NSW Health

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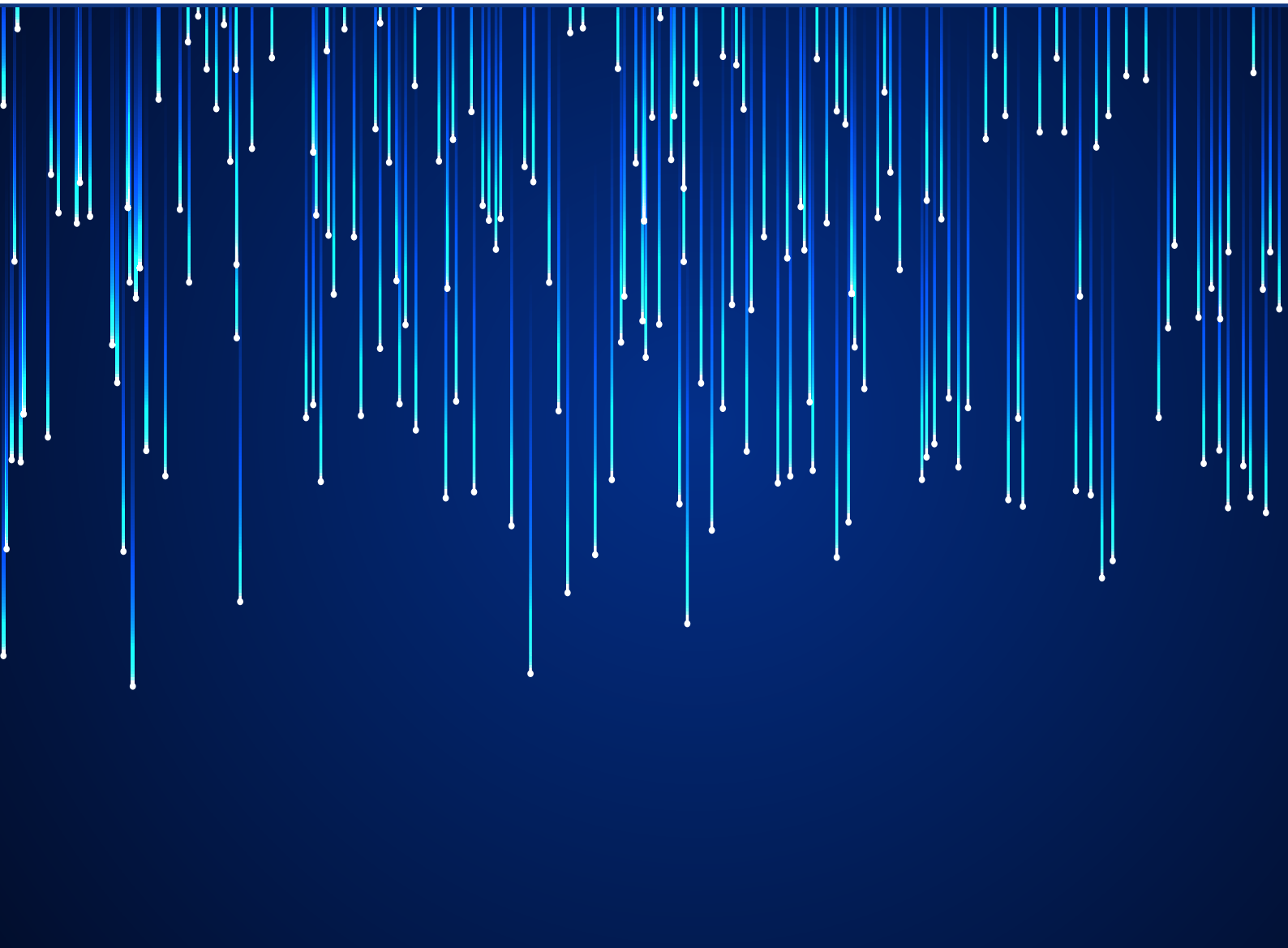
Prescription, Recreational and Illicit Substance Evaluation (PRISE)

Program Activity Report

July 2018 – December 2021



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The NSW Ministry for Health acknowledges the traditional custodians of the lands across NSW. We acknowledge that we live and work on Aboriginal lands. We pay our respects to Elders past and present and to all Aboriginal people.

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SNAPSHOT

519 total cases reported
July 2018 – December 2021

82 reported cases from music festivals

390 cases had toxicology testing (tested cases)

11 public drug warnings released

8 clinician safety advisories released

Festival cases

MDMA was the most commonly detected drug in cases from music festivals – **58 out of 78** cases (**70.4%**)

NPS* were detected in **2 of the 78** tested cases (2.6%)

Non-festival cases

Methamphetamine was the most commonly detected drug – **99 out of 312** tested cases (31.7%)

NPS* were detected in **56 of the 312** tested cases (17.9%).

Acetylfentanyl was the most commonly detected NPS.

* NPS = new psychoactive substance; includes fentanyl analogues, nitazenes, unregistered benzodiazepine groups, and other NPS.

Tested cases

1 **34.6%** **of tested cases**

Methamphetamine was the **most** commonly detected drug

2 **30.2%** **of tested cases**

MDMA was the **second most** commonly detected drug

Age of tested cases

28.6 years the median age of all tested cases

21.6 years the median age of tested cases from music festival exposures

32.0 years the median age of tested cases from non-music festival exposures

68.5% of tested cases were male

Executive Summary

Since its inception, the Prescription, Recreational and Illicit Substance Evaluation (PRISE) program has provided an understanding of the specific drugs causing severe toxicities in NSW Health. The initial surveillance focus was on music festival settings but has widened to provide actionable intelligence for rapid public health responses.

Between July 2018 – December 2021, 519 cases were notified to PRISE. Of these, 390 cases proceeded to testing of biological samples and/or physical substances associated with the case.

NSW hospital-based clinical toxicology services (194, 37.4%) were the most common source of notifications, followed by surveillance of Emergency Department presentations (98, 18.9%) and the NSW Poisons Information Centre (97, 18.7%).

The most commonly detected drug in all cases was methamphetamine, found in 117 (34.6%) of 390 tested cases. Of the 390 tested cases, 78 were related to music festivals, in which the most commonly detected drug combination was MDMA together with ketamine (unable to distinguish between medical administration).

The majority of cases tested were male (68.5%). The median age of all tested cases was 28.6 years, with the median age of tested cases from music festivals 21.6 years and the median age of tested cases from non-music festival settings was 32.0 years.

There were eleven public drug warnings and eight clinician safety advisories released in response to findings from PRISE over this period.

Key detections made through PRISE have included:

- Fentanyl analogues – acetylfentanyl, carfentanil, fluoro furanyl fentanyl
- Potent opioid etodesnitazene
- Unregistered benzodiazepines in “street” Xanax and in other substances – flubromazolam, clonazolam, bromazolam and etizolam
- Ketamine analogue – 2-FDCK
- Synthetic hallucinogen – 25C-NBOMe
- Heroin contaminated cocaine
- THC (tetrahydrocannabinol) containing edibles (lollies) being inadvertently consumed by children leading to hospital presentations

Section 1: PRISE Program

Background

Alcohol and other drug use is a major cause of preventable disease and death in Australia.[1,2,3] There is an increased focus on improved understanding and prevention of drug-related harms in New South Wales (NSW). This followed an inquest into the deaths of six young people at music festivals, along with a higher prevalence of severe toxicity requiring urgent hospital transports and ICU admissions from 2017 to 2019.[4,5]

Identification of drugs involved in poisonings is challenging due to the limited scope of detection and false positives in urine drug screening (UDS) routinely available in hospitals. The standard methodology applied for UDS is immunoassays due to its ability to provide identification with rapid turnaround times for the most common drug classes.[6] The most common drug classes included in UDS assays are opiates, benzodiazepines, amphetamines, cocaine and cannabinoids. Barbiturates and methadone are also available in some assays. It is important to note that a limitation of UDS are the substantial rates of both false positive and negative results.[7] Many drugs such as oxycodone, fentanyl, synthetic cannabinoid receptor agonists, gamma-hydroxybutyrate (GHB) and lysergic acid diethylamide (LSD) are not specifically detectable by UDS. Specific drug identification can only be performed by chromatography-mass spectrometry at a reference laboratory, but the turnaround time can take days or weeks. Historically in NSW, drug and chemical screening and quantitation of blood samples of hospitalised patients has been limited. This has been due to lack of availability at many sites, compounded by poor access with many clinical teams unaware of when assays are available.

The PRISE Program began in July 2018 as a collaboration across multiple functional units of NSW Health including the Centre for Alcohol and Other Drugs (CAOD), NSW Ministry of Health, the NSW Poisons Information Centre (NSW PIC), NSW hospital-based Clinical Toxicology services and NSW Health Pathology Forensic & Analytical Science Service (FASS). It provides access to extensive toxicology testing to NSW Health acute care services for cases of severe and unusual substance-related toxicity or clusters of overdoses.

The collaborative approach to obtaining comprehensive toxicology testing with rapid turnaround time at FASS was formalised following the public health response to deaths and severe toxicity of people who attended music festivals.[4] This approach has been expanded to identify specific drugs causing severe toxicity in non-music festival settings. This initiative was subsequently named the PRISE Program. The PRISE program received support to continue as part of the NSW Health drug surveillance program. It is complemented by a range of intelligence inputs from surveillance of emergency department presentations, coronial toxicology results and police seizures.

Here, we present an overview of the PRISE Program, its objectives, operations, performance, limitations and recommendations.

Objectives

1. To enhance clinical management of patients with severe drug-related toxicity
2. To rapidly identify substances (primarily recreational and/or illicit substances) associated with severe drug-related toxicity which have potential for significant public health impact, and where risk may be improved by timely public health response
3. To identify emerging trends on acute recreational and/or illicit substance poisonings and inform public health response.

Operation

The key steps in PRISE Program operation include the following:

1. **Case notification and active case finding**

   Patients presenting to hospital with severe and unusual suspected drug-related toxicity are notified to the PRISE Team. The PRISE team sits within the Centre for Alcohol and Other Drugs, NSW Ministry of Health and comprises of a public health medicine advanced trainee (supervised by the NSW Poisons Information Centre), the manager of the Toxicity Response, Epidemiology and Surveillance team (a position held by a toxicology trained pharmacist), and the Centre's medical advisor (clinical toxicologist).Notification is typically done via email (MOH-PRISE@health.nsw.gov.au) or telephone (9461 7178) designated to the PRISE team.

