



IN THE CORONERS COURT
OF VICTORIA
AT MELBOURNE

Court Reference: COR 2016 2730

FINDING INTO DEATH WITHOUT INQUEST

Form 38 Rule 60(2)

Section 67 of the Coroners Act 2008

I, AUDREY JAMIESON, Coroner having investigated the death of SAMUEL JACK MORRISON

without holding an inquest:

find that the identity of the deceased was SAMUEL JACK MORRISON

born 21 November 1991

and the death occurred on 17 June 2016

at 9 Gildan Court, Hoppers Crossing Victoria 3029

from:

1 (a) COMBINED DRUG TOXICITY (HEROIN, BENZODIAZEPINE AND OTHERS)

Pursuant to section 67(1) of the **Coroners Act 2008**, I make findings with respect to **the following circumstances:**

1. Samuel Jack Morrison was 24 years of age at the time of his death. Mr Morrison lived in Hoppers Crossing with his father Jeffrey Morrison and one of his brothers, Luke Morrison. He was known to use illicit substances, including heroin. Mr Morrison also suffered from anxiety and depression.

2. At approximately 10.30am on Friday 17 June 2016, Mr Morrison was located by his brother, Luke; he was on his bed and there was a blood filled syringe next to him. Luke contacted emergency services. He also moved Mr Morrison onto the floor and commenced cardiopulmonary resuscitation (CPR). Ambulance paramedics arrived shortly afterwards but were unable to render assistance. Mr Morrison was declared deceased. Police were also in attendance.

INVESTIGATIONS

Forensic pathology investigation

3. Dr Khamis Almazrooei, Forensic Pathology Registrar at the Victorian Institute of Forensic Medicine, supervised by Senior Forensic Pathologist Dr Malcolm Dodd, performed a full post mortem examination upon the body of Mr Morrison, reviewed a post mortem computed tomography (CT) scan and medical records from Westgate Medical Centre, and referred to the Victoria Police Report of Death, Form 83. At autopsy, Dr Almazrooei identified heavy oedematous lungs with mixed inflammatory infiltrate.
4. Toxicological analysis of post mortem substances detected the presence of 6-monoacetylmorphine, morphine, codeine,¹ citalopram,² diazepam and its metabolites nordiazepam, temazepam and oxazepam,³ and methylamphetamine.⁴ These results were consistent with the recent use of heroin. Dr Almazrooei noted that heroin and morphine are depressants of the central nervous system (CNS), causing a reduced rate and depth of breathing and may cause cessation of the breathing reflex. In addition, there is an additive CNS depressive effect with concurrent use of other CNS depressant drugs, such as benzodiazepines and antidepressants, which may increase the risk of death.

¹ Heroin is an illegal drug produced from morphine obtained from the opium poppy. Within minutes of injection into a person, heroin is converted to morphine via the intermediate compound 6-acetyl morphine (6-AM). Morphine is the principal form detected in blood, although 6-AM may be detected in urine for about six hours of an injection and in blood only for a short time. 6-AM is not always present in the urine of recent heroin users. Heroin and morphine are depressants of the CNS, causing reduced rate and depth of breathing and eventually cessation of the breathing reflex. Multiple use of drugs that also depress the CNS, such as alcohol, benzodiazepines and morphine-like drugs (opiates/opioids) will increase the risk of death. The presence of a small amount of codeine in blood, urine or other tissues of morphine positive cases is consistent with its presence from the use of heroin, in which it is a contaminant. However, the use of codeine cannot be excluded.

² Citalopram is a selective serotonin reuptake inhibitor with antidepressant activity.

³ Diazepam is a sedative/hypnotic drug of the benzodiazepines class.

⁴ Amphetamines is a collective word to describe CNS stimulants structurally related to dexamphetamine. One of these, methamphetamine, is often known as 'speed' or 'ice'. Methamphetamine is a strong stimulant drug that acts like the neurotransmitter noradrenaline and the hormone adrenaline.

5. Dr Almazrooei ascribed the cause of Mr Morrison's death to combined drug toxicity involving heroin, benzodiazepine and others.

Police investigation

6. Upon attending the Hoppers Crossing premises after Mr Morrison's death, Victoria Police did not identify any signs of third party involvement. A number of used and unused syringes were located throughout the bedroom. There was also a packet of escitalopram 20mg tablets; 23.5 out of 28 tablets remained.
7. Detective Senior Constable Daniel Blake, the nominated coroner's investigator,⁵ conducted an investigation of the circumstances surrounding Mr Morrison's death, at my direction, including the preparation of the coronial brief. The coronial brief contained, *inter alia*, statements made by Mr Morrison's father Jeffrey Morrison, brother Luke Morrison, General Practitioner at Westgate Medical Centre Dr Firas Al-Jabbari, Senior Consultant Psychiatrist Dr Samir Ibrahim and Clinical Psychologist Dr Matthew Berry.
8. In the course of the investigation, police learned that Mr Morrison had a long history of illicit drug use and mental ill-health. Jeffrey Morrison stated that his son was a long term drug user, and was known to use 'ice' and heroin.
9. General Practitioner Dr Firas Al-Jabbari stated that Mr Morrison was a patient at Westgate Medical Centre from 2006. Mr Morrison was reviewed several times at the clinic for issues relating to mental illness and drug use. Since 2014, he had attended 14 appointments. Dr Al-Jabbari stated that 11 of these consultations related to mental health and drug use issues. Mr Morrison was under the care of a drug clinic in Altona Meadows, and was on their suboxone program. Dr Al-Jabbari said he was referred to multiple psychiatrists and psychologists during the last two years of his life.
10. Jeffrey Morrison noted that his son had struggled following the death of a close friend from a drug overdose in mid-2015. At around this time, Mr Morrison was referred to Clinical Psychologist Dr Matthew Berry. The first of their five appointments took place on 27 June 2016. Dr Berry reported that Mr Morrison presented with some suicidal ideation, however there were no signs or symptoms of impending risks. He was highly anxious, ambivalent about his substance use and quiet depressed. Dr Berry opined that Mr Morrison's depression

⁵ A coroner's investigator is a police officer nominated by the Chief Commissioner of Police or any other person nominated by the coroner to assist the coroner with his/her investigation into a reportable death. The coroner's investigator takes instructions direction from a coroner and carries out the role subject to the direction of a corner.

and anxiety were primarily psychological in origin, relating to the death of his friend and his sexuality. Mr Morrison's fourth appointment with Dr Berry was on 23 July 2015.

11. Senior Consultant Psychiatrist Dr Samir Ibrahim stated that Mr Morrison was admitted to the Wyndham Clinic on 9 November 2015 for drug dependence issues. He underwent four weeks of drug detoxification and was subsequently transferred to the general psychiatric ward for assessment and management of his depression.
12. Dr Ibrahim first met Mr Morrison on 9 December 2015. Dr Ibrahim noted that Mr Morrison had a long history of chronic depression and substance abuse. He had undergone numerous detoxification attempts and rehabilitation inpatient admissions, but invariably relapsed. Mr Morrison reported to Dr Ibrahim that he had been depressed and anxious since the age of 12 or 13. Dr Ibrahim was aware that Mr Morrison had endured a few accidental drug overdoses over the years.
13. On 14 January 2016, Mr Morrison was discharged from hospital, into the care of his mother, after conceding he had used heroin on the premises. Mr Morrison was referred to a Crisis Assessment and Treatment (CAT) Team and a private psychiatrist.
14. Dr Berry stated that Mr Morrison made contact with him in early 2016. Mr Morrison was hoping to talk about his grief regarding the death of his close friend, as his inpatient admissions had focused primarily on physical rather than psychological treatments. Their fifth and final appointment took place on 11 March 2016. Dr Berry stated that Mr Morrison spoke more openly at this appointment about his grief. He said Mr Morrison appeared quite relieved to recognise that relapsing into substance use was strongly influenced by psychological issues.
15. Dr Ibrahim noted that he saw Mr Morrison on 7 April 2016, at his rooms in Sydenham. Mr Morrison attended this appointment with his father, and expressed a desire for readmission to a detoxification program and subsequent rehabilitation.
16. On 27 April 2016, Mr Morrison was again admitted to the Wyndham Clinic for drug detoxification, and subsequently transferred to the general ward on 25 May 2016. Dr Ibrahim reported that Mr Morrison expressed sadness relating to a number of matters. After signing an informed consent form, Mr Morrison began an electroconvulsive therapy (ECT) course. At an appointment on 7 June 2016, after receiving a second ECT treatment, he reported feeling better. Dr Ibrahim described Mr Morrison as optimistic about the future at this time. Nursing notes over different shifts reported he had a good mood and 'nil' suicidal thoughts. Dr Ibrahim

noted that Mr Morrison's behaviour on the ward was changing and becoming more elevated and active; some of the co-patients were concerned he was using illicit substances.

