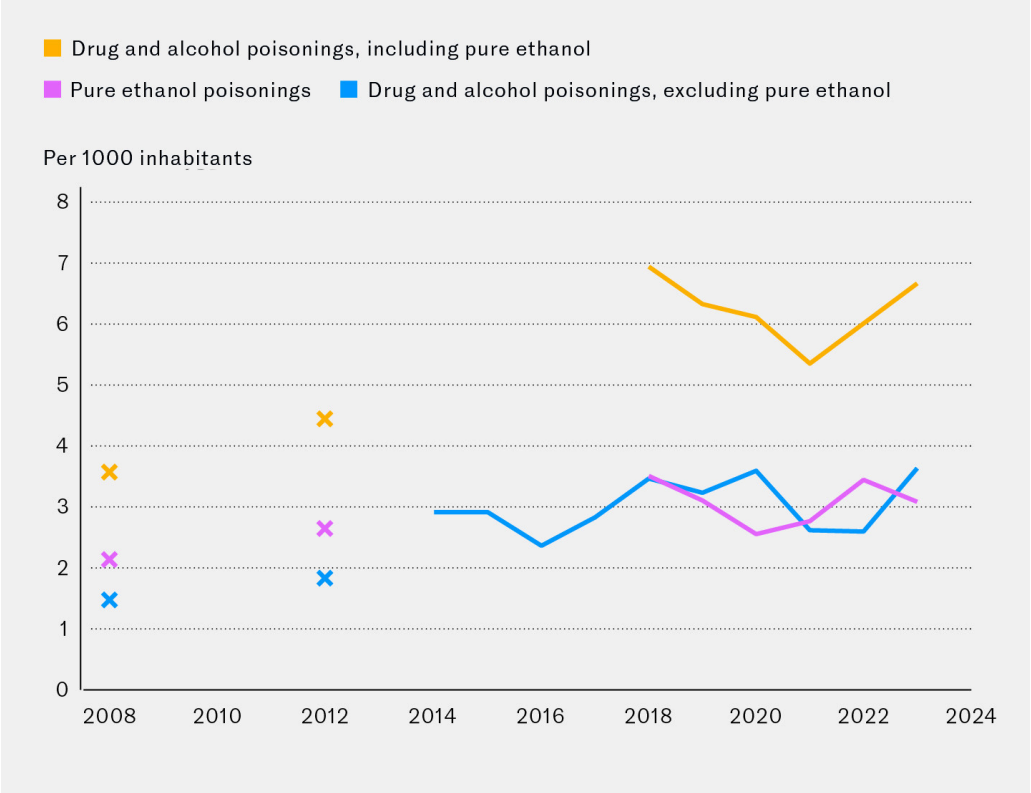

Figure 1 Incidence of drug and alcohol poisonings treated at Oslo Accident and Emergency Outpatient Clinic from 2008 to 2023. Figures for 2008, 2012 and 2014–2018 are from previous studies (10–12). Incidence rates are based on cases, not unique patients.

Between 2019 and 2023, the incidence of cocaine poisonings increased markedly from 0.28 (95 % CI 0.24–0.43) to 0.70 (0.63–0.77) per 1000 inhabitants (Table 3). During the same period, the incidence of ethanol poisonings rose from 4.01 (3.85–4.17) to 4.24 (4.08–4.41), benzodiazepines from 0.66 (0.60–0.73) to 0.98 (0.91–1.06), cannabis from 0.41 (0.36–0.47) to 0.57 (0.51–0.63) and ketamine from 0.01 (0.005–0.02) to 0.12 (0.10–0.16). In contrast, the incidence of heroin poisonings decreased from 1.11 (1.03–1.20) to 0.97 (0.89–1.05), while the incidence of other/unspecified opioids ranged between 0.14 and 0.43.

Drug and alcohol poisonings were markedly reduced between November 2020 and April 2021, coinciding with the longest COVID-19 lockdown (Figure 2). The incidence of pure ethanol poisonings was particularly low in the periods March–May 2020, November 2020–April 2021 and December 2021–January

2022, which were all lockdown periods. The proportion of patients leaving OAEOC before completion of treatment was substantially lower in 2020 and 2021 compared with preceding and subsequent years (Table 1).