   The common sources of passive notifications include acute care settings such as clinical toxicology service, NSW PIC, Disaster Planning and Management (LHD Health Service Functional Area Coordinator for music festivals) and ongoing care settings such as alcohol and other drugs clinics. Active case finding is performed by the PRISE team with weekly keyword search of emergency department triage notes through the NSW Public Health Rapid, Emergency, Disease and Syndromic Surveillance (PHREDSS) System, daily active case review of clinical toxicologist consults to the NSW PIC and reports from different media platforms.

2. **Decision to test**

   The decision to proceed with further comprehensive toxicology testing is based on agreed eligibility and depends if the hospital is part of a pilot site with extended access to testing for single cases (**Table 1**).

Table 1. Eligibility criteria for PRISE comprehensive toxicology testing and suggested mode of notification

#	Criteria	Pilot site/s		State-wide interim	
		Notification	Test	Notification	Test
1	One patient with severe toxicity or deceased; AND the toxidrome is not consistent with the history of exposure.		✓	✓ Email	Collect and hold samples for one month
2	A cluster of 2 or more people experiencing acute toxicity, with at least one patient admitted to ICU or deceased; AND the toxidrome is not consistent with the history of exposure.	✓ Email/phone	✓	✓ Email/phone	✓
3	A cluster of 5 or more people experiencing acute toxicity, with a least 3 patients admitted to ICU or deceased.	✓ Email/phone	✓	✓ Email/phone	✓
4	An ICU admission or death following attendance at a music festival.	✓ Email/phone	✓	✓ Email/phone	✓

If the notification meets one of the eligibility criteria, testing will proceed. There are sometimes exceptions to this, if it is believed there is potential use of a substance of particular interest based on recent detections or particular public health concern at that time. The clinician or notifier will send a completed PRISE request form containing clinical detail and exposure history to the PRISE Team. The PRISE Team determines the urgency of testing based on clinical status and potential public health impacts (**Table 2**).

Table 2. Urgency triage scale and expected results timing for PRISE toxicology testing

Urgency Triage Scale	Turnaround time for Toxicology Result from sample receipt at FASS	
	Preliminary result	**Final report**
Urgent	As soon as possible (may require overtime)	4 weeks
M1	2 business days	4 weeks
M2	5 business days	4 weeks
M3	Not required	4 weeks

3. **Liaison with laboratory**

   Upon receipt of the completed PRISE request form, the PRISE team will contact local pathology to identify appropriate biological samples for testing, including the earliest EDTA blood and urine, then arrange sample transport to FASS for analysis.

4. **Comprehensive toxicology analysis**

   The analytical techniques employed at FASS are constantly evolving to meet the needs of toxicology testing. These techniques are able to rapidly identify approximately 500 different drugs, including new psychoactive drugs (NPS) such as fentanyl analogues, unregistered benzodiazepines, synthetic cannabinoids and synthetic cathinones, as well as having the ability to identify "unknown" drugs. In some cases, physical samples brought in with the patient or seized by the Police will be tested to facilitate drug identification.

5. **Interpretation and report of results**

   FASS will report the testing result to the PRISE Team within the agreed timeframe based on the urgency triage scale as described in **Table 2**. The PRISE team reviews the toxicology result to determine whether the detected drug types can explain the patient's presentation, toxicology input is available via the medical advisor from CAOD and the NSW PIC if required. The PRISE team makes a preliminary assessment if it warrants any public health interventions. The result will be sent to the local pathology department to upload to respective patient medical records. At pilot sites, the result is sent directly from FASS to the local laboratory; at non-pilot sites the PRISE team send the result to the local laboratory. The clinician will inform the result to the patient if possible.

6. **Risk assessment and response**

   NSW Ministry of Health has established an expert panel (Standing Panel for Toxicity Risk or SPaToR) which includes representation from a range of experts in clinical toxicology, addiction medicine, emergency medicine, public health and community groups. When there are emerging substance detections or findings with substantial public health risks, the PRISE Team will convene the SPaToR expert panel to discuss risk assessment and determine appropriate public health response. Public health actions may include notification to relevant jurisdictions or risk communication by issuing public and clinical alerts on multiple platforms, including, websites and social media.

7. **Data management and report**

   Documents related to PRISE Program are stored in a secure platform (Content Manager) at the NSW Ministry of Health with access limited to authorised persons (PRISE Team) only. Key variables and toxicology results are entered into the PRISE master spreadsheet, which is an interim PRISE database. Updates are currently being undertaken for the PRISE database to be hosted by NSW PIC, with access to PRISE cases limited to authorised PRISE team members only.

Governance

PRISE Program Advisory Committee (PRISE PAC) provides oversight of the PRISE Program and reaches consensus on the developmental, logistical, technical, communication and funding elements of the program.

PRISE PAC members include key personnel from NSW Ministry of Health, NSW Poisons Information Centre, NSW Health Pathology Forensic & Analytical Science Service.

The PRISE Program Advisory Committee convenes on a quarterly basis. The Committee reports to Executive Director of the Centre for Alcohol and Other Drugs MoH, Director of FASS, and to the NSW PIC Director.

Evaluation

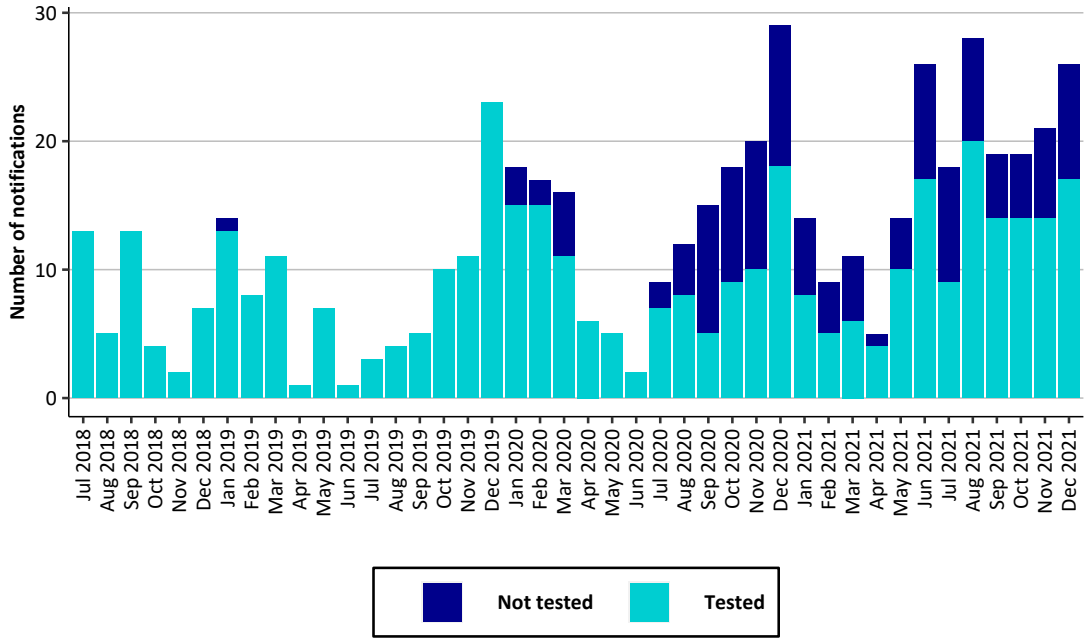
As the PRISE Program has grown there have been continued quality improvements and changes to improve all processes. These have included the triage system to allow more urgent cases to be prioritised for testing at FASS and the implementation of eOrder system at select pilot sites allowing streamlined ordering. A process evaluation is planned for late 2023 and a number of activities relating to the evaluation of public drug warnings are underway or have been completed. These improvements will not be further discussed as they are outside the scope of this report.

Section 2:
Case Notifications

There were 519 cases notified to the PRISE Program during the period of review, of which 390 cases (75%) proceeded to comprehensive toxicology testing of biological samples and/or physical substances (**Figure 1**).

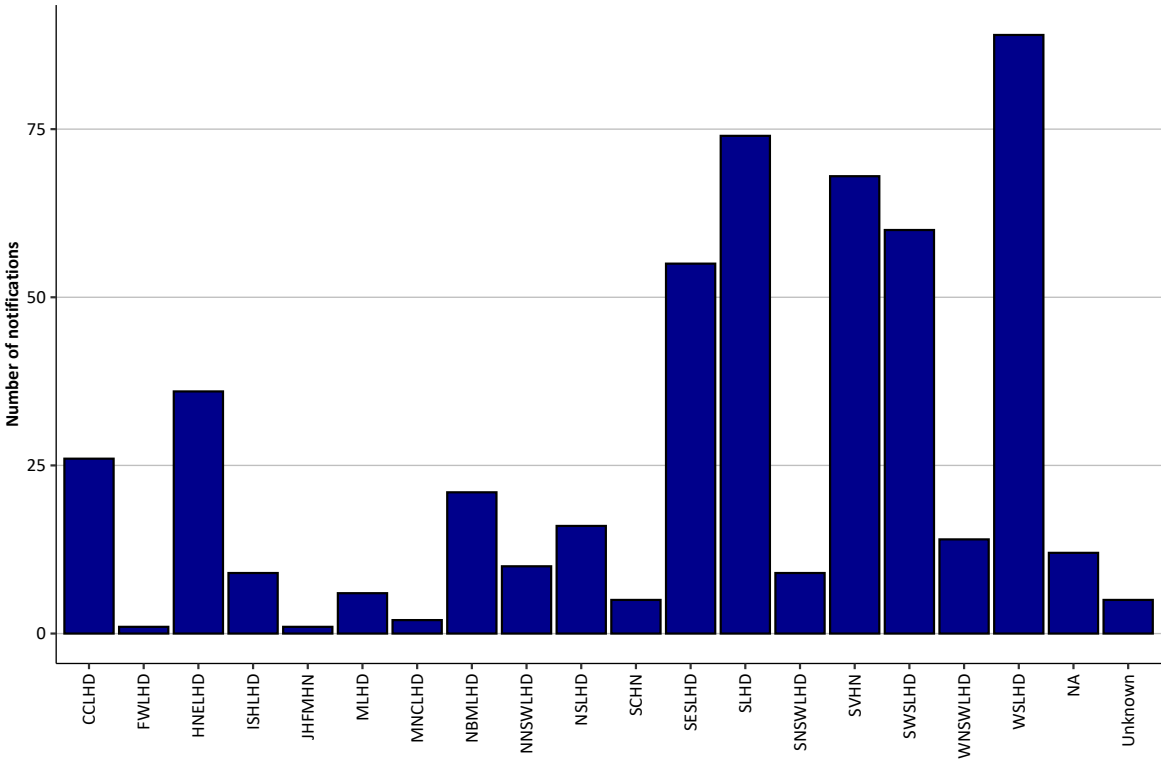
There is a notable decrease in case notifications in early to mid-2020, as a result of the public health restrictions put in place at the beginning of the COVID-19 pandemic, with the population essentially confined to their home, reducing socialising and public events.