17. On 13 June 2016, Mr Morrison was asked about whether he was using drugs. Dr Ibrahim stated that Mr Morrison admitted using 'ice' which was provided by friends 'over the fence'. Mr Morrison's mother was called and he was discharged pursuant to an agreement he had signed upon admission. Dr Ibrahim noted that Mr Morrison was provided escitalopram medication upon discharge, and advised to call his rooms for an urgent appointment.
18. On 14 June 2016, Mr Morrison telephoned Dr Ibrahim to request an appointment. Dr Ibrahim understood he was using drugs. Mr Morrison was provided an appointment on the afternoon of 16 June 2016.
19. Dr Al-Jabbari stated that he last saw Mr Morrison on 14 June 2016. He attended the appointment with his mother and advised that he was craving alcohol and drugs, and wanted a diazepam prescription to assist his withdrawal symptoms. Dr Al-Jabbari said that Mr Morrison conceded he had started using 'ice', heroin and marijuana again. He also wanted a prescription for his regular anti-depressants. Dr Al-Jabbari stated that he issued the prescription for escitalopram 20mg, and rejected his request for diazepam. He also advised Mr Morrison to book an appointment with his psychiatrist as soon as possible, and return for a review if needed.
20. Jeffrey Morrison stated that he was concerned for his son's health on 15 June 2016, and he was taken to hospital by ambulance for observation. Mr Morrison was discharged the next day.
21. On 16 June 2016, Dr Ibrahim received a phone call from Jeffrey Morrison, apologising that his son had left the house half an hour prior to the scheduled appointment time, and refused to attend. They agreed to try for another appointment when he returned.
22. At approximately 1.30am on Friday 17 June 2016, Jeffrey Morrison went to Mr Morrison's room to say goodnight. Mr Morrison was seated at the end of his bed, watching television. Jeffrey Morrison reported that he seemed alright at this time.

Further correspondence

23. By way of correspondence dated 17 December 2016, Mr Morrison's mother Sally-Ann Morrison provided further information to the Court. Ms Morrison stated that her son had initially suffered from mental ill-health and that he used alcohol and drugs to numb his pain.

24. Ms Morrison reported that her son had variously been treated by facilities including Sober Living House in Carnegie, Essendon Private Hospital, Malvern Private Hospital and the Royal Melbourne Hospital, in addition to the Wyndham Clinic. She noted that Mr Morrison was able to access drugs in these environments, by friends who visited. Ms Morrison lamented that her son would invariably be discharged when he was found to be using drugs, but that the facilities' systems had allowed the drugs to enter in the first place.
25. Ms Morrison stated that after every discharge, her son would 'go on a binge' due to his disappointment and shame. She added that he was at significant risk of overdosing during these periods, and on a number of occasions his family had called an ambulance. Ms Morrison also expressed concern that her son was often released too early from hospital following drug overdoses, and would return within 24 hours, following another overdose. She added that she believed that if safe injection rooms were available, Mr Morrison would still be alive.
26. Ms Morrison suggested that the conditions in rehabilitation centres should be more restrictive, with regard to internet access and visitors. She expressed concern in relation to Mr Morrison's ECT treatment in the weeks leading up to his death, and the lack of consultation with family. Ms Morrison also noted dissatisfaction with waiting times and lengthy processes to access rehabilitation centres. While Mr Morrison was covered by private health insurance, she noted that he often had to wait up to six weeks to obtain a place.

COMMENT

Pursuant to section 67(3) of the Coroners Act 2008, I make the following comments connected with the death:

Recent Coronial engagement with heroin-related harms in Victoria

1. In October 2016, Her Honour Coroner Jacqui Hawkins announced that she would hold an inquest into the death of Ms A,⁶ whose death was ascribed to global cerebral ischaemia secondary to mixed drug toxicity including a substance consistent with heroin. Ms A attended the City of Yarra regularly, particularly the North Richmond area, to purchase and use heroin; and her fatal heroin-involved overdose occurred in this area.

⁶ COR 2016 2418.

2. The impetus for Coroner Hawkins' investigation and inquest was a Coroners Prevention Unit (CPU)⁷ review of fatal heroin overdoses in Victoria for the period 2012-2015, which highlighted the burden of heroin-related mortality in the City of Yarra. The CPU advised that across the period examined, the City of Yarra had consistently been the local government area (LGA) with the highest frequency of heroin overdose deaths in Victoria. A large number of deaths occurred in a relatively well defined area, centred on Victoria Street, and surrounding streets in Richmond and Abbotsford. In 2015, 20 of the 172 fatal heroin overdoses in Victoria occurred in the City of Yarra.
3. Coroner Hawkins invited submissions from a wide range of government and non-government organisations in the lead-up to the inquest, about what could be done to reduce heroin overdose deaths in the City of Yarra. At inquest on 14 December 2016 she heard evidence from several experts in drug harm reduction. The recurring theme of the submissions and inquest evidence was that a supervised injecting centre is an essential element of any serious prevention response to heroin-related harms in the area.
4. Concurrently with Coroner Hawkins' investigation, on 8 February 2017, Member for Northern Metropolitan Fiona Patten introduced a Private Members' Bill, the *Drugs, Poisons and Controlled Substances Amendment (Pilot Medically Supervised Injecting Centre) Bill 2017* into the Victorian Parliament's Legislative Council. The Bill was referred for review to the Legislative Council's Legal and Social Issues Committee ('the Issues Committee').
5. On 20 February 2017, when Coroner Hawkins delivered the Finding pursuant to the Inquest into the death of Ms A, she recommended *inter alia* that a safe injecting facility trial be established in North Richmond, and that the availability of naloxone be expanded to people in a position to intervene and reverse opioid drug overdoses in the City of Yarra.
6. Following the publication of Coroner Hawkins's finding with recommendations, the CPU produced further data to highlight the distinctive features of fatal heroin overdose in the City of Yarra compared to other Victorian LGAs. This data confirmed that during 2016 the City of Yarra remained the LGA with the highest frequency of heroin-involved overdose deaths, and

⁷ The Coroners Prevention Unit (CPU) was established in 2008 to strengthen the prevention role of the coroner. The unit assists the coroner with research in matters related to public health and safety and in relation to the formulation of prevention recommendations, as well as assisting in monitoring and evaluating the effectiveness of the recommendations. The CPU comprises a team with training in medicine, nursing, law, public health and the social sciences.

also demonstrated that, as distinct from any other LGA, a significant majority of fatal heroin overdoses in the City of Yarra involving people who travelled from other areas to consume heroin. Additionally, a much greater proportion occurred in non-residential locations such as parks, carparks, public toilets, restaurant toilets, cars, and on streets.