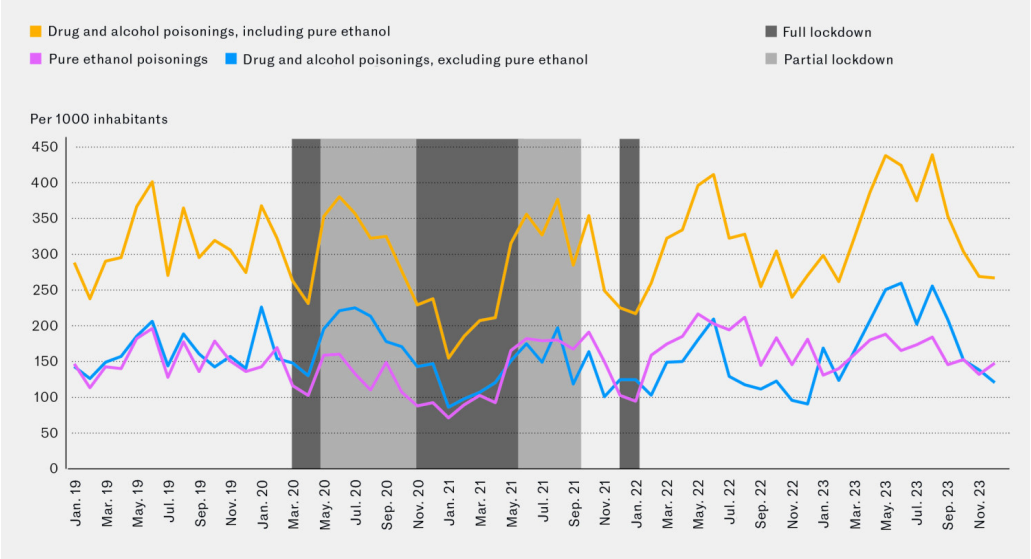

Figure 2 Number of drug and alcohol poisonings treated at Oslo Accident and Emergency Outpatient Clinic per month in the period 2019–2023. The figures represent cases, not unique patients.

Discussion

The incidence of drug and alcohol poisonings treated at OAEOC increased between 2019 and 2023, though the rise was substantially smaller than that observed in the period 2008–2018 (Figure 1) (10–12). After a decline in 2020 and 2021, a total of 4138 cases were recorded in 2023, just slightly higher than the 4021 cases reported for 2018 (12). Ethanol, heroin and benzodiazepines remained the most frequently involved substances, consistent with findings from Trondheim (12, 13).

Over the past decade, the incidence of heroin poisonings has fluctuated within a stable range, whereas the increased incidence of unspecified opioid poisonings observed in 2017–2018 remained high throughout 2019–2023 (12). A substantial proportion of these cases involved long-acting opioids (20). Naloxone, an opioid antagonist, has a relatively short duration of action, and repeated administration may be necessary within 1–2 hours. This highlights the importance of a two-hour observation period following opioid antagonist treatment (21). In light of the record number of deaths from novel synthetic opioids in Norway in 2023 (5, 6) and the rising number of fatal overdoses linked to prescribed opioids (22), these trends are a cause for concern.

We observed a major increase in cocaine poisonings, rising from 163 cases in 2019 to 432 in 2023, with most cases occurring among adolescents and young adults. Reports from Norway indicate that cocaine use has increased over the past five years, particularly in this age group (5). Large seizures of cocaine suggest increased importation (23), and wastewater analyses indicate rising consumption in Oslo (24). Among upper secondary school pupils in Oslo, the

proportion reporting cocaine use tripled between 2018 and 2023, to 17 % of male final-year pupils (25). Increasing cocaine use among adolescents and young adults has been reported throughout Europe and corresponds with a simultaneous large rise in cocaine seizures (6). Cocaine is implicated in approximately one fifth of drug-related deaths in Europe (6), with myocardial infarction, arrhythmias and stroke representing the main risks (26). Clinicians should therefore remain alert to the possibility that chest pain following cocaine use may indicate a coronary event, even in patients considered too young for coronary artery disease.

The number of ketamine poisoning cases increased from six in 2019 to 77 in 2023. While this magnitude is new for Oslo, it is in line with the increasingly frequent and larger ketamine seizures (23). Rising prevalence and seizures are also reported in other parts of Europe and the United States (6, 27). Ketamine, an anaesthetic also used recreationally, can cause agitation, dissociation, hallucinations and confusion in cases of acute intoxication, which are best managed with benzodiazepines (28). Chronic ketamine use can lead to ulcerative cystitis (28).

We found a marked increase in poisonings involving benzodiazepines in 2023, accompanied by a higher proportion of cases among adolescents and young adults. It remains unclear whether this reflects increased use of illicit benzodiazepines or misuse of prescribed benzodiazepines among patients treated for poisoning with other primary agents. No corresponding changes were observed in police seizures of benzodiazepines (23).

The rise in the proportion of women in our data was due to an increase in the number of female cases, while the number of male cases remained stable. This increase was seen for nearly all substances, particularly MDMA. Among school pupils, the proportion of girls who reported alcohol intoxication during the past 12 months increased from 32 % in 2018 to 37 % in 2023, while the proportion of boys remained stable at 32 % (25). However, survey data show no increase in the proportion of women who drank alcohol in the past year, nor in those who consumed more than six units on a single occasion in the same period (4). Surveys also indicate a slight rise in cannabis use among women in general and among girls of school age (5, 25). Taken together, these findings suggest an increase in psychoactive substance use among women, which may help explain the rising number of drug and alcohol poisonings among women. Across Europe, women account for roughly one quarter of people with serious problems related to illicit drug use, and our findings are consistent with this (29). Notably, women made up 43 % of MDMA poisonings in our data, and as many as 61 % in 2023 – considerably higher than the 29 % reported in a European study covering 2013–2022 (30).