Figure 1. Number of cases notified to PRISE and testing status by month and year of notification, July 2018 – December 2021



A variation in location of notifications was seen when the source of notifications was categorised by Local Health Districts (LHD) (**Figure 2**). Most notified cases were from WSLHD (89, 17.1%), SLHD (74 ,14.3%), SVH (68, 13.1%) and SWSLHD (60, 11.6%). NSW hospital-based clinical toxicology services (194, 37.4%) were by far the most common source of notifications, PHREDSS search (98, 18.9%) and the NSW PIC (97, 18.7%), were the second and third most common source of notifications (**Figure 3**).

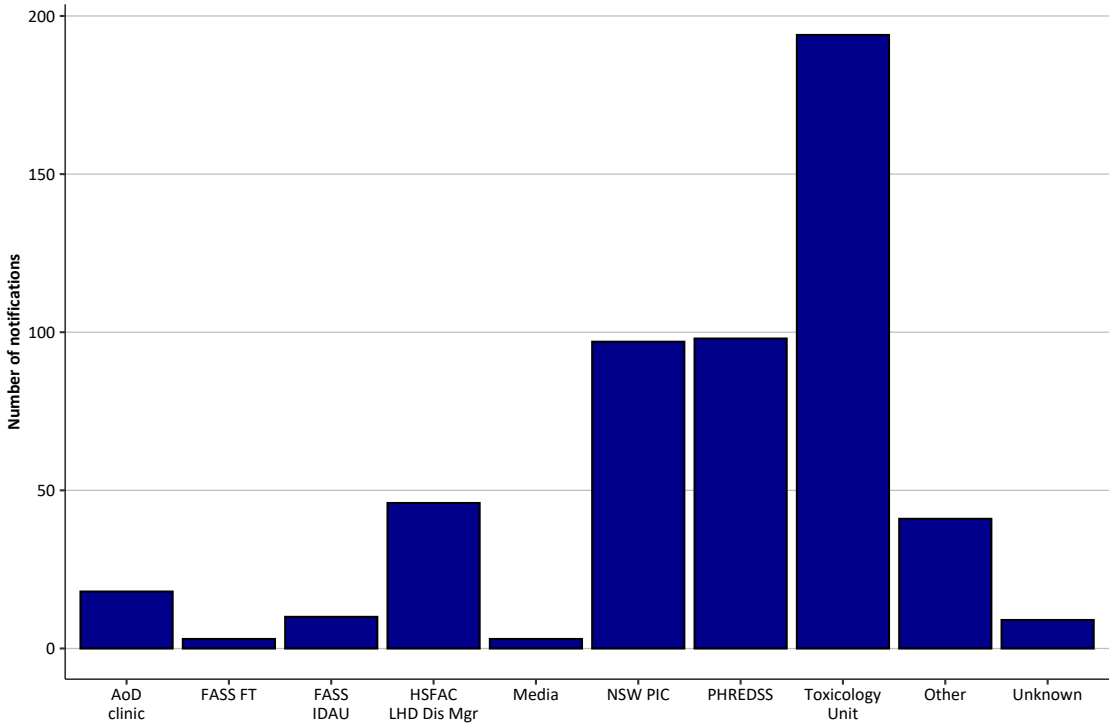
Figure 2. Number of notifications by Local Health District and Specialty Health Network, July 2018 – December 2021



CCLHD – Central Coast Local Health District; FWLHD – Far West Local Health District; HNELHD – Hunter New England Local Health District; ISLHD – Illawarra Shoalhaven Local Health District; JHFMHN – Justice Health and Forensic Mental Health Network. MLHD – Murrumbidgee Local Health District; MNCLHD – Mid North Coast Local Health District; NBMLHD – Nepean Blue Mountains Local Health District; NNSWLHD – Northern NSW Local Health District; NSLHD – Northern Sydney Local Health District; SCHN – Sydney Children's Hospitals Network; SESLHD – South East Sydney Local Health District; SNSWLHD – Southern NSW Local Health District; VHN – St Vincent's Hospital Network; SWSLHD – South West Sydney Local Health District; WNSWLHD – Western NSW Local Health District; WSLHD – Western Sydney Local Health District.

NOTE: The Local Health District / Specialty Health Network as shown on the horizontal axis corresponds to the location of the hospital where the patient first presented. 'Unknown' denotes that the case presented at hospital but that the LHD was not recorded; 'NA' denotes that the case did not present to hospital, for example, an out of hospital death.

Figure 3. Number of notifications by source of notification, July 2018 – December 2021

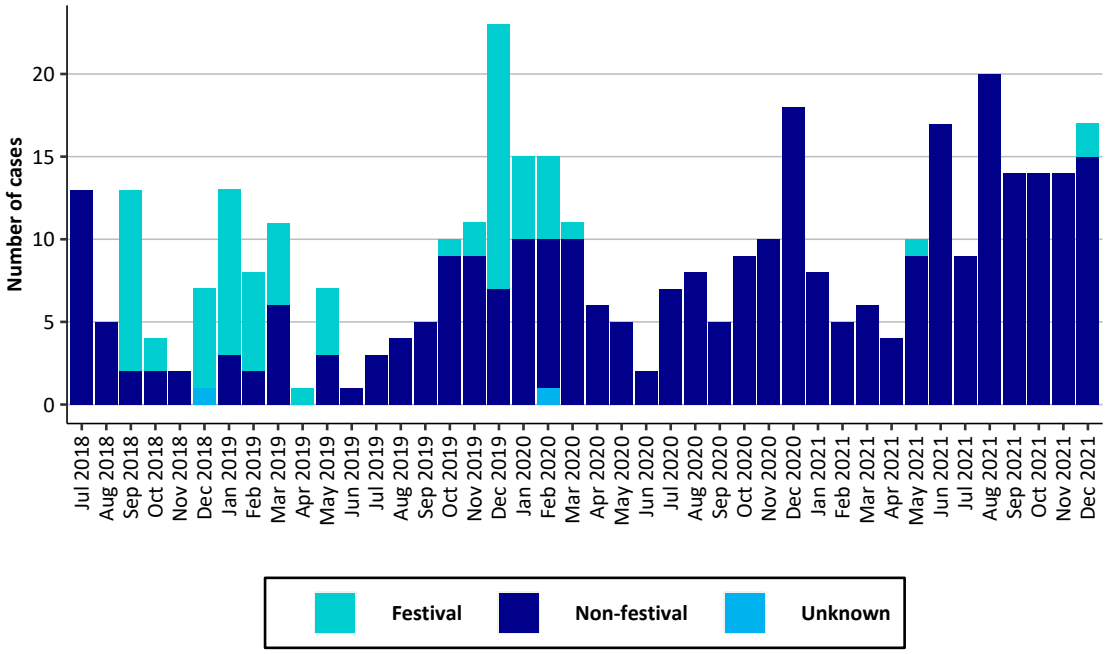


FASS FT = FASS Forensic Toxicology; FASS IDAU = FASS Illicit Drug Analysis Unit HSFAC LHD Dis Mgr = Health Services Functional Area Coordinator Local Health District disaster management; PHREDSS = Public Health Rapid, Emergency, Disease and Syndromic Surveillance

Eighty-two notified cases (15.8%) were from music festival settings. Among these 82 notified cases from music festivals, 78 cases (95.1%) proceeded to comprehensive toxicology testing.

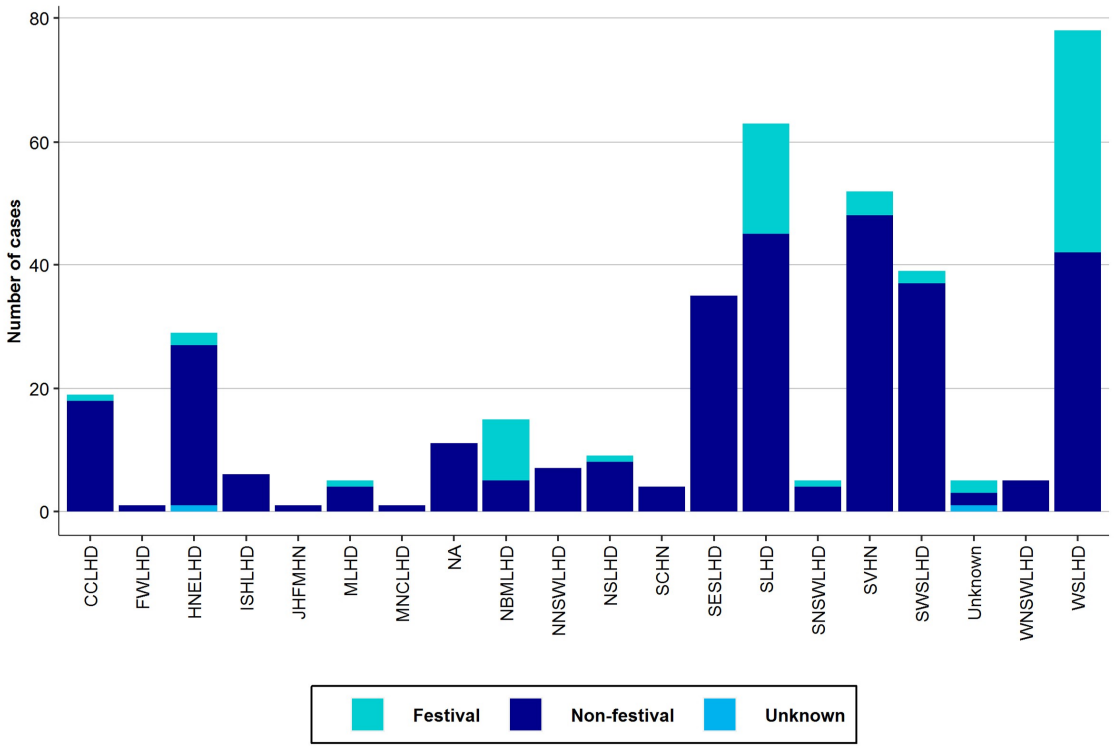
A high number of cases related to music festivals over the spring and summer months in 2018, 2019 and early 2020 was observed, in keeping with timing of music festivals over these months. A large decrease in cases from music festivals was seen in 2020 in keeping with the implementation of public health restrictions related to the COVID-19 pandemic (**Figure 4**). In December 2021 further cases from music festivals were seen as music festivals re-started. There was geographical variation in proportion of tested cases from festivals versus non-festival exposures (**Figure 5**), notably WSLHD has the largest number of tested cases which is contributed to significantly by a large proportion of cases from music festivals. The median age of all tested cases was 28.6 years (IQR=16.8; range 1-71 years). The median age of 78 tested cases who were from music festivals was 21.6 years (IQR=5.4; range 16-41 years), and the median age of tested cases who were from non-music festival settings was 32.0 years (IQR=18.2; range 1-71 years). The highest proportion of tested cases were in the age groups 15-24 years (127, 32.6%) and 25-34 years (105, 26.9%). More tested cases were male (267, 68.5%), which can be observed in all age groups and regardless of their status on festival exposure (**Figure 6**).