7. In light of this data (an extract of which is Attachment A to this finding), I supported Coroner Hawkins' recommendations relating to safe injecting facilities and complimentary interventions in the Finding into the death of David Leslie Chapman, delivered 8 May 2017.⁸ Coroner McNamara also supported the recommendations in a redacted Finding into death without Inquest, delivered 7 July 2017.⁹
8. In September 2017, the Legal and Social Issues Committee ('Issues Committee') published its final report into the Inquiry into the Drugs, Poisons and Controlled Substances Amendment (Pilot Medically Supervised Injecting Centre) Bill 2017.¹⁰ The main body of the final report did not include any recommendations, but did include several findings that recognised the drug harm reduction potential of supervised injecting facilities.
9. On 16 October 2017, in Her Honour's Finding into the death of Skye Turner,¹¹ Coroner Hawkins noted that the Law Reform, Road and Community Safety Committee's ('Safety Committee') Inquiry into Drug Law Reform¹² was still underway. At that time, the Safety Committee had received a number of submissions highlighting the place of supervised injecting facilities among new strategies, policies and programs that should be considered to address the steady increase of fatal and non-fatal drug harms in Victoria.
10. On 31 October 2017, the Victorian Government announced its intention to trial a single Medically Supervised Injection Centre (MSIC) for two years at North Richmond Community Health and, after some debate in the Victorian Parliament, the *Drugs, Poisons and Controlled Substances Amendment Medically Supervised Injecting Centre) Bill 2017* was passed in

⁸ COR 2016 2722.

⁹ COR 2016 3735.

¹⁰ Legal and Social Issues Committee, Parliament of Victoria, *Inquiry into the Drugs, Poisons and Controlled Substances Amendment (Pilot Medically Supervised Injecting Centre) Bill 2017*, (2017).

¹¹ COR 2017 1152.

¹² Law Reform, Road and Community Safety Committee, Parliament of Victoria, *Inquiry into Drug Law Reform*, (2018).

December 2017. The North Richmond Community Health MSIC was opened to the public and commenced a two year trial period in June 2018.

Future directions in heroin harm reduction

11. Advocating for establishment of the North Richmond Community Health MSIC has been the central focus of Coroners' heroin harm reduction efforts over the past two years. However, if this MSIC had been operating when Mr Morrison was still alive, I suspect it would not have had an impact on the risk of his dying from heroin-involved overdose. The reason is, there is no evidence before me that Mr Morrison ever attended the City of Yarra to purchase and/or use heroin. The City of Yarra is not mentioned in any witness statements, and a Victoria Police Law Enforcement Assistance Program (LEAP) search did not reveal any contacts between Victoria Police members and Mr Morrison in the City of Yarra.
12. This observation led me to consider what other prevention opportunities might exist to address heroin-related harms and prevent the deaths of people like Mr Morrison. To assist in considering this question, I directed that the CPU prepare updated data on overdose deaths generally and heroin-involved deaths in particular. The updated data, including 2017 statistics on fatal overdoses in Victoria, is Attachment B to this finding and shows:
 - a. The frequency of heroin-involved overdose deaths continued to rise in 2017, reaching 220 deaths (table 6). Between 2012 and 2017, the annual frequency of Victorian heroin-involved overdose deaths more than doubled.
 - b. A substantial number of heroin-involved overdose deaths continued to occur in the City of Yarra in 2017, confirming that it remains an area of elevated heroin-related mortality. However, there were several other LGAs with notably high levels of heroin overdose deaths, including the City of Melbourne and Brimbank (table 9a).
 - c. The City of Yarra remained the only LGA where the majority of heroin-involved overdose deaths were of people who did not live in that LGA (table 10a). This provides further support for the rationale for locating the first MSIC in North Richmond: the City of Yarra attracts people from other areas to use heroin to an extent that does not occur anywhere else.

13. The data suggests that the continuing rise in fatalities associated with heroin use is manifesting in a number of areas around Metropolitan Melbourne, and that locally-specific responses to these emerging harms - such as the MSIC in North Richmond - may require broader strategic coordination so that lessons learned from interventions in one area are shared and applied in a timely manner to other areas where they could have a positive impact on the lives of people who inject drugs.

FINDING

Mr Morrison had a significant history of mental ill-health and illicit drug use. However, there is no evidence that he intended to take his own life on 17 June 2016.

I accept and adopt the medical cause of death as opined by Dr Khamis Almazrooei and find that Samuel Jack Morrison died from combined drug toxicity involving heroin, benzodiazepine and others, in circumstances where he did not intend to end his own life.

I acknowledge the immense distress and grief endured by Mr Morrison's family in the wake of his death. I note Ms Morrison's frustration that her son was able to access illicit substances while seeking treatment for drug dependence. In doing so, I note that Mr Morrison died at home, and was not an inpatient at this time.

Mr Morrison's death is, tragically, only one of hundreds of heroin-involved overdose deaths that have occurred in Victoria over the past few years. Each year since 2012 the number of heroin-involved overdose deaths has risen in Victoria, and over time several local government areas in Metropolitan Melbourne have been the location of particularly high numbers of deaths.

I commend the Victorian Department of Health and Human Services for implementing Victoria's first Medically Supervised Injecting Centre at North Richmond Community Health in the City of Yarra. This initiative hopefully marks the commencement of renewed engagement in prevention of harms among people who inject drugs.

RECOMMENDATIONS

Pursuant to section 72(2) of the **Coroners Act 2008**, I make the following recommendations:

1. With a view to promoting public health and safety and preventing like deaths, **I recommend** that the Secretary of the Department of Health and Human Services considers the circumstances of Mr Morrison's death in the context of continuing increases in heroin related harms and in relation to the latest data which supports the need for continued development of risk reducing strategies for people who inject drugs.

Pursuant to section 73(1A) of the Coroners Act 2008, I order that this Finding be published on the internet.

I direct that a copy of this finding be provided to the following:

Mr Jeffrey Morrison

Ms Sally-Anne Morrison

Mrs Jan Moffatt, Grindal & Patrick Lawyers on behalf of North Western Mental Health Service

Secretary of the Department of Health and Human Services

Detective Senior Constable Daniel Blake

Signature:


AUDREY JAMIESON
CORONER
Date: **6 August 2018**



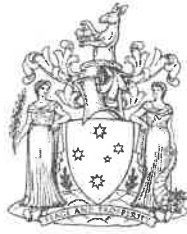


Coroners Court of Victoria

COR 2016 2730

**CORONIAL FINDING INTO THE
DEATH OF
SAMUEL JACK MORRISON**

ATTACHMENT A



Coroners Court of Victoria

Table 1. Frequency of overdose deaths by local government area of fatal overdose, and type of location where the fatal overdose occurred, Victoria 2012-2016.

Local government area of fatal overdose	Type of location at which the deceased fatally overdosed							
	Own home		Another's home		Non-residential		Total	
	N	%	N	%	N	%	N	%
Yarra	18	28.1	15	23.4	31	48.4	64	100.0
Melbourne	34	58.6	5	8.6	19	32.8	58	100.0
Port Phillip	35	72.9	9	18.8	4	8.3	48	100.0
Brimbank	28	63.6	8	18.2	8	18.2	44	100.0
Greater Dandenong	32	80.0	4	10.0	4	10.0	40	100.0
Greater Geelong	20	60.6	9	27.3	4	12.1	33	100.0
Darebin	25	80.6	4	12.9	2	6.5	31	100.0
Maribyrnong	18	64.3	3	10.7	7	25.0	28	100.0
Whitehorse	18	75.0	2	8.3	4	16.7	24	100.0
Frankston	14	60.9	7	30.4	2	8.7	23	100.0

Table 2. Frequency of overdose deaths by local government area of fatal overdose, and local government area of deceased's usual residence, Victoria 2012-2016.