The observed decline in drug and alcohol poisonings in 2020–2021 is likely attributable to the lockdowns during the COVID-19 pandemic. The incidence was markedly lower in months with a full lockdown, particularly for ethanol poisonings. Psychoactive substances are often consumed in social contexts, and the restrictions led to a shutdown of the hospitality sector and limited social

contact. It is also possible that substance use shifted from public settings to private homes, reducing the likelihood of being found and brought in for treatment following intoxication.

Although reports from ambulance personnel and the police indicated increased GHB use due to heroin shortages, no corresponding rise in GHB poisonings was observed at OAEOC. GHB poisoning is often so severe that patients are transported directly to hospital by ambulance, so an increase may have gone unnoticed at OAEOC. However, no rise was observed at Oslo University Hospital either (K.E. Hovda, senior consultant, Department of Acute Medicine, personal communication, unpublished Euro-DEN data).

Excluding pure ethanol poisonings, the proportion of patients transferred from OAEOC to somatic hospitals declined from 18 % at the start of our previous study in 2014 (12) to 11 % at the end of the latest study in 2023. This could reflect a higher threshold for hospital transfer, although there have been no changes in the clinic's routines to suggest this. It is also possible that the threshold for presenting to the clinic with drug and alcohol poisoning has decreased (12).

The proportion of patients leaving the clinic during treatment was markedly low in 2020–2021, possibly because staff had more time for follow-up due to reduced patient volumes during the pandemic lockdown.

Strengths and limitations

Most patients with drug and alcohol poisoning in Oslo are treated at OAEOC, while the most severe cases are transported directly to hospital by ambulance. Some patients remain at the scene after receiving care from ambulance personnel and are therefore not included in our dataset (18). In addition, there are fatal overdoses and cases where the health service is not involved at all. Although our findings do not provide a complete picture of the situation in Oslo, they are a strong indicator of the prevalence of different substances used in drug and alcohol poisonings. Given that our findings are consistent with a similar study from Trondheim and with national data on police seizures, they are likely generalisable to other urban settings in Norway (13, 23). The large sample size reduces susceptibility to random variation, and combined with previous studies, provides a robust dataset spanning 2008 onwards (10–12) for monitoring trends over time.

Incidence rates are not an exact measure of drug and alcohol poisonings in the Oslo population, but they serve as a useful metric for monitoring trends over time. Although 30 % of patients with drug and alcohol poisoning are not Oslo residents (31), population figures from Oslo local authority were used as the denominator for incidence calculations. Because drug and alcohol poisoning is extremely rare in children under 12, the at-risk population was defined as individuals aged ≥ 12 years.

Cases were identified through a retrospective review of OAEOC's presentation records, and were included if the patient was recorded with a condition suggestive of drug and alcohol poisoning. It is therefore likely that not all cases were captured.

We recorded the number of cases rather than individual patients. In two previous Norwegian studies, 14 % of patients were treated for more than one poisoning episode within a year (11) and 20 % within two years (13), with 1 % and 2 %, respectively, experiencing more than five episodes. Given that our study spans a five-year period, the proportion of patients with more than one episode is expected to be slightly higher. Nonetheless, counting cases is appropriate for our purposes, as our primary interest is in identifying the substances likely to be implicated in drug and alcohol poisonings encountered in clinical practice.

Data were collected retrospectively from medical records. No routine toxicological testing was performed. Substance diagnosis was based on the treating doctor's clinical assessment, as documented in the medical record, drawing on information from patients and their companions, and the clinical presentation. Toxicological analyses indicate that patients generally report the substances they have taken, although some substances may be underreported when multiple substances are involved (32).

Some inconsistencies in case inclusion and data recorded are likely, even though all ten medical students who collected the data were trained and supervised by the same person (last author).

Conclusion

The incidence of drug and alcohol poisonings treated at OAEOC increased between 2019 and 2023, with a temporary decline during the COVID-19 pandemic in 2020 and 2021. Poisonings involving cocaine and ketamine rose sharply, particularly among adolescents and young adults. Clinically, this highlights the importance of recognising that chest pain following cocaine use may indicate a coronary event, even in patients who would normally be considered too young for coronary artery disease, and that acute confusional states may be due to ketamine use.

The article has been peer-reviewed.

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Publisert: 23 October 2025. Tidsskr Nor Legeforen. DOI: 10.4045/tidsskr.25.0128
Received 18.2.2025, first revision submitted 11.6.2025, accepted 1.9.2025.