Figure 4. Number of tested cases by month and year and music festival exposure, July 2018 – December 2021



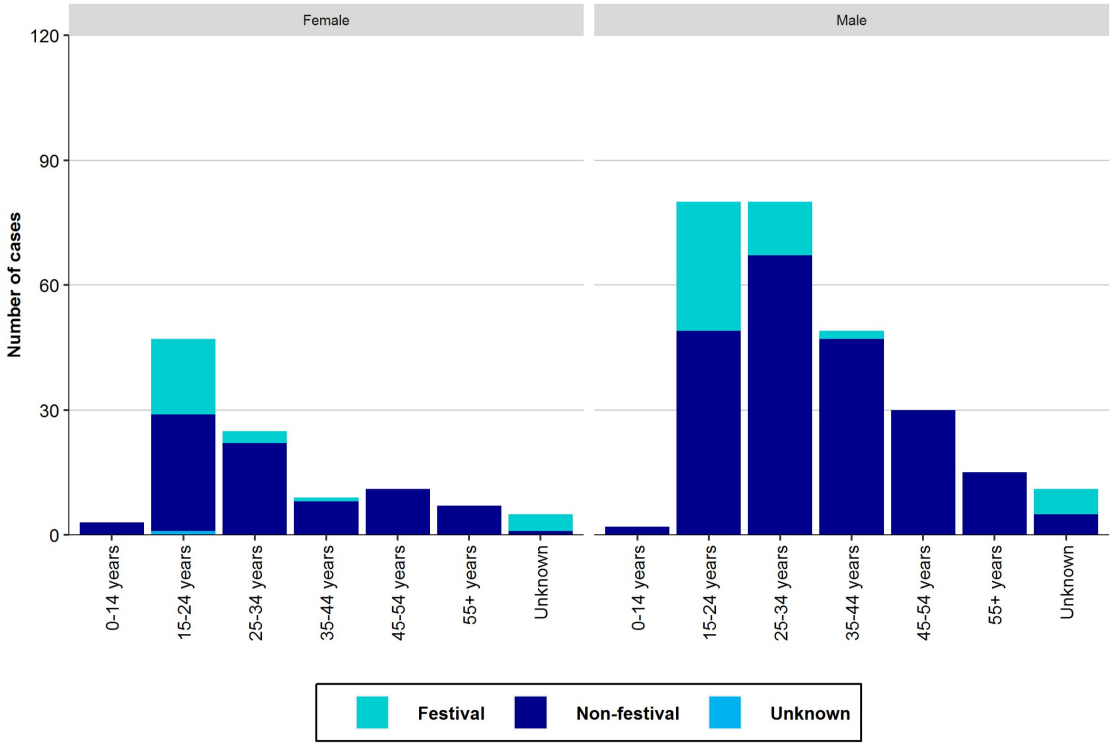
SCHN – Sydney Children's Hospitals Network; SESLHD – South East Sydney Local Health District; SNSWLHD – Southern NSW Local Health District; VHN – St Vincent's Hospital Network; SWSLHD – South West Sydney Local Health District; WNSWLHD – Western NSW Local Health District; WSLHD – Western Sydney Local Health District.

Figure 5. Number of tested cases by Local Health District and festival attendance, July 2018 – December 2021



NOTE: The Local Health District as shown on the horizontal axis corresponds to the location of the hospital where the patient first presented. 'Unknown' denotes that the case presented at hospital but that the LHD was not recorded; 'NA' denotes that the case did not present to hospital, for example, an out of hospital death.

Figure 6. Number of tested cases by age group, sex and music festival attendance, July 2018 – December 2021



There were 62 tested cases (16.1%) with death being reported as the final outcome. However, the information on the final outcomes was unavailable in 107 cases (27.9%). A substantial number of cases with missing data on the final outcomes is observed throughout the study period. It is assumed that those where the final outcome was unavailable were not deceased as FASS laboratory processes identify the samples of deceased individuals subject to a coronial investigation.

As a sub-project of PRISE, an additional 6-month enhanced monitoring program was commenced in July 2020 to monitor the emerging threat of counterfeit "alprazolam". NSW Health clinicians were requested to notify and submit tablet samples from patients for analysis by the Therapeutic Goods Administration (TGA).

During July – December 2020, 91 notifications of suspected counterfeit benzodiazepines were received and 46 confirmed as counterfeit from across NSW based on the label/tablet appearance or analytical testing. 72% were from males with a median age of 21.5 years (IQR=12; range 13-62). The source where provided was 'street' (n=13), Internet/social media (n=6), and friends (n=2). All suspected counterfeit samples submitted to TGA were confirmed as counterfeit (**Figure 7**). The contents included a range of benzodiazepines (**Table 3**) and were from a range of locations (**Table 4**).

Table 3. Tablet samples received through clinical presentations involving counterfeit "alprazolam" to NSW Health facilities and analysed by Therapeutic Goods Administration, June – September 2020

Appearance/Label	Location (Local Health District)	Contents
Mylan 2 mg	South Western Sydney	Etizolam (main component), flubromazolam (minor component)
Kalma 2 mg	Mid North Coast	Alprazolam (1.7 mg/tablet)
Mylan 2 mg	Central Coast	Etizolam and flualprazolam; content varied between the 4 tested tablets
Kalma 2 mg	South Eastern Sydney	Alprazolam (trace amount)
Mylan 2 mg	Hunter New England	Etizolam and flualprazolam; content varied between the 5 tested tablets
Mylan 2 mg	Hunter New England	Etizolam (main component) flualprazolam (minor component)
Mylan 2 mg	Western NSW	Flualprazolam; content varied between the 4 tested tablets
Alprazolam 2 mg	South Western Sydney	Clonazolam and trace amount Alprazolam
Alprazolam 2 mg	Sydney Children's Hospitals Network	Etizolam (major peak), flualprazolam (minor peak)
Xanax 2 mg	South Eastern Sydney	Clonazolam

Figure 7. Selected examples of the tablet tablet and container photos received through clinical presentations to NSW Health facilities

Table 4. NSW Health clinician reports of suspected counterfeit alprazolam by Local Health District.

Local Health District/Specialty Network	Number of reports (n=91)
Central Coast	4
Hunter New England	7
Illawarra Shoalhaven	7
Murrumbidgee	2
Mid North Coast	1
Nepean Blue Mountains	6
Northern NSW	3
North Sydney	14
Sydney Children's Hospitals Network	10
South Eastern Sydney	3
Sydney	1
Southern NSW	2
St Vincent's Health Network	1
South Western Sydney	21
Western NSW	5
Western Sydney	4

NOTE: Most reports were received by the NSW PIC, who do not receive calls from hospitals with clinical toxicology services (based in Sydney, Western Sydney, South Eastern Sydney, St Vincent's Health, Hunter New England).

A comprehensive report including other datasets on unregistered benzodiazepines and counterfeit alprazolam has been presented.

Section 3:
Toxicology Analysis

Toxicology results were available for 339 tested cases (40 of the tested cases had missing results, 11 of the tested cases had physical substance tested only, without testing of biological samples). The figures in this section refer to cases with results from biological samples only. Where available, blood and urine specimens were tested for each case, however this was dependent on whether specimens were taken, urine specimens were much less commonly collected (**Figure 8**). There were a small number of coronial cases which had other types of specimens tested such as spleen fluid or vitreous humor (**Figure 8**). The median number of substances detected in patients was 9 (IQR=7, range 1 to 29 substances) (**Figure 9**). This includes all substances tested for in the extended toxicology testing, this includes metabolites, for example heroin use commonly results in multiple detections which are all metabolites of the primary substance used.

Figure 8. Number of cases with toxicology results by samples analysed, July 2018 – December 2021

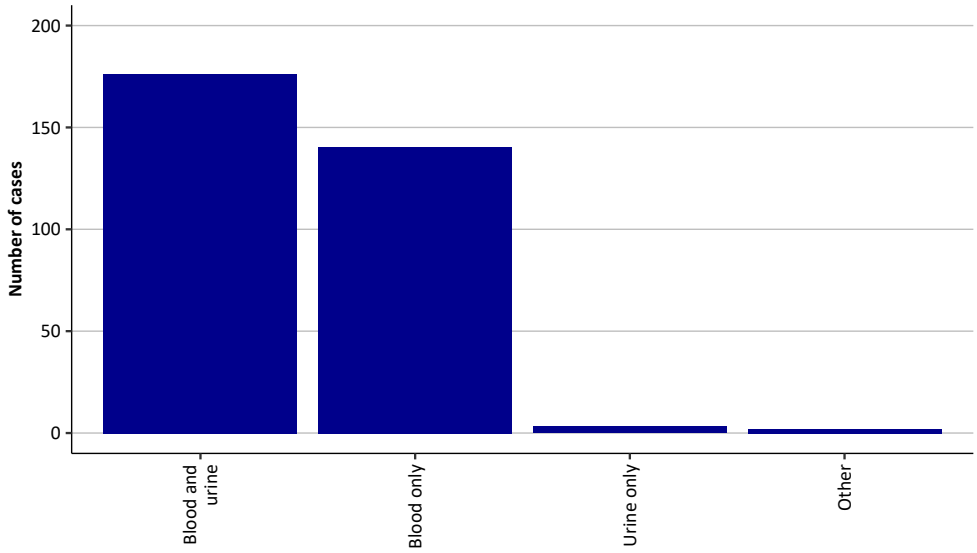
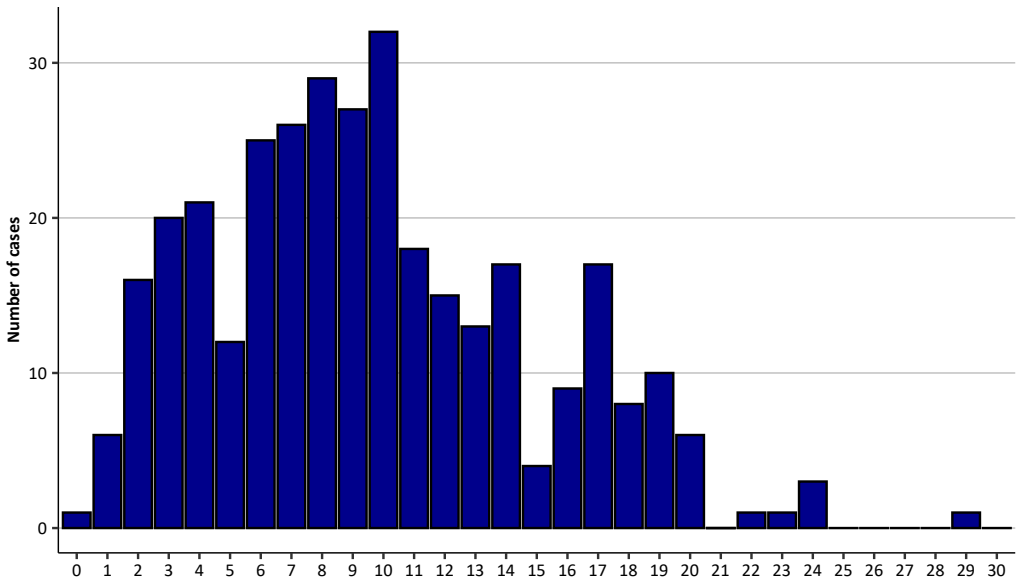