Local government area of fatal overdose	Local government area of usual residence					
	Same as LGA of fatal overdose		Different to LGA of fatal overdose		Total	
	N	%	N	%	N	%
Yarra	20	31.3	44	68.8	64	100.0
Melbourne	40	69.0	18	31.0	58	100.0
Port Phillip	36	75.0	12	25.0	48	100.0
Brimbank	36	81.8	8	18.2	44	100.0
Greater Dandenong	33	82.5	7	17.5	40	100.0
Greater Geelong	32	97.0	1	3.0	33	100.0
Darebin	28	90.3	3	9.7	31	100.0
Maribyrnong	19	67.9	9	32.1	28	100.0
Whitehorse	19	79.2	5	20.8	24	100.0
Frankston	17	73.9	6	26.1	23	100.0



Coroners Court of Victoria

COR 2016 2730

**CORONIAL FINDING INTO THE
DEATH OF
SAMUEL JACK MORRISON**

ATTACHMENT B



Coroners Court of Victoria

Overdose deaths, Victoria 2009-2017

Date: 6 August 2018

To: Coroner Audrey Jamieson

From: Coroners Prevention Unit

Executive summary

- (a) This data summary examines overdose deaths investigated by Victorian coroners during the period 2009-2017, and includes two sections specifically focusing on heroin-involved overdose deaths.
- (b) The annual frequency of fatal overdoses generally followed an upward trend between 2009 and 2017, reaching 523 deaths in 2017 (page 3). Approximately 70% of deaths were caused by the acute toxic effects of multiple contributing drugs rather than a single drug (page 3).
- (c) Benzodiazepines were consistently the most frequent contributing drug group in overdose deaths across the period (page 6). The proportion of Victorian overdose deaths involving pharmaceutical opioids declined somewhat between 2009 and 2017, while the proportion involving illegal drugs rose (page 6).
- (d) Steadily increasing heroin involvement in Victorian overdose deaths was a highly notable finding. Between 2012 and 2017 the annual frequency of Victorian heroin-involved overdose deaths more than doubled, reaching 220 in 2017 (page 12). A substantial majority occurred in Metropolitan Melbourne rather than Regional Victoria (page 14).
- (e) Among local government areas where heroin-involved overdose deaths occurred, the City of Yarra was distinctive for two reasons. First, it was where the highest frequency of heroin-involved overdose deaths occurred. Second, it was the only local government area examined where the majority of people who fatally overdosed on heroin did not reside there (page 16).

1. Background

Coroner Audrey Jamieson directed that the Coroners Prevention Unit (CPU) prepare this data summary of overdose deaths investigated by Victorian coroners during the period 2009-2017, including a particular focus on heroin-involved overdose deaths, to contextualise individual deaths currently under investigation.

2. Method

This section describes how data was sourced, extracted and analysed to prepare the summary.

2.1 Data source

In Victoria, all deaths from suspected non-natural causes (including suspected overdose deaths) must be reported to the CCOV for investigation. If the investigation establishes the death was an overdose, it is entered into the Victorian Overdose Deaths Register ('the Register').

The Register definition of an overdose death is consistent with the definition of "drug poisoning death" in the Substance Abuse and Mental Health Services Administration (SAMHSA) Consensus Panel recommendations: a death where the expert death investigators (the coroner, forensic pathologist and forensic toxicologist) established that the acute toxic effects of a drug or drugs played a contributory role.¹ Overdose deaths include deaths where acute toxic effects of drugs were the only cause, and deaths where acute drug toxicity contributed in combination with other non-drug causes such as cardiovascular or respiratory disease. Deaths associated with the behavioural effects of drug taking (for example a fatal motor vehicle collision while affected by drugs and alcohol) or its chronic effects (for example haemorrhage of a gastrointestinal ulcer caused by chronic ibuprofen consumption) are excluded from the Register. Likewise, deaths resulting from allergic reactions to drugs are excluded, and deaths from drug administration-related injury and disease.

The Register definition of the term 'drug' is largely consistent with the SAMHSA definition:

Any chemical compound that may be used by or administered to humans or animals as an aid in the diagnosis, treatment, or prevention of disease or injury; for the relief of pain or suffering; to control or improve any physiologic or pathologic condition; or for the feeling it causes.²

However the Register includes alcohol as a drug whereas it is excluded under the SAMHSA definition.

Coded information is stored in the Register for each overdose death, including the deceased age, sex, reported date of death, and the location where the fatal overdose occurred. In line with the SAMHSA Consensus Panel recommendations for documenting causality in drug-

1 Goldberger BA, Maxwell JC, Campbell A, Wilford BB, "Uniform Standards and Case Definitions for Classifying Opioid-Related Deaths: Recommendations by a SAMHSA Consensus Panel", *Journal of Addictive Diseases*, 32(3), 2013: 231-243.

2 Goldberger BA, Maxwell JC, Campbell A, Wilford BB, "Uniform Standards and Case Definitions for Classifying Opioid-Related Deaths: Recommendations by a SAMHSA Consensus Panel", *Journal of Addictive Diseases*, 32(3), 2013: 235.

caused deaths, the Register records each individual drug that the expert death investigators determined was contributory in the fatal overdose. Where more than one drug was contributory, each was deemed to be equally contributory. Information regarding drugs that were detected but not determined to be contributory is not recorded.

2.2 Data extraction and analysis

To prepare the summary, on 3 August 2018 the Register was used to identify all Victorian overdose deaths reported to the CCOV between 2009 and 2017, and to extract data on the individual drugs that contributed to each death. This data was collated into a series of tables showing the annual frequency of Victorian overdose deaths by contributing drugs groups, drug types and individual drugs.

2.3 Considerations for interpreting Register data

The contents of the Register are regularly revised and updated as coronial investigations progress. Through the coroner's investigation, an overdose death initially characterised as involving one drug might be determined to have involved two other drugs; or a death initially thought to be unrelated to drug consumption might be found to be a fatal overdose. This means that data reported from the Register about Victorian overdose deaths occurring in any given period, can change over time.

The contents of the Register are also revised as a result of coding practices being refined in line with current evidence. For example, this data extract was prepared following a detailed review of how the CPU ascertains codeine contribution to heroin- and morphine-involved overdose deaths; this review in turn was sparked by the publication of a new evidence-based model for classifying and reporting heroin-related deaths.³ The result is that codeine contribution to Victorian overdose deaths in this data summary is lower than the CPU has previously reported.⁴

A death is only included in the Register when the individual drugs that played a contributory role are known. In some circumstances, overdose can be established as the medical cause of death but the drugs are not known, because suitable blood and urine samples were not able to be obtained for toxicological testing; these are excluded from the Register. Some deaths occur in circumstances strongly suggestive of a fatal overdose, but the forensic pathologist and coroner are unable to ascertain the cause of death. These deaths too are excluded from the Register. Consequently the Register data slightly under-estimates the true number of overdose deaths that occur in Victoria each year.

3 Stam NC, Gerostamoulos D, Dietze PM, Parsons S, Smith K, Lloyd B, Pilgrim JL, "The attribution of a death to heroin: A model to help improve the consistent and transparent classification and reporting of heroin-related deaths", *Forensic Science International*, 281, 2017: 18-28.

4 For example, in the Victorian overdose deaths summary for 2009-2016 which the CPU provided to the Inquiry into Drug Law Reform, the annual frequency of codeine-involved overdose deaths peaked at 93 in 2012. In the revised data presented here, the annual frequency peaks at 55 deaths in 2012.

3. Overdose deaths, Victoria 2009-2017

The 3 August 2018 data extract included 3685 overdose deaths investigated by Victorian coroners between 2009 and 2017. The following tables provide a basic overview of patterns of drug contribution over time in the deaths.

3.1. Annual frequency of Victorian overdose deaths

Table 1 shows the overall annual frequency of overdose deaths in Victoria for the period 2009-2017, and the frequency and proportion of overdose deaths each year which were due to the toxic effects of a single drug versus multiple drugs.

Table 1: Annual frequency and proportion of single- and multiple-drug overdose deaths, Victoria 2009-2017.

Overdose deaths	2009	2010	2011	2012	2013	2014	2015	2016	2017
Overall frequency	379	341	362	367	380	387	454	492	523
Single drug	131	123	134	116	119	101	131	137	123
Multiple drug	248	218	228	251	261	286	323	355	400
Overall proportion	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Single drug	34.6	36.1	37.0	31.6	31.3	26.1	28.9	27.8	23.5
Multiple drug	65.4	63.9	63.0	68.4	68.7	73.9	71.1	72.2	76.5

Between 2016 and 2017 the annual frequency of Victorian overdose deaths increased by 6.3%. This was the seventh straight year that such an increase occurred; since 2010 the annual frequency of Victorian overdose deaths has increased by 53.4%. The proportion of Victorian overdose deaths involving multiple drugs increased across this period, from 65.4% of deaths (248 of 379) in 2009 to 76.5% of deaths (400 of 523) in 2017.

3.2. Overdose deaths by contributing drug types

Contributing drugs across all Victorian overdose deaths were classified into three main types: pharmaceutical drugs, illegal drugs, and alcohol. Table 2 shows the annual frequency of Victorian overdose deaths involving each of these three contributing drug types. Most overdose deaths were from combined (multiple) drug toxicity, which is why the annual frequencies for each drug type in Table 2 sum to greater than the overall annual frequency.

Table 2: Annual frequency and proportion of overdose deaths by contributing drug types, Victoria 2009-2017

Drug types	2009	2010	2011	2012	2013	2014	2015	2016	2017
Overall frequency	379	341	362	367	380	387	454	492	523
Pharmaceutical	287	263	274	303	312	316	356	381	414
Illegal	147	146	150	130	163	164	227	263	271
Alcohol	94	85	89	80	95	94	106	124	151
Overall proportion	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Pharmaceutical	75.7	77.1	75.7	82.6	82.1	81.7	78.4	77.4	79.2
Illegal	38.8	42.8	41.4	35.4	42.9	42.4	50.0	53.5	51.8
Alcohol	24.8	24.9	24.6	21.8	25.0	24.3	23.3	25.2	28.9

The proportion of annual Victorian overdose deaths involving pharmaceutical drugs was relatively steady during the period, ranging between 75.7% (2009 and 2011) and 82.6%

(2012); pharmaceutical drugs contributed in an average 78.9% of all overdose deaths across the period. Alcohol contribution was also relatively steady as a proportion of annual Victorian overdose deaths, ranging between 21.8% (2012) and 28.29% (2017) with an annual average 24.9%.

Greater variation occurred in illegal drug contribution. Between 2009 and 2014, the annual proportion of Victorian overdose deaths involving illegal drugs ranged from 35.4% (2012) and 42.9% (2013), but then increased to 50.0% of overdose deaths in 2015, and 53.5% of overdose deaths in 2016, and 51.8% of overdose deaths in 2017.

3.3. Overdose deaths by combinations of contributing drug types

To explore further how pharmaceutical drugs, illegal drugs and alcohol interacted with one another, each death was classified according to the combination of drug types that contributed to the fatal overdose. The seven mutually exclusive combinations were:

- Pharmaceutical drugs only (no contributing illegal drugs or alcohol).
- Pharmaceutical and illegal drugs (no alcohol).
- Illegal drugs only (no pharmaceutical drugs or alcohol).
- Pharmaceutical drugs and alcohol (no illegal drugs).
- Pharmaceutical and illegal drugs and alcohol.
- Alcohol only (no contributing pharmaceutical or illegal drugs).
- Illegal drugs and alcohol (no contributing pharmaceutical or illegal drugs).

Table 3 shows the annual frequency and proportion of Victorian overdose deaths for each combination of contributing drugs.

Table 3: Annual frequency and proportion of overdose deaths by combinations of contributing drug types, Victoria 2009-2017

Combination of drug types	2009	2010	2011	2012	2013	2014	2015	2016	2017
Overall frequency	379	341	362	367	380	387	454	492	523
Pharma only	163	141	148	171	148	160	153	153	165
Pharma + illegal	66	64	63	74	82	91	125	144	139
Illegal only	56	51	62	42	55	42	70	71	68
Pharma + alc	45	33	45	47	57	45	52	47	61
Pharma + ill + alc	13	25	18	11	25	20	26	37	49
Alcohol only	24	21	19	19	12	18	22	29	26
Illegal + alcohol	12	6	7	3	1	11	6	11	15

Table 3 continued over page

Table 3 continued from previous page

Combination of drug types	2009	2010	2011	2012	2013	2014	2015	2016	2017
Overall proportion	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Pharma only	43.0	41.3	40.9	46.6	38.9	41.3	33.7	31.1	31.5
Pharma + illegal	17.4	18.8	17.4	20.2	21.6	23.5	27.5	29.3	26.6
Illegal only	14.8	15.0	17.1	11.4	14.5	10.9	15.4	14.4	13.0
Pharma + alc	11.9	9.7	12.4	12.8	15.0	11.6	11.5	9.6	11.7
Pharma + ill + alc	3.4	7.3	5.0	3.0	6.6	5.2	5.7	7.5	9.4
Alcohol only	6.3	6.2	5.2	5.2	3.2	4.7	4.8	5.9	5.0
Illegal + alcohol	3.2	1.8	1.9	0.8	0.3	2.8	1.3	2.2	2.9

Pharmaceutical drug only overdose deaths were consistently the most frequent type of Victorian overdose death between 2009 and 2017. However, over time there was a decline in the proportion of pharmaceutical drug only overdose deaths, and a shift towards overdose deaths involving pharmaceutical drugs in combination with illegal drugs (both with and without alcohol).

3.4. Overdose deaths by contributing pharmaceutical drug groups

Pharmaceutical drugs were disaggregated into drug groups for more detailed analysis. Table 4a shows the annual frequency of Victorian overdose deaths 2009-2017 involving each of the major contributing pharmaceutical drug groups, with illegal drugs and alcohol included for context. Most overdose deaths were from combined drug toxicity, which is why the annual frequencies for each drug group in Table 4 sum to greater than the overall annual frequency.

Table 4a: Annual frequency and proportion of contribution to overdose deaths, among major contributing pharmaceutical drug groups plus alcohol and illegal drugs, Victoria 2009-2017. (^ Non-benzodiazepine anxiolytics; * Non-opioid analgesics.)

Drug groups	2009	2010	2011	2012	2013	2014	2015	2016	2017
Overall frequency	379	341	362	367	380	387	454	492	523
Benzodiazepines	160	168	180	199	212	215	238	263	303
Illegal drugs	147	146	150	130	163	164	227	263	271
Opioids	156	127	165	188	175	182	185	183	198
Antidepressants	122	105	101	142	134	144	161	164	196
Alcohol	94	85	89	80	95	94	106	124	151
Antipsychotics	63	64	65	78	75	81	91	107	136
Non-benzo anx.^	35	28	33	38	56	48	60	39	56
Non-opioid anlg.*	26	25	30	44	39	49	46	35	38
Anticonvulsants	18	14	13	10	37	45	51	54	75
Overall proportion	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Benzodiazepines	42.2	49.3	49.7	54.2	55.8	55.6	52.4	53.5	57.9
Illegal drugs	38.8	42.8	41.4	35.4	42.9	42.4	50.0	53.5	51.8
Opioids	41.2	37.2	45.6	51.2	46.1	47.0	40.7	37.2	37.9

Table 4a continued over page

Table 4a continued from previous page.

Drug groups	2009	2010	2011	2012	2013	2014	2015	2016	2017
Antidepressants	32.2	30.8	27.9	38.7	35.3	37.2	35.5	33.3	37.5
Alcohol	24.8	24.9	24.6	21.8	25.0	24.3	23.3	25.2	28.9
Antipsychotics	16.6	18.8	18.0	21.3	19.7	20.9	20.0	21.7	26.0
Non-benzo anx.^	9.2	8.2	9.1	10.4	14.7	12.4	13.2	7.9	10.7
Non-opioid anlg.*	6.9	7.3	8.3	12.0	10.3	12.7	10.1	7.1	7.3
Anticonvulsants	4.7	4.1	3.6	2.7	9.7	11.6	11.2	11.0	14.3

Benzodiazepines were the most frequent contributing pharmaceutical drug group, playing a role in an average 52.6% of overdose deaths annually across the period. The next most frequent pharmaceutical drug groups were opioids (an average 42.3% of overdose deaths each year), antidepressants (annual average 34.4%) and antipsychotics (annual average 20.6%). Notable trends in the data included the proportional increase over time in benzodiazepine, antipsychotic and anticonvulsant involvement in overdose deaths; and the recent decrease in the proportion of annual overdose deaths involving pharmaceutical opioids.