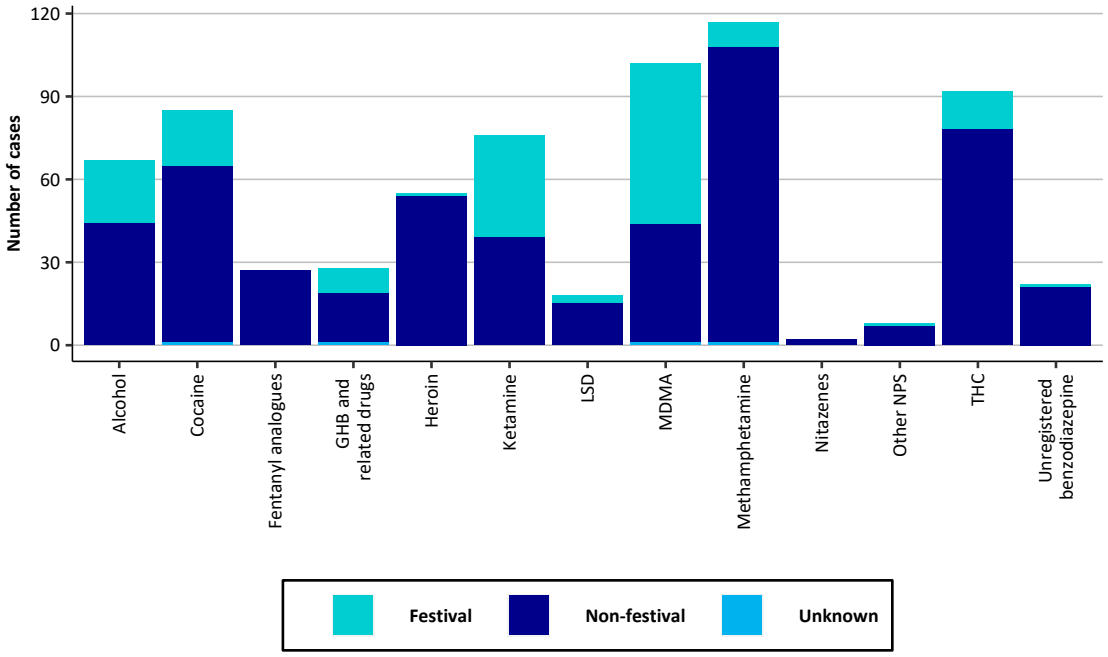
Figure 9. Number of cases with toxicology results by number of substances (including metabolites) detected in the samples analysed, July 2018 – December 2021



The number of cases by specific drug class and drugs of interest were reviewed (**Figure 10**). In 117 (34.6%) tested cases, methamphetamine was the most commonly detected listed drug of interest, followed by MDMA in 102 (30.2%) cases. These were also classified by their music festival exposure, which highlights that most methamphetamine detections were in cases not associated with music festivals, whereas the majority of MDMA detections were in cases from music festivals. MDMA was detected in 58 (70.4%) tested cases from music festivals.

It was notable to see five detections of 1,4-butanediol within the gamma-hydroxybutyrate (GHB) and related drugs category. This is an emerging drug of concern replacing GHB from analysis of police seizures in NSW. If GHB is suspected and specially requested, analyses include searching for GHB, 1,4-butanediol and gamma-butyrolactone. However, in the absence of ethanol, 1,4-butanediol is rapidly converted to GHB in the body and so unless samples are collected rapidly after exposure; only the metabolite GHB (reported as 4-hydroxybutanoic acid) will often be detected.

Figure 10. Number of cases with toxicology results by selected drug or drug class detected and festival status, July 2018 – December 2021



NPS = new psychoactive substances; Fentanyl analogues were primarily acetylfentanyl (n = 26)

The combinations of drugs detected in tested cases was reviewed. These were then analysed separately as cases associated with festivals (**Figure 11**) and those that were not associated with festivals (**Figure 12**). The most common combination detected in festival cases was MDMA and ketamine, with this combination detected in 15 cases (19.2%). It should be noted that although ketamine is commonly used recreationally, it also could have been administered as part of on-location medical treatment. Due to incomplete case information available, for some cases, to the PRISE

Team the source of the ketamine cannot always be confirmed. The most common 'combination' detected in non-festival cases was methamphetamine alone, which was seen in 24 non-festival cases, and only in 2 from music festivals. It should be noted this is referring to methamphetamine alone, methamphetamine was detected in 99 of all non-festival cases (31.7%), often detected along with another substance or substances.

Figure 11. Number of cases with toxicology results associated with music festivals, by selected combination of drug or drug classes detected, July 2018 – December 2021

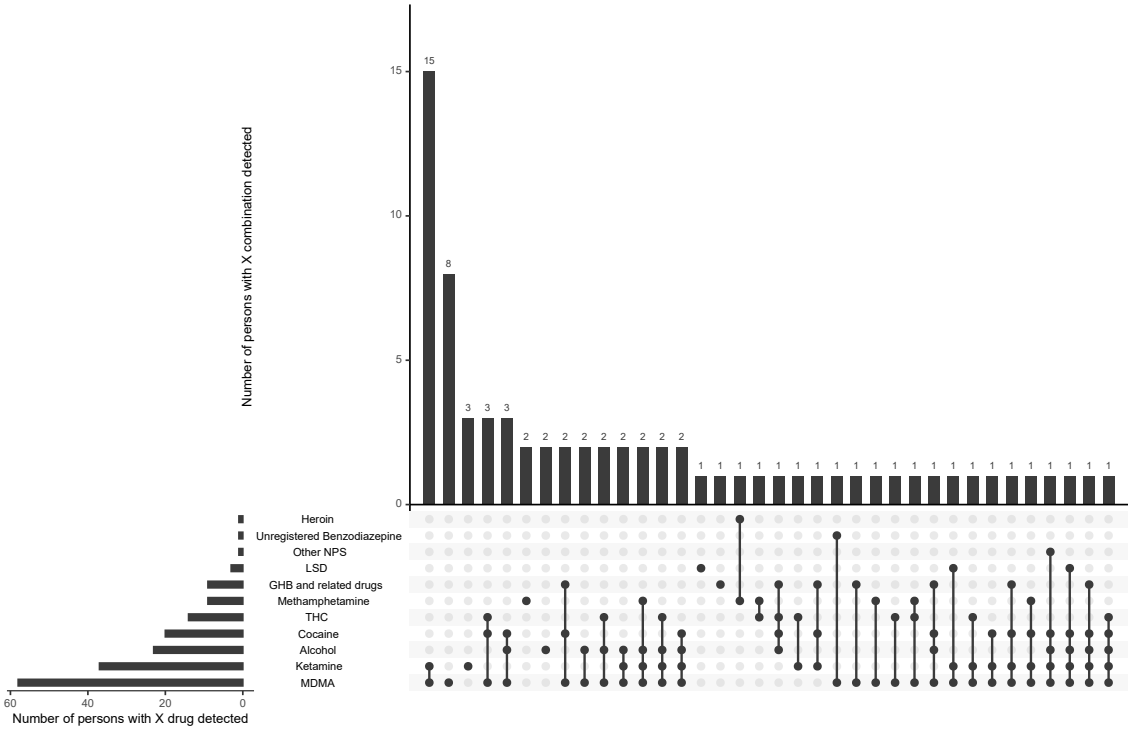
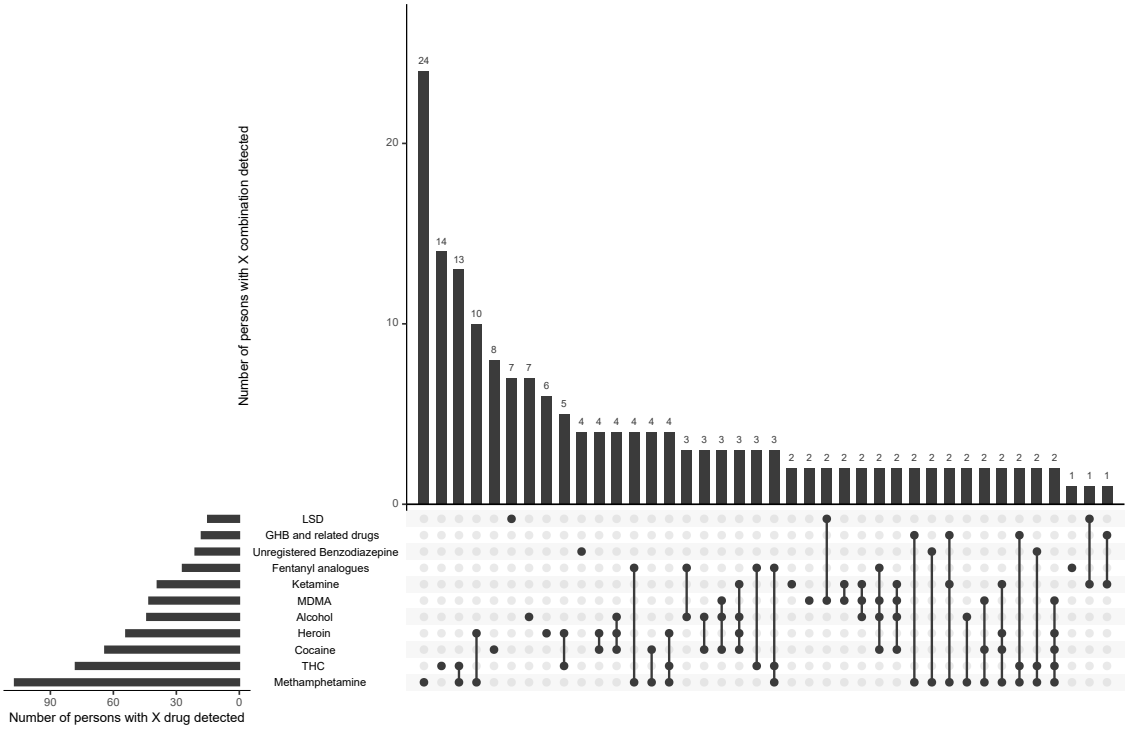


Figure 12. Number of cases with toxicology results not associated with music festivals, by selected combination of drug or drug classes detected, July 2018 – December 2021



The PRISE Program continues to facilitate the detection of novel substances. **Table 5** below outlines the novel and emerging substances detected and the date of first detection in a PRISE case, the date of first detection in a PRISE case (the date of sample collection) is used for the date of first detection, if that date isn't available then the date of notification of the case is used as a surrogate.