In Table 4b, the overall frequency of overdose deaths for each of the major contributing drug groups was analysed to establish the proportion of single versus multiple drug overdose deaths associated with each contributing drug group.

Table 4b: Proportion of single and multiple drug overdoses involving drugs from major contributing drug groups, Victoria 2009-2017

Drug group	N	% single drug deaths	% multiple drug deaths
Benzodiazepines	1938	1.7	98.3
Illegal drugs	1661	27.0	73.0
Opioids	1559	9.4	90.6
Antidepressants	1269	5.7	94.3
Alcohol	918	20.7	79.3
Antipsychotics	760	3.4	96.6
Non-benzodiazepine anxiolytics	393	15.0	85.0
Non-opioid analgesics	332	13.9	86.1
Anticonvulsants	317	3.8	96.2

At one end of the spectrum, 27.0% of the 1661 Victorian overdose deaths that occurred between 2009-2017 and involved illegal drugs, were single-drug deaths. At the other end of the spectrum, only 1.7% of the 1938 overdose deaths involving benzodiazepines were single-drug deaths.

3.5. Overdose deaths by individual contributing drugs

Table 5a shows the annual frequency of overdose deaths, Victoria 2009-2017, involving the most frequent contributing individual drugs. The individual drugs are tabulated by the major drug groups to which they belong.

Table 5a: Most frequent contributing individual drugs in overdose deaths, Victoria 2009-2017.

Individual drugs	2009	2010	2011	2012	2013	2014	2015	2016	2017
Benzodiazepines	160	168	180	199	212	215	238	263	303
Diazepam	104	109	124	133	164	169	192	204	242
Alprazolam	62	56	43	57	45	28	23	23	27
Temazepam	28	22	48	34	22	20	25	26	32
Oxazepam	18	19	44	40	17	19	34	27	23
Clonazepam	7	8	14	18	19	25	33	31	48
Nitrazepam	17	15	11	24	26	13	17	22	11
Lorazepam	0	0	3	1	4	6	2	7	7
Opioids	156	127	165	188	175	182	185	183	198
Methadone	50	55	72	75	70	67	67	73	71
Oxycodone	41	38	46	46	60	46	58	54	66
Codeine	48	32	38	55	46	47	48	46	37
Tramadol	22	9	15	18	23	23	32	26	32
Morphine	22	12	12	13	9	12	9	13	18
Fentanyl	1	2	5	17	11	11	23	13	14
Buprenorphine	3	4	14	4	3	7	4	2	8
Illegal drugs	147	146	150	130	163	164	227	263	271
Heroin	127	136	125	107	128	136	171	190	220
Methamphetamine	23	14	29	34	51	53	72	119	93
Amphetamine	4	4	19	10	10	8	9	1	3
Cocaine	7	1	2	4	5	7	15	11	10
MDMA	5	1	1	1	3	4	5	12	7
Antidepressants	122	105	101	142	134	144	161	164	196
Mirtazapine	24	26	22	32	25	41	28	34	47
Amitriptyline	23	21	23	26	30	29	50	25	42
Citalopram	17	22	21	25	24	25	26	28	35
Venlafaxine	25	12	16	15	20	19	10	22	27
Fluoxetine	8	9	8	13	10	7	12	16	10
Duloxetine	3	5	7	15	11	12	12	15	12
Sertraline	6	6	4	12	13	9	12	11	18
Desvenlafaxine	0	1	3	6	8	11	15	19	15
Alcohol	94	85	89	80	95	94	106	124	151
Antipsychotics	63	64	65	78	75	81	91	107	136
Quetiapine	28	36	34	41	41	48	49	57	74
Olanzapine	19	18	17	22	15	21	30	36	41
Risperidone	6	3	11	8	10	7	9	14	9
Zuclopenthixol	5	4	4	6	3	3	5	4	14
Chlorpromazine	5	2	4	10	6	3	5	5	5
Clozapine	5	6	0	4	6	2	4	5	3

Table 5a continued over page

Table 5a continued from previous page

Individual drugs	2009	2010	2011	2012	2013	2014	2015	2016	2017
Non-benzo anx.	35	28	33	38	56	48	60	39	56
Doxylamine	13	16	11	21	23	13	14	12	18
Zopiclone	6	3	6	13	14	11	17	13	17
Pentobarbitone ⁵	4	5	11	1	8	15	18	9	10
Zolpidem	11	3	5	5	4	6	11	6	8
Diphenhydramine	5	1	4	2	7	5	5	4	6
Non-opioid anlg.	26	25	30	44	39	49	46	35	38
Paracetamol	23	21	24	42	37	37	42	30	32
Ibuprofen	5	5	4	5	2	7	5	4	1
Anticonvulsants	18	14	13	10	37	45	51	54	75
Pregabalin ⁶	0	0	0	0	17	27	34	34	52
Sodium valproate	9	9	5	6	13	9	9	6	7
Carbamazepine	7	3	6	1	3	3	2	8	3
Lamotrigine	1	2	1	2	2	2	2	3	6

For Table 5b, the most frequent contributing individual drugs were collated by the proportion of single-drug and multiple-drug deaths in which each was involved across the period 2009-2017.

Table 5b: Most frequent contributing drugs in overdose deaths, and the proportion of single and multiple drug overdoses to which each drug contributed, Victoria 2009-2017

Drug	Group	N	% single drug	% multiple drug
Diazepam	Benzodiazepine	1441	0.1	99.9
Heroin	Illegal	1340	26.4	73.4
Alcohol	Alcohol	918	20.7	79.3
Methadone	Opioid	600	8.3	91.7
Methamphetamine	Illegal	488	14.8	85.2
Oxycodone	Opioid	455	8.6	91.4
Quetiapine	Antipsychotic	408	2.7	97.3
Codeine	Opioid	397	2.5	97.5
Alprazolam	Benzodiazepine	364	0.5	99.5
Paracetamol	Non-opioid analgesic	288	15.6	84.4
Amitriptyline	Antidepressant	279	8.6	91.4
Mirtazapine	Antidepressant	269	1.1	98.9
Temazepam	Benzodiazepine	257	5.4	94.6
Oxazepam	Benzodiazepine	241	1.2	98.8

Table 5b continued over page

5 Pentobarbitone prescribing to humans is not permitted in Australia, and the drug could be alternatively classified as illegal.

6 Routine post-mortem testing for pregabalin did not commence in Victoria until 2013, which may account for the lack of recorded pregabalin-involved overdose deaths in 2009-2012.

Table 5b continued from previous page.

Drug	Group	N	% single drug	% multiple drug
Citalopram	Antidepressant	223	2.2	97.8
Olanzapine	Antipsychotic	219	0.9	99.1
Clonazepam	Benzodiazepine	203	1.0	99.0
Tramadol	Opioid	200	1.5	98.5
Venlafaxine	Antidepressant	166	5.4	94.6
Pregabalin	Anticonvulsant	164	0.0	100.0
Nitrazepam	Benzodiazepine	156	3.8	96.2
Doxylamine	Non-benzodiazepine anxiolytic	141	1.4	98.6
Morphine_Drug	Opioid	120	17.5	82.5
Zopiclone	Non-benzodiazepine anxiolytic	100	0.0	100.0
Fentanyl	Opioid	97	17.5	82.5
Fluoxetine	Antidepressant	93	2.2	97.8
Duloxetine	Antidepressant	92	3.3	96.7
Sertraline	Antidepressant	91	5.5	94.5
Promethazine	Antihistamine	88	0.0	100.0
Pentobarbitone	Non-benzodiazepine anxiolytic	81	64.2	35.8
Desvenlafaxine	Antidepressant	78	0.0	100.0
Risperidone	Antipsychotic	77	1.3	98.7

Notably, only one drug (pentobarbitone) was involved in a greater proportion of single-drug than multiple-drug overdose deaths.

3.6. Commentary

The majority of Victorian fatal overdoses occurred as a result of combined or multiple drug toxicity. This underscores the importance of educating people in how drugs interact with one another, to reduce overdose-related harms.