Table 5. Novel detections and date of first detection in PRISE cases, July 2018 – December 2021

Novel substance	Date first detected
DNP (2,4-DNP)	August 2018
Carfentanil	September 2018
DMT (Dimethyltryptamine)	August 2018
2-FDCK (2-Fluorodeschloroketamine)	July 2019
Flubromazolam	July 2019
Bromazolam	July 2019
Etizolam	August 2019
Acetylfentanyl	December 2019
4-ANPP (4-anilino-N-phenethylpiperidine)	December 2019
Clonazolam[a]	August 2020
Ethylpentylone	October 2020
Etodesnitazene	April 2021
25c-NBOMe	June 2021
4-fluoro-amphetamine	June 2021

[a] Analytical constraints did not allow confirmation of clonazolam, however the patient reported the substance used was clonazolam and the testing available indicated a novel benzodiazepine

Section 4: Clinical Vignettes

The following are case vignettes on selected cases and trends of interest based on the available clinical information, which can often be limited, and the results of comprehensive toxicology testing.

Carfentanil detections

Carfentanil was first confirmed in a NSW patient in September 2018. Blood and urine samples tested at FASS identified carfentanil in a patient aged in their early 50s who became comatose after using what he thought was N,N Dimethyltryptamine (DMT). He presented to a hospital with a Glasgow Coma Scale (GCS) of 3 and required respiratory support. A urine drug screen performed at the hospital did not reveal any drugs. He was subsequently discharged uneventfully. The product was purchased from the dark web.

Two additional cases aged early 20s to mid-40s were confirmed as separate incidents in 2019. Both patients experienced reduced level of consciousness and respiratory depression after injecting products for a recreational purpose. The patients received large doses of naloxone (more than 800 micrograms) to achieve an improvement of respiration. No fatalities resulted but one patient had multiorgan failure, requiring prolonged hospitalisation and was discharged with significant morbidity. Carfentanil was confirmed in urine and the liquid in glass vials brought in with patients. Fluoro furanyl fentanyl was also detected in one case. One patient intentionally purchased carfentanil off the street. It was unknown whether the other patient purchased carfentanil or thought they were purchasing another substance.

Carfentanil is a potent fentanyl analog that resulted in multiple deaths in a US outbreak in 2016. NSW Ministry of Health issued a public drug warning and media release to warn the public about harm from this potentially lethal substance. A clinician safety alert was issued to inform the detection, to guide management and to urge clinicians to report suspected cases for further investigation. A new keyword for surveillance was created for NSW PHREDSS system to periodically monitor potential presentations to Emergency Department and Ambulance calls. These public health actions lead to additional detections of another fentanyl analog – acetylfentanyl.

Acetylfentanyl detections

The first detection of acetylfentanyl was a result of PHREDSS system surveillance keyword that was set up after carfentanil detections. A signal was detected through PHREDSS system surveillance in December 2019, one day after the 2019 carfentanil clinical alert was released, describing a man aged in his 20s who presented to a Sydney hospital with coma (GCS=3) unresponsive to naloxone, and was admitted to ICU. A treating clinician was contacted by the PRISE team for additional information and for verification. This patient used stimulants before he collapsed at a local café. He had respiratory depression and constricted pupils on arrival. These features are not expected effects from stimulants but are expected from opioids. He was intubated for more than 12 hours due to respiratory failure and received 1600 mcg of naloxone in the emergency department. Urine toxicology screen obtained in hospital was positive for cocaine, amphetamine, cannabis and benzodiazepines. From comprehensive toxicology testing through PRISE Program, the fentanyl analogue acetylfentanyl, along with 4-ANPP, were detected in the patient's urine. Fentanyl was also detected in the urine, but it was administered medically.

Two months after the first detection, a cluster[8] of 4 patients with acetylfentanyl poisoning was confirmed approximately 10 km away. One patient (aged late 20s male, case 1) inhaled what he thought was cocaine at a friend's place then developed coma and had respiratory depression requiring naloxone infusion and ICU admission at a Sydney hospital. Within the same week, another patient (late teen female, case 2) presented to the same hospital as she collapsed after having a drink

at a brothel where she worked. She was comatose and had respiratory depression and constricted pupils in keeping with opioid toxidrome. Acetylfentanyl was detected in blood and urine of these two patients although their exposures were from different venues and events. An additional two cases were identified and confirmed the presence of acetylfentanyl after active surveillance through the hospital toxicology services. The third case (aged early 20s female) was case 2's colleague who also had respiratory depression after having a drink at the same venue and presented to the same hospital 3 days prior to case 2. The fourth case (aged mid 30s male) is case 2's client who collapsed after using cocaine and drinking alcohol. He had a cardiac arrest and died at the scene during the same hour at the same brothel as case 2. Acetylfentanyl was confirmed in both additional cases. These four cases were from 2 incidents which occurred at locations 1 km apart and presented to the same hospital within 1 week. It was concluded that acetylfentanyl adulterated cocaine or was misrepresented as cocaine. The source of substance was unknown. Multiple harm minimisation measures were implemented in this cluster. Site inspection, education about opioid poisoning and emergency management, and ensuring a drug free workplace were implemented at the brothel. Naloxone was made available at the venue and other similar businesses. The NSW Ministry of Health issued public drug warning, media release and clinician safety alert after the incident. Another patient (aged late 20s male) with acetylfentanyl poisoning after using cocaine was confirmed 2 months after this cluster. Adulterated stimulants, in particular cocaine with acetylfentanyl, have been reported in other countries including the USA.

LSD in cocaine

Four men aged in their 20s nasally insufflated a line of white powder purchased from overseas via internet which they thought was cocaine. Patients experienced hallucinations, dissociation and sedation which were inconsistent with the effects of cocaine. One patient required intubation. These patients presented to two hospitals in Sydney. The LSD concentrations in blood were 0.01-0.07mg/L which is much higher than the highest concentration previously detected at FASS (0.001mg/L). Some other substances were detected but not which would explain the cluster. The testing of the white powder associated with these patients returned 93% LSD, with no other substances detected.[9]

A centralised investigation and response led by the PRISE team produced an informed risk assessment and fast system response. Inter-agency collaboration between toxicology services, NSW Ministry of Health, PIC, two laboratories at FASS, two police area commands was essential to investigate the ongoing public health risk. These improved the understanding of the exposure history and source, and extensive toxicological analytical testing clarified the substance and concentrations responsible for this otherwise unexplained cluster. Additional case finding was sought through the PIC and toxicology services across the state, FASS, police and the NSW PHREDSS system. No further cases were identified prior or in the following two months. There were no further reports of similar cases.

Pentobarbitone suicide

A late teen male patient was found comatose by family. His missing medications included sertraline 300 mg, citalopram 120 mg, metoclopramide 40 mg, paracetamol 4 g and risperidone 3 g. He had been talking about wanting to make himself taller and increase muscle mass. A substance known as MK-677 was also found in his room. The patient remained comatose without sedation for 5 days which was not in keeping with the medication and substance found at the scene. Urine drug screen was positive for benzodiazepines and opiates; however this could not explain prolonged sedation for 5 days. Noting that the UDS performed could not detect barbiturates. Barbiturate poisoning was anticipated but only phenobarbital concentration was available through routine send-away toxicology testing (the laboratory noted some potential cross-reactivity with other barbiturates). Phenobarbital concentration from the presenting blood sample was negative. Comprehensive toxicology testing including pentobarbital concentrations at FASS was urgently organised through PRISE Program. Blood pentobarbital concentrations were 91 mg/L, 56 mg/L and 19 mg/L on day 1, day 3 and day 5 respectively. Detection of pentobarbital concentration in this patient confirmed the cause of prolonged coma. It contributed to clinical management and further investigation. The patient was extubated on hospital day 6. He admitted to being advised to use pentobarbitone as a suicide option via an online platform. He subsequently purchased the substance from the dark web and drank it. He received mental health treatment after being medically clear. The Chief Psychiatrist at NSW Ministry of Health was informed about the case and the upward trend of deaths and suicidal attempts in young patients for consideration of further harm minimisation measures.[10]

A month later, there was another confirmed pentobarbital suicide in a woman aged mid 20s in another hospital in Sydney. Her presenting blood pentobarbital concentration was 33.6 mg/L. Pentobarbital was also confirmed from viscous liquid contained in 2 syringes brought in with the patient. Pentobarbital analysis was not a routine analysis in the hospital. The experience from the first case assisted in the sample transfer and analysis of the second case.

Caffeine poisoning in an amphetamine user

A man in his early 20s ingested what he thought was amphetamine powder diluted in water. He had nausea, vomiting and tremor an hour later and presented to a small hospital outside Sydney. He was hypotensive, tachycardic and tachypneic on arrival. Initial laboratory results revealed hypokalaemia, respiratory alkalosis and lactic acidosis. His presentation was inconsistent with amphetamine intoxication. It was initially thought to be salicylate poisoning so urinary alkalinisation was initiated in addition to other supportive care. Other differential diagnoses included poisoning from agents with beta-2 agonist effects i.e. theophylline and caffeine. However, both salicylate and theophylline concentrations were negative. Caffeine assay was unavailable locally. The patient was transferred to a tertiary hospital for ICU admission, intubation and hemodialysis. His blood caffeine concentration was confirmed to be very high at 70 mg/L through PRISE Program. The leftover product brought in by his family was confirmed to contain 98 percent caffeine. The detection was confirmed while the patient was in the intensive care unit. The result was advised to both the treating clinician and the patient. The patient reported buying the substance on the street which contradicted the initial history provided by a relative that the product was from overseas and was obtained online. The patient appreciated being informed about the product that had risked his life. He was referred to follow up support for his depression and substance use issues with a local community clinic.

Benzhexol misuse

A man aged in his early 40s presented to a hospital in Sydney with an extended period of anticholinergic delirium and sedation. His GCS was 10. He admitted taking benzhexol which could explain anticholinergic delirium with dilated pupils, agitation, myoclonus and urinary retention but the effects at 48 hours were unusually long-lasting. He required unusually large doses of antidote including 8 vials (16 mg) of physostigmine, and rivastigmine patches, to control his toxicity. The treating clinical toxicologist suspected he might have used a long-acting benzodiazepine or unusual substances. Benzhexol was the only substance confirmed in the admission blood sample, at an unusually high concentration of 0.65mg/L which supported the large benzhexol burden in his body that could explain prolonged effects in this patient. The detection is helpful for clinicians to prepare and use higher doses of antidotes such as physostigmine when the clinical manifestation is convincing for a particular substance.

Methanol poisoning from methylated spirits

In early 2020 a 49 year old woman presented to a Sydney hospital unconscious. She had a high anion gap metabolic acidosis with a high osmol gap. Her salicylate concentration was low and ethanol concentration was zero. She was started on ethanol infusion about 2 hours after admission and quickly commenced on dialysis. Toxic alcohol screen was sent and returned results in 12 hours with a very high methanol concentration of 180 mmol/L. Metabolic derangements largely improved over 36 hours of continued dialysis and ethanol infusion. Cerebral function did not improve, and the patient remained intubated and ventilated with no cerebral activity discernible clinically. Repeated neuroimaging showed global hypoxic ischemic injury. She did not make any recovery and was declared dead 5 days later. The patient had a history of drinking methylated spirits and her family brought in bottles from home of a commercially available methylated spirits product; these normally do not contain a significant concentration of methanol. On testing of the product, it was found to contain >60% methanol. An alert was sent to the LHDs, for ED clinicians, to warn of the potential for methanol poisoning in patients drinking methylated spirits, and the importance of additional investigations to assess for this. This was notified to the Pharmaceutical Regulatory Unit, NSW Ministry of Health with further investigation undertaken. Further testing of the commercial products could not find any other bottles containing similar methanol concentrations. As it was a single case with no further evidence of high methanol concentrations in other samples, no further action could be taken in relation to the product itself.

Edible cannabinoids

In March 2021, police seized substances resembling commercially marketed lollies were found to contain THC, this included confectionary which looked like Skittles and Nerds Rope products. Labelling indicated these contained up to 800 mg of THC for some. These were legitimate products in some parts of the USA. The packaging was very similar to confectionery products which are appealing to children and included popular themes, e.g., Star Wars. A clinician safety information was released. No reports of toxicity in children were made regarding these specific products seized, however multiple reports of toxicity in children accidentally consuming THC "gummies" were made. This included a young boy who consumed 5-6 THC containing gummies after finding them in the fridge and asking his dad if he could have them, his dad complied thinking they were normal lollies and not aware that they were the mother's THC-containing gummies. The boy had reduced GCS, initially GCS=11 and fluctuation, with initial tachycardia which settled quickly. He was otherwise hemodynamically stable but required overnight admission in HDU for observation and monitoring. He improved and was discharged. His UDS detected cannabinoids. Another case involved a young boy who found a pack of THC containing 'sour worm' lollies in his parent's vehicle. He initially reported eating but then subsequently denied it and there was lack of clarity on whether he did ingest the lollies. He was observed in the emergency department for 4 hours and remained asymptomatic. This is an ongoing issue which continues to be monitored.

Heroin in cocaine

In early 2021, a cluster was detected in greater Sydney of patients who presented with opioid toxicity following the use of what they believed to be cocaine. Over the course of 2021, heroin contaminating cocaine or heroin misrepresented as cocaine was implicated in 19 presentations with varying severity of opioid toxicity, including treatment in the emergency department or ICU, and death. In the first case presented to a Sydney hospital in March 2021, they used a white powder they believed to be cocaine as well as alcohol and alprazolam. Later in the evening they used more 'cocaine', this time from a new batch. After this, they had decreased GCS and hypoxia requiring intubation and ICU admission. The 2 bags of white powder were obtained and tested, the first contained cocaine (purity not tested) and the second contained heroin (purity not tested). Biological samples from the patient had cocaine metabolites, codeine and morphine detected. There was a further individual patient and group of 3 friends who presented to a hospital in metropolitan Sydney with severe opioid toxicity after using cocaine. In all of these cases the patients had used what they believed to be cocaine but testing of biological samples detected codeine and morphine and no cocaine or cocaine metabolites. Following the discovery of these cases the Standing Panel on Toxicity Risk was convened and advised the release of a public drug warning and clinician safety notice which were issued on 14 May 2021.

Further presentations were then reported from other inner Sydney hospitals. Contaminated cocaine was implicated in the presentation of 4 patients to a Sydney hospital over 4 weeks, 2 of whom required intubation and ICU admission and the other 2 died. In all 4 cases, testing identified cocaine metabolites and heroin metabolites. This prompted release of a further public drug warning which was issued on 23 June 2021.

A further cluster of 6 patients who used the same substance presented to a hospital in metropolitan Sydney with opioid toxicity. 1 required retrieval and ECMO, 1 required intubation and admission to ICU, the other 4 required treatment in the emergency department. This was another incidence of the patients using cocaine, then sourcing a second batch of 'cocaine' later in the night and subsequently suffering opioid toxicity. The second bag of cocaine was tested, and it was found to be heroin 33.5% purity.

Following this there were a further 4 cases over the remainder of 2021 reported to PRISE, which were confirmed on toxicology testing. All 4 required ICU admission and in all 4 cases cocaine contaminated with heroin was implicated.

This highlights the harms related to stimulants contaminated with sedative drugs such as heroin, or sedative drugs such as heroin being sold as cocaine, and that this has remained an issue across NSW throughout 2021.

LSD in Ice Drops breath freshener

In late 2019, a cluster of 7 high school children presented to a rural emergency department with unusual behaviour and hallucinations requiring transfer to a tertiary hospital. The history of consumption was 1 drop each of Ice Drops Mint Breath Drops, a commercially marketed retail product. Urine drug screens were negative for cannabis, cocaine, benzodiazepines and amphetamines. Toxicology testing of urine in all 7 identified LSD only, which matched the toxidrome. The product was obtained but a decision not to test was made. The investigation identified that the product was strongly suspected to have been deliberately adulterated.

Sodium nitrite suicides

A cluster of suicides was reported to PRISE in early 2020. The reported substance was sodium nitrate/ nitrite, a novel substance for deliberate self-harm which had been under investigation by the NSW PIC following increasing numbers of cases in 2019. Toxicology analysis has not been possible in NSW, although the case history is usually available. A joint investigation between the Poisons Information Centre and Ministry of Health using the National Coronial Information System to assist with surveillance is ongoing.[11,12,13]

Public health interventions included issuing alerts to clinicians and coroners. Providing information to support product rescheduling and enforcement, surveillance of online retailers and reporting to regulators and online marketplaces. A directive was issued to increase antidote stocking of methylene blue across NSW hospitals and to store in the Emergency Department (ED) and issuing of clinical guidelines. Education has been incorporated into hospital training e.g. ED teaching and hospital grand rounds. Proposals to NSW Ambulance to stock methylene blue and to update protocols for toxic cardiac arrest were made but were not enacted. As well as advocacy to the eSafety commissioner and police intervention on websites and social media promoting use through collaborations with Mental Health Branch, NSW Chief Psychiatrist and NSW Police Force. Lessons learnt regarding managing these cases have also been communicated in clinical journals to increase awareness.[14]

Section 5:
Outputs and Outcomes

Outputs

The outputs of the PRISE Program include enhanced interdisciplinary collaboration, extended toxicology testing results, a maintained database of severe and unusual cases and clusters of toxicity, drug alerts, media releases, de-identified reports, and updates to key stakeholders on findings/trends and subsequent actions.

The PRISE Program facilitates extended toxicology testing performed at FASS with the provision of preliminary and final results. Individual patient results are shared with the treating clinicians who then report to patients as appropriate. The results are also uploaded to the patient's electronic medical record (eMR). The incorporation of the eOrder at specific sites has helped in simplification of this process and made results more readily accessible for clinicians.

Follow up and testing of patients as part of PRISE contributes to the continuously updated database. This provides a database of clinically relevant cases of severe or unusual toxicity in NSW and the clinical and demographic information for these cases.

Public drug warnings are developed in consultation with appropriate stakeholders and are disseminated publicly via NSW Health website and circulated to key partners in NSW. These are shared with interjurisdictional and federal partners as appropriate; this includes the prompt response network (PRN) which is a newly established network through NCCRED (National Centre for Clinical Research on Emerging Drugs) with intended function as an early warning system by facilitating facilitating collaboration across jurisdictions to implement necessary changes to reduce the risks related to emerging substances. Media releases are prepared to accompany public releases of information which are intended to be shared widely. In some cases there was significant media uptake and interviews undertaken by appropriate clinicians including the medical director of NSW PIC. Clinician safety notices are also released, where appropriate, for clinician focused information on detections of concern. The decision to release public information and/or clinician specific information is dependent on the harm identified. During the period of this report, the results from the PRISE Program operations have led to the development and release of 11 public drug warnings and 8 clinical safety advisories (Appendix). The detections from the PRISE Program have been shared with relevant organisations, interstate, national and international platforms.

Following on from this report there will be regular reporting of findings of PRISE and trends that are being seen.

Throughout the consultation process and release of drug warnings, local teams involved implement local interventions as required. For example, during the consultative process surrounding the severe opioid toxicity seen in patients having used what they believed to be cocaine, local AOD (alcohol and other drugs) teams facilitated increased take-home naloxone distribution. Other such localised responses are encouraged during the consultative processes.

Outcomes

The PRISE Program has enhanced clinical risk assessment, management and prognostication in patients with acute and severe toxicity. Knowing the type of drugs and their respective concentrations is helpful for clinicians to evaluate the causal relationship between the patient's clinical presentation and drugs detected in their bodies. It also suggests the expected duration of toxicity and potential specific treatment, the so-called 'antidote' in some cases. The PRISE Program offers timely access and logistic support for comprehensive toxicology testing performed at FASS with rapid turnaround time determined by clinical status (**Table 2**). If the patient is in a critical condition, the clinician will be able to receive the preliminary result within 2 business days, compared to 4 weeks which is the time taken under the conventional pathway.

These benefits to inpatient management from the PRISE Program were highlighted in the program's pivotal role in detecting lysergic acid diethylamide (LSD) in the substance sold as cocaine, as well as the confirmation of pentobarbitone in a patient who presented with coma after ingesting an unknown substance purchased from a dark web.

Because FASS receives funding from the Ministry of Health for work on the PRISE Program this has allowed increasing work and development within FASS. The work that FASS undertakes as part of the PRISE Program has led to increased engagement and capacity building of staff at FASS.