The continuing ubiquity of benzodiazepines in Victorian overdose deaths reflects a prevention opportunity lost. Acting on concerns about benzodiazepine contribution to Victorian overdose deaths, in 2012 Victorian Coroners commenced a campaign for the Therapeutic Goods Administration (TGA) to move all benzodiazepines from Schedule 4 to Schedule 8 of the Standard for the Uniform Scheduling, so that doctors would need to provide stronger clinical justification when prescribing them. The TGA ultimately determined to move only alprazolam to Schedule 8, leaving all others in their previous schedules. The results of this are now clear: alprazolam involvement in Victorian overdose deaths has declined, but the harms have simply shifted to other benzodiazepines such as diazepam and clonazepam, and overall fatal harms associated with benzodiazepines have remained unchanged.⁷

The increase in illegal drug contribution to Victorian overdose deaths that was observed in 2015 and 2016, has continued in 2017. Methamphetamine contribution in the deaths

7 For an earlier background and commentary on this issue see Lloyd B, Dwyer J, Bugeja L, Jamieson J, "Alprazolam in fatal overdose following regulatory rescheduling: A response to Deacon et al", *International Journal of Drug Policy*, 39, 2017, 138-139.

decreased from 2016 to 2017 after six years of steady year-on-year increases (which included a 65% jump between 2015 and 2016, from 76 to 119 deaths). However this was compensated by yet another year-on-year rise in heroin-involved overdose deaths. Between 2012 and 2017 the annual frequency of heroin-involved overdose deaths more than doubled.

The increasing contribution of quetiapine and pregabalin in the deaths, may be at least in part be driven by the increasing number of heroin-involved overdose deaths; both quetiapine and pregabalin are known to be widely used to enhance the effects of opioids including heroin, and to manage side effects of drug use. While the Victorian Department of Health and Human Services has recognised the seriousness of quetiapine misuse and have determined to include quetiapine among monitored drugs in its real-time prescription monitoring system, pregabalin has not been included as yet; this data suggests they should reconsider this decision.⁸

4. Heroin-involved overdose deaths, Victoria 2009-2017

The 3 August 2018 data extract included 1340 overdose deaths investigated by Victorian coroners between 2009 and 2017 where heroin was determined to be a contributory drug. This section examines the heroin deaths in more detail.

4.1. Ascertaining heroin contribution in overdose death

By way of background, the CPU notes that determining heroin contribution to an overdose is not always straightforward. When heroin-specific metabolite 6-monoacetylmorphine (6-MAM) is detected in toxicological analysis, this is generally regarded as sufficient evidence that heroin was used by a deceased person. However 6-MAM is rapidly converted to morphine and therefore can be cleared from the body before death. Morphine, as well as being a heroin metabolite, is also a drug in its own right, and is a metabolite of the drug codeine. And to further confuse matters, codeine is often present as an adulterant in heroin purchased on the street.

Techniques for interpreting the presence of 6-MAM, morphine and codeine in forensic toxicology results, to determine whether the deceased had used heroin, morphine and/or codeine, have recently been described in the literature.⁹ The CPU has used similar techniques for some time when coding possible heroin-involved overdose deaths into the Register, taking into account the circumstances of the death and the deceased's history of drug use. Recently, in line with the literature, the CPU revised its coding approach to also consider the ratio of morphine to codeine detected in toxicological analysis.

The CPU acknowledges that despite its best efforts, uncertainty in the available evidence could lead to some overdose deaths being inappropriately attributed to heroin, and likewise heroin being inappropriately excluded as a contributing drug in other deaths. However the number of wrongly coded overdose deaths is likely to be low; each year on average around 78% of Victorian overdose deaths coded as heroin-involved are on the basis of 6-MAM being detected, and 22% are coded as heroin-involved on the basis of circumstantial evidence and codeine-morphine ratios in the absence of 6-MAM.

8 For a more detailed discussion of this issue see Coroner Rosemary Carlin, Finding without Inquest in the Death of NJ [name suppressed], COR 2015 2127, delivered on 4 July 2017.

9 Roxburgh A, Pilgrim JL, Hall WD, Burns L, Degenhardt L, "Accurate identification of opioid overdose deaths using coronial data", *Forensic Science International*, 287, 2018: 40-46.

4.2. Heroin-only and multiple drug overdose deaths

Table 6 shows the annual frequency of heroin-involved overdose deaths in Victoria for the period 2009-2017, and the frequency and proportion of overdose deaths each year which were due to the toxic effects of heroin only versus multiple drugs including heroin.

Table 6: Annual frequency and proportion of heroin-only and multiple-drug (including heroin) overdose deaths, Victoria 2009-2017.

Overdose deaths	2009	2010	2011	2012	2013	2014	2015	2016	2017
Overall frequency	127	136	125	107	128	136	171	190	220
Heroin only	47	46	53	32	38	27	38	36	39
Multiple drug	80	90	72	75	90	109	133	154	181
Overall proportion	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Heroin only	37.0	33.8	42.4	29.9	29.7	19.9	22.2	18.9	17.7
Multiple drug	63.0	66.2	57.6	70.1	70.3	80.1	77.8	81.1	82.3

The majority of deaths involved other contributing drugs in combination with heroin. Additionally, the proportion of multiple drug heroin-involved overdose deaths appears to have increased over time.

4.3 Co-contributing drugs in heroin-involved overdose deaths

Table 7 shows the main co-contributing drug groups in heroin-involved overdose deaths, with individual drugs arranged under the groups to which they belong.

Table 7: Most frequent co-contributing drug groups and individual drugs in heroin-involved overdose deaths, Victoria 2009-2017.

Co-contributors	2009	2010	2011	2012	2013	2014	2015	2016	2017
Benzodiazepines	46	73	55	58	71	78	89	109	132
Diazepam	27	46	39	43	61	71	81	91	115
Alprazolam	24	26	14	23	23	14	8	13	16
Oxazepam	4	8	17	8	6	8	9	12	8
Clonazepam	2	7	3	3	6	12	10	9	16
Temazepam	4	4	22	6	5	0	6	5	5
Nitrazepam	2	6	2	2	9	3	4	11	2
Antidepressants	18	25	25	32	31	33	42	47	56
Mirtazapine	5	8	5	9	8	10	23	11	11
Citalopram	2	3	8	4	4	9	7	10	13
Amitriptyline	2	5	4	3	7	8	5	7	12
Venlafaxine	0	3	3	4	3	2	0	7	5
Opioids	22	21	28	28	36	35	46	45	38
Methadone	12	12	15	18	24	21	24	25	27
Oxycodone	3	2	7	5	10	5	11	7	7
Tramadol	3	3	1	5	6	7	7	9	5
Codeine	3	3	3	0	2	2	3	8	1

Table 7 continued over page

Table 5a continued from previous page

Co-contributors	2009	2010	2011	2012	2013	2014	2015	2016	2017
Illegal drugs	17	8	15	20	27	43	39	61	57
Methamphetamine	11	6	13	17	24	34	32	57	52
Cocaine	4	0	0	0	4	5	7	8	7
Amphetamine	1	3	7	6	4	4	6	0	0
Alcohol	23	29	22	14	22	27	25	41	60
Antipsychotics	14	18	11	22	24	21	27	33	46
Quetiapine	4	8	5	12	13	10	13	15	20
Olanzapine	7	6	4	7	5	8	11	12	16
Risperidone	2	1	3	3	5	1	4	7	4
Zuclophenthixol	2	2	1	2	1	2	3	2	10
Non-benzo anx.	6	7	2	5	11	8	9	6	13
Diphenhydramine	3	1	2	2	4	5	4	2	5
Doxylamine	2	6	0	2	6	1	2	2	5
Anticonvulsants	2	3	2	1	4	4	7	9	19
Pregabalin	0	0	0	0	2	2	4	5	14

The most frequent co-contributing drug group was benzodiazepines; they played a role overall in 53.1% (711) of the 1340 heroin-involved overdose deaths. Antidepressants were the next most frequent co-contributing drug group (309 deaths, 23.1%) followed by opioids (299 deaths, 22.3%), illegal drugs other than heroin (287 deaths, 21.4%) and alcohol (263 deaths, 19.6%). The highest co-contributing individual drugs were diazepam (574 deaths, 42.8%), methamphetamine (246 deaths, 18.4%) and methadone (178 deaths, 13.3%).

4.4. Commentary

Alcohol, methamphetamine, and a broad range of central nervous system depressant pharmaceutical drugs contribute to heroin-involved overdose death in Victoria. As was noted more generally with respect to overdose death in section 3.6 of this data summary, strategies to prevent heroin-involved overdose deaths will likely need to address also the drugs that are taken together with heroin.

5. Locations of heroin-involved overdose deaths, Victorian 2012-2017

On 8 May 2017, Coroner Audrey Jamieson delivered her finding in the death of David Leslie Chapman (case 2722 of 2016), who died from a fatal heroin-involved overdose at a non-residential location in Richmond. The finding included an attachment with location data on selected heroin-involved overdose deaths for the period 2012-2016. The following tables expand this location data and update it to include deaths from 2017.

5.1. Regions where heroin-involved overdose deaths occurred

Table 8 shows the annual frequency and proportion of heroin-involved overdose deaths that occurred in Metropolitan Melbourne or Regional Victoria.

Table 8: Annual frequency and proportion of heroin-involved overdose deaths where fatal incident occurred in Metropolitan Melbourne and Regional Victoria, 2009-2017.

Location where fatal overdose occurred	2012	2013	2014	2015	2016	2017	Total
Overall frequency	107	128	136	171	190	220	952
Metropolitan Melbourne	90	109	119	150	157	184	809
Regional Victoria	15	18	17	21	32	35	138
Unknown	2	1	0	0	1	1	5
Overall proportion	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Metropolitan Melbourne	84.1	85.2	87.5	87.7	82.6	83.6	85.0
Regional Victoria	14.0	14.1	12.5	12.3	16.8	15.9	14.5
Unknown	1.9	0.8	0.0	0.0	0.5	0.5	0.5

The majority (85%) of heroin-involved overdose deaths occurred in Metropolitan Melbourne; this proportion was relatively steady from year to year.

5.2. Local government areas (LGAs) where heroin-involved overdose deaths occurred

The CPU further disaggregated the location of fatal drug-taking incident to LGA level. Table 9a shows the annual frequency of heroin-involved overdose deaths for the 15 Metropolitan Melbourne LGAs where a total of 20 or more such deaths occurred during the period 2012-2017. Table 9b shows similar data for the seven Regional Victorian LGAs where a total of eight or more deaths occurred across the period being examined.

Table 9a: Annual frequency and proportion of heroin-involved overdose deaths by LGA where fatal incident occurred, Metropolitan Melbourne 2012-2017.

LGA where fatal overdose occurred	2012	2013	2014	2015	2016	2017	Total
Metropolitan Melbourne	90	109	119	150	157	184	809
Yarra	5	11	11	19	18	16	80
Melbourne	10	12	17	12	6	15	72
Brimbank	7	12	7	5	12	19	62
Port Phillip	8	7	10	9	13	9	56
Greater Dandenong	7	6	4	11	11	10	49
Darebin	3	4	6	8	9	9	39
Maribyrnong	6	1	7	9	5	9	37
Frankston	1	4	8	8	3	6	30
Whitehorse	3	3	4	8	6	6	30
Moreland	4	2	3	5	4	8	26
Knox	0	7	1	7	4	6	25
Moonee Valley	2	2	5	2	6	6	23
Monash	1	4	2	1	10	4	22
Wyndham	2	1	3	5	5	6	22
Boroondara	1	6	1	5	2	5	20
<i>All other LGAs</i>	<i>30</i>	<i>27</i>	<i>30</i>	<i>36</i>	<i>43</i>	<i>50</i>	<i>216</i>

Table 9b: Annual frequency and proportion of heroin-involved overdose deaths by local government area where fatal incident occurred, Regional Victoria 2012-2017.

LGA where fatal overdose occurred	2012	2013	2014	2015	2016	2017	Total
Regional Victoria	15	18	17	21	32	35	138
Greater Geelong	4	6	6	4	12	6	38
Greater Bendigo	0	1	1	2	3	9	16
Ballarat	1	1	2	1	1	4	10
Latrobe	0	2	2	1	2	2	9
Wangaratta	1	1	0	0	2	2	6
Wellington	0	0	1	3	2	0	6
Mitchell	2	1	1	0	0	1	5
<i>All other LGAs</i>	7	6	4	10	10	11	48

In both Metropolitan Melbourne and Regional Victoria, there were a large number of LGAs each with a comparatively low number of heroin-involved overdose deaths, which is why the 'all other LGAs' rows in Table 9a and Table 9b are so high.

5.3. LGA of fatal overdose and LGA of usual residence

For the 15 Metropolitan Melbourne LGAs shown in Table 9a with the highest frequencies of heroin-involved overdose deaths during 2012-2017, the CPU compared the LGA where the fatal overdose occurred with the LGA where the deceased usually resided. Each death was categorised into one of four groups:

- Same, if the LGA where the deceased usually resided was the same as the LGA where the fatal overdose occurred.
- Different, if the LGA where the deceased usually resided was different to the LGA where the fatal overdose occurred.
- Unknown, if the LGA where the deceased usually resided was not able to be established, or if the deceased had no fixed address proximal to the death.
- Interstate / overseas, if the deceased usually resided interstate or overseas and had been in Victoria for less than seven days when the death occurred.

The same categorisation was also applied to the seven Regional Victorian LGAs shown in Table 9b. The results of the categorisation process are shown in Tables 10a and 10b, for Metropolitan Melbourne and Regional Victoria respectively.

Tables 10a and 10b show that overall, the majority of heroin-involved overdose deaths in Metropolitan Melbourne (74.5%, 603 of 809) and Regional Victoria (89.1%, 123 of 138) occurred in the LGA where the deceased usually resided. The only specific LGA examined where this finding did not hold true was the City of Yarra; only 30% of overdose deceased also resided there.

Table 10a: Overall frequency of heroin-involved overdose deaths by LGA where fatal incident occurred, Metropolitan Melbourne 2012-2017.

LGA where fatal overdose occurred	LGA of deceased's usual residence				Total
	Same	Different	Unknown	Interstate/overseas	
Metropolitan Melbourne	603	184	13	9	809
Yarra	24	52	2	2	80
Melbourne	48	22	1	1	72
Brimbank	48	11	1	2	62
Port Phillip	40	12	3	1	56
Greater Dandenong	40	8	0	1	49
Darebin	36	3	0	0	39
Maribyrnong	27	10	0	0	37
Frankston	22	7	1	0	30
Whitehorse	24	3	2	1	30
Moreland	22	4	0	0	26
Knox	22	3	0	0	25
Moonee Valley	15	8	0	0	23
Monash	18	4	0	0	22
Wyndham	19	3	0	0	22
Boroondara	16	4	0	0	20
<i>All other LGAs</i>	<i>182</i>	<i>30</i>	<i>3</i>	<i>1</i>	<i>216</i>

Table 10b: Overall frequency of heroin-involved overdose deaths by LGA where fatal incident occurred, Metropolitan Melbourne 2012-2017.

LGA where fatal overdose occurred	LGA of deceased's usual residence				Total
	Same	Different	Unknown	Interstate/overseas	
Regional Victoria	123	11	2	2	138
Greater Geelong	37	0	0	1	38
Greater Bendigo	14	2	0	0	16
Ballarat	9	1	0	0	10
Latrobe	8	0	1	0	9
Wangaratta	4	2	0	0	6
Wellington	5	1	0	0	6
Mitchell	3	0	1	1	5
<i>All other LGAs</i>	<i>43</i>	<i>5</i>	<i>0</i>	<i>0</i>	<i>48</i>

6. Further information

For further information or clarification regarding the Victorian overdose deaths summary presented here, please contact Coroners Prevention Unit Senior Case Investigator Dr Jeremy Dwyer.