The PRISE Program has provided rapid identification of substances associated with severe toxicity, which have the potential for significant public health impact, and where risk may be improved by timely public health responses. One such example was seen in the identification of stimulant adulteration with acetylfentanyl which resulted in one death, and three patients with severe toxicity were confirmed by PRISE Program. The detection led to timely public health interventions, including site inspection, provision of take-home naloxone at the premises, prompt education to staff and early dissemination of information to clinicians.

Death and drug-related harms at music festivals have become a public health focus since 2018. The PRISE Program has been the essential pathway to identify drug types in patients who became critically unwell or died after attending music festivals.

The PRISE Program has identified emerging trends on acute recreational and/or illicit substance poisonings and informed public health response. This has included 25C-NBOMe, etodesnitazene, 2,4-dinitrophenol (DNP), etizolam and carfentanil. These findings have been discussed at the music festival stakeholder meetings, and have enhanced ongoing harm minimisation measures and medical services at music festivals.

Section 6:
Limitations and Future Direction

Although the PRISE Program is still in its infancy, it has expanded its operations rapidly. However, there is an imbalance between its original proposal, current resources, and the rate of growth. Some of the functioning of the program is quite labour-intensive, and this consequently imposes some limitations on future growth.

The PRISE Program end-to-end process from case notification to public health response is multidisciplinary and quite labour intensive. It involves substantial investments of time from the PRISE team member involved with the treating team, local laboratories around NSW and FASS to obtain the correct documentation and specimens for testing and get these to FASS to be analysed. This also requires the engagement of treating clinicians and perception of this as a worthwhile program, as testing serves a greater public health purpose rather than directly impacting the individual patient's care in many cases. The streamlining of this process has been started through building the PRISE test request function into the electronic medical record, so clinicians can place the order like other conventional tests. The PRISE Program implemented a pilot site at Western Sydney LHD and built a PRISE eOrder. The lessons learned from using this eOrder system have led to further implementation at hospitals in Nepean Blue Mountains LHD, South Western Sydney LHD and Sydney LHD. The plan is to continue to expand this to achieve state-wide PRISE eOrdering with integration of sample transport into the existing system.

The success of testing results is dependent on a sample being made available for testing, and there are a number of challenges in this process. For FASS extended toxicology testing, a blood sample in EDTA tube and a urine sample are the specimens tested. The timing of collection of specimens after the substance was taken by the patient is important in detections, in most instances for patients presenting to the emergency department with severe symptoms, blood samples will be taken for an array of routine clinical testing, so the appropriate blood sample is often available and taken soon after presentation.

However, urine samples are not routinely taken and can be more difficult to obtain, so this is often not available which limits testing capacity. The amount of blood and urine available can limit how much testing can be done and how many additional substances can be analysed for; often there are only small volumes of blood and/or urine which can be challenging. The time requirements for the analysis performed at FASS also poses a limitation to how quickly results can be reported. FASS have been developing a new ExpressTox Quant, which will significantly decrease the time required for analysis and also allow it to be performed on smaller volumes of sample which will see a significant improvement in the efficiency of analyses undertaken.

The interim PRISE Program database is maintained via an excel spreadsheet, hosted in the secure record management system in the Ministry of Health. Because the PRISE Program continues to evolve there are changes required in the way data is inputted and the coding of information captured, which will improve the function of the database and aid the ability to obtain information from it. The ultimate plan for the PRISE Program database is to be incorporated with the NSW PIC database, which is a platform approved for patient care. The requirements for this are currently being reviewed with a plan to move to the new database system in late 2023; this is part of national harmonisation of Poisons Information Centre's databases as well datasets maintained by the Emerging Drugs Network of Australia, to improve toxicosurveillance in NSW and across Australia.

Future direction of the PRISE Program includes ongoing developments as discussed above to streamline processes and expand the capacity of identification, testing and detection of substances implicated in unusual and severe toxicity and their trends. It also includes expanding collaboration with national groups – the Prompt response network (PRN) and the Emerging Drugs Network of Australia (EDNA) – to further enhance early warning systems with sharing of information and the required public health response.

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- Australian Industrial Chemicals Introduction Scheme
- Centre for Alcohol and Other Drugs, NSW Ministry of Health
- Centre for Epidemiology and Evidence, NSW Ministry of Health
- Clinical Toxicologists, Nepean Hospital
- Clinical Toxicology, Pharmacology and Addiction Medicine, St Vincent's Hospital,
- Clinicians from across NSW Health
- Department of Drug Health, Sydney Local Health District
- Department of Toxicology, South Western Sydney Local Health District
- Department of Toxicology, Western Sydney Local Health District
- Drug & Alcohol Clinical Services, Hunter New England Local Health District
- Emergency Care Institute, Agency for Clinical Innovation
- Emerging Drugs Network of Australia
- Forensic & Analytical Science Service, NSW Health Pathology
- Health Protection NSW
- Hunter Area Toxicology Service, Calvary Mater Hospital
- Medically Supervised Injecting Centre
- NSW Ambulance
- NSW Coroners Court
- NSW Poisons Information Centre
- NSW Police Force
- NSW Public Health Units
- NSW Users and AIDS Association
- Prompt Response Network, National Centre for Clinical Research on Emerging Drugs
- South Eastern Area Toxicology Service, South Eastern Sydney Local Health District
- Specimen Reception and Sendaways staff at NSW Health Pathology
- Therapeutic Goods Administration

References

1. Australian Institute of Health and Welfare. National Drug Strategy Household Survey 2019. Canberra (AU): Australian Institute of Health and Welfare; 2020. 104 p. Available from: https://www.aihw.gov.au/reports/illicit-use-of-drugs/national-drug-strategy-household-survey-2019/contents/summary/ DOI: 10.25816/e42p-a477
2. Penington Institute. Australia's Annual Overdose Report 2021. Melbourne (AU): Penington Institute; 2021. 167 p. Available from: https://www.penington.org.au/wp-content/uploads/Australias-Annual-Overdose-Report-2021.pdf/
3. Chrzanowska A, Man N, Darke S, Degenhardt L, Farrell M, Moran L, Peacock A. Unintentional and intentional drug poisoning deaths, Australia, 2012–2016: Drug pattern profile and demographic characteristics. Drug and alcohol dependence. 2021 Dec 1;229:109112
4. Black E, Govindasamy L, Auld R, McArdle K, Sharpe C, Dawson A, Vazquez S, Brett J, Friend C, Shaw V, Tyner S. Toxicological analysis of serious drug-related harm among electronic dance music festival attendees in New South Wales, Australia: a consecutive case series. Drug and alcohol dependence. 2020 Aug 1;213:108070.
5. State Coroner's Court of New South Wales. Inquest into the death of six patrons of NSW music festivals. Lidcombe (AU): State Coroner's Court of New South Wales; 2019. 179p. Available from: https://coroners.nsw.gov.au/documents/findings/2019/Music_Festival_Redacted_findings_in_the_joint_inquest_into_deaths_arising_at_music_festivals_.pdf
6. Barthwell AG. Clinical and public health considerations in urine drug testing to identify and treat substance use. Substance Use & Misuse. 2016 May 11;51(6):700-10.
7. Reisfield GM, Goldberger BA, Bertholf RL. 'False-positive' and 'false-negative' test results in clinical urine drug testing. Bioanalysis. 2009 Aug;1(5):937-52.
8. Perananthan V, Tremonti C, Nash E, Jiranantakan T, Dawon AH. Rapid detection, toxicosurveillance and public health response to stimulant adulteration with acetyl fentanyl. The Medical Journal of Australia. 2021 May, 214(1).
9. Roberts DM, Premachandra KH, Chan BS, Auld R, Jiranantakan T, Ewers C, McDonald C, Shaw V, Brown JA. A cluster of lysergic acid diethylamide (LSD) poisonings following insufflation of a white powder sold as cocaine. Clinical toxicology. 2021 Nov 2;59(11):969-74.
10. Campbell G, Darke S, Zahara E, Duflou J, Shand F, Lappin J. Trends and characteristics in barbiturate deaths Australia 2000-2019: a national retrospective study. Clinical toxicology. 2021 Mar; 59(3):224-30.
11. Brown JA, Berling I, Jiranantakan T, Buckley NB, Dawson A. Collaborative public health responses to suicide prevention: sodium nitrite. Oral presentation at TAPNA 11-13 May 2022, Newcastle. Abstract published in Toxicology Communications, 6:1, 102-120, DOI: 10.1080/24734306.2022.2118475
12. Brown JA, Berling I, Jiranantakan T, Buckley NB, Dawson A. Monitoring (and responding) to emerging deliberate self-poisoning trends: sodium nitrite. Oral presentation at FACTA 10-13 April 2022, Brisbane.
13. Brown J, Berling I, Jiranantakan T, Buckley NB, Dawson A. Toxicovigilance for suicide prevention following Internet promotion of sodium nitrite. Oral presentation at Virtual Pre-Conference Global Injury Prevention Showcase 22-26 March 2021. Abstract published in Injury Prevention 2021;27:A18.
14. Rosenbaum E, Bode MJ, Roberts DM. Death from severe, refractory methaemoglobinaemia: A case report to illustrate an increasingly frequent manifestation of deliberate self-poisoning. Emerg Med Australas. 2022 Aug;34(4):654-655.

Appendix

Public Drug Warnings released in response to detections through PRISE program

Title	Date of publication
Counterfeit alprazolam	December 2019
Dangerous Drug Alert Acetyl-Fentanyl-and-Illicit Fentanyl	February 2020
Counterfeit alprazolam	July 2020
Cocaine or ketamine may contain dangerous opioids fentanyl and acetylfentanyl	October 2020
Cocaine may contain the dangerous opioids fentanyl and acetylfentanyl	November 2020
Heroin may contain the dangerous opioids fentanyl and acetylfentanyl	November 2020
Heroin may contain fentanyl, a dangerous opioid	January 2021
Cocaine found to contain strong opioids	May 2021
Increases in severe overdoses from cocaine found to contain opioids	June 2021
'MDMA (ecstasy)' powder found to contain: 25C-NBOMe (a hallucinogen) and 4-fluoroamphetamine	July 2021
Cocaine found to contain other dangerous substances – heroin and large amounts of lidocaine	August 2021

Clinician safety advisories released in response to detections through PRISE program

Title	Date of publication
Carfentanil Safety Alert	December 2019
Acetylfentanyl Clinical Alert	February 2020
Illicit supply of counterfeit alprazolam	July 2020
Acetylfentanyl and fentanyl in non-opioid illicit drugs	October 2020
Heroin and cocaine containing fentanyl and acetylfentanyl	November 2020
Illicit cocaine containing strong opioids	May 2020
25C-NBOMe toxicity in patients who used powder thought to be MDMA	July 2021
Illicit cocaine containing high levels of lidocaine (lignocaine)	August 2021

NSW Health