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## Lifetime and recent opioid overdose among a sample of people who inject drugs in Australia

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### KEY FINDINGS

- 45% of participants in the survey of people who inject drugs (PWID) conducted as part of the IDRS reported having ever had an opioid overdose.
- 14% reported recently having an opioid overdose.
- PWID who initiated injecting with pharmaceutical opioids were more likely to report experiencing an overdose with these drugs.
- Reports of recent opioid overdose were associated with daily alcohol use and illicit benzodiazepine use.

### INTRODUCTION

Opioid overdose is a major public health issue associated with substantial morbidity and mortality in Australia (1, 2). People who inject drugs (PWID) frequently report experiencing non-fatal opioid overdose and a history of injecting drug use is often noted in coronial findings related to deaths induced by opioids including heroin and fentanyl (see 1, 2). Interventions to prevent fatal and non-fatal opioid overdose are available, including opioid substitution therapy (OST) and take-home naloxone (3-5).

A range of risk factors for non-fatal opioid overdose have been identified in previous work (6, 7). These include demographic factors such as age, as well as drug-related behaviours such as injecting opioids compared to other routes of administration (e.g. 6), concomitant central nervous system depressant use, and shifting injecting locations from private to public spaces (e.g. 7). Much of the work undertaken around non-fatal opioid overdose in Australia was conducted in the late 1990s, around the time of the so-called heroin glut (8), and was therefore primarily focused on heroin use and overdose specifically (9, 10). In this Bulletin we examine opioid overdose in the context of the wider range of opioids now used by PWID (e.g. 11), to determine whether the patterns of factors associated with reporting lifetime non-fatal heroin overdose are the same as those seen in relation to reports of lifetime non-fatal overdose related to other opioids such as morphine, methadone or oxycodone. We then explore some of the mutable demographic and drug use characteristics of participants as they relate to recent opioid overdoses in particular.

### METHOD

Data were drawn from the survey of PWID conducted as part of the IDRS in 2016. Participants were 877 PWID who injected regularly and were recruited from all capital cities of Australian states and territories, through services such as needle and syringe programs and peer-referral. Participants were administered structured questionnaires in face-to-face

interviews that canvassed a broad range of topics including participant demographic characteristics, drug use patterns and perceptions of key issues such as price, purity and availability of a range of drugs. As we were examining opioid overdose we excluded those who did not report ever having injected at least one of the opioids under examination (see below), along with those who had incomplete demographic or drug use information, leaving a total of 747 available for analysis. For further details on the overall methods of the IDRS see (12).

For the purposes of this Bulletin we examined a series of questions that were included in relation to opioid overdose. First, lifetime experience of heroin overdose was generated through a non-zero response to the question “How many times have you overdosed on heroin?”. Lifetime experiences of overdose related to three other opioids, morphine, methadone and oxycodone were also calculated from analogous questions. An overall lifetime opioid overdose variable was generated from any positive response to the questions related to these four opioids. Lifetime experience of overdose on the three opioids other than heroin was also calculated. As experience of recent (past year) opioid overdose was reported much less frequently, only two recent opioid overdose variables were generated: (1) recent heroin overdose, and (2) recent opioid overdose (any of heroin, morphine, methadone or oxycodone).

Descriptive statistics on the frequency of self-reported overdose across opioid overdose categories along with selected demographic and drug use characteristics of the sample (outlined in Table 1) were generated. Logistic regression was used to examine associations between these sample demographic and drug use characteristics and the low frequency overdose outcomes, with analogous Poisson regression used for the higher frequency outcomes, producing adjusted odds ratios and incidence rate ratios respectively. All analyses were undertaken using Stata, with  $p < 0.05$  used as the level of statistical significance.

## RESULTS

### Sample characteristics

Table 1 shows the characteristics of participants recruited for the survey of PWID in the 2016 IDRS who reported lifetime consumption of heroin and/or other opioids. The sample recruited was similar to most samples of PWID recruited for the IDRS since 2000 but showed the increased age seen in recent years. Most participants were aged over 35 years, were unemployed, had been injecting drugs for more than 16 years and were born in Australia. Around half

reported injecting daily or more frequently and heroin was the drug that was reported as being injected most frequently by participants.

**Table 1. Demographic and drug use characteristics of IDRS PWID survey respondents selected for analysis, 2016**

<i>Demographic characteristics</i>	<b>(N=747) %</b>
<b>Age group</b>	
<36	21
36-45	42
46+	37
<b>Male</b>	70
<b>Australian born</b>	87
<b>Indigenous</b>	17
<b>Unstable accommodation</b>	30
<b>Highest grade of school completed</b>	
<year 10	31
Year 10-11	17
Year 12+	22
<b>Unemployed</b>	12
<b>Drug use characteristics</b>	
<b>Age first injected</b>	
<17 years	34
17-20 years	33
20+ years	34
<b>Length of injecting career</b>	
<16 years	20
16-25 years	41
25+ years	39
<b>First drug injected</b>	
Heroin	41
Meth/amphetamine	50
Other opioids	6
Other	3
<b>Drug of choice</b>	
Heroin	52
Meth/amphetamine	27
Methadone or buprenorphine	4
Other pharmaceutical opioids	10
Other	7
<b>Current treatment</b>	
None	56
Opioid Substitution Therapy	41
Other	3
<b>Recent (past six months) benzodiazepine use</b>	
None	42
Licit	18
Illicit	22
Licit and illicit	18
<b>Recent (past six months) alcohol use</b>	
None	43
Monthly or less	18
>monthly, <daily	30
Daily	8
<b>Injecting frequency</b>	
<daily	50
Daily or more frequency	50
<b>Drug injected most</b>	
Heroin	43
Methamphetamine	36
Methadone or buprenorphine	7
Pharmaceutical opioids	14

### Experience of recent opioid overdose

Table 2 shows that 45% of the sample reported that they had experienced an opioid overdose in the past. Most of these overdoses involved heroin, with 41% of the sample reporting a previous heroin overdose but 8% of the sample reported an overdose related to use of one of the opioids other than heroin considered in this analysis. Recent opioid overdose was reported by 14% of the sample with most of these again being related to the use of heroin, with 13% of the sample reporting a heroin overdose in the 12 months prior to interview.

### Correlates of lifetime heroin and other opioid overdose

Table 3 shows the results of the multivariable Poisson regression undertaken to examine the correlates of reports of lifetime heroin (model 1) and other opioid (model 2) overdose drawn from the demographic and drug use characteristics of the participants. Few significant associations were evident, with no significant relationship between demographic characteristics and reports of heroin or other opioid overdose. Reports of lifetime heroin overdose were more likely as length of injecting career increased and those who reported first injecting pharmaceutical opioids were more likely to report an overdose on opioids other than heroin than those who reported first injecting heroin.

**Table 2. Self-reported opioid overdose history by IDRS PWID survey respondents selected for analysis, 2016**

Overdose type	(N=747) %
<b>Lifetime overdose</b>	
Opioids	45
Heroin	41
Morphine	4
Methadone	3
Oxycodone	2
Opioids other than heroin	8
<b>Recent (past 12 months) overdose</b>	
Opioids	14
Heroin	13
Morphine	1
Methadone	1
Oxycodone	<1

**Table 3. Correlates of lifetime self-reported heroin overdose and other opioid overdose determined through multivariable Poisson regression, IDRS PWID survey, 2016**

Demographic characteristics	Heroin overdose (Model 1)		Other opioid overdose (Model 2)	
	IRR	95% CI	IRR	95% CI
<b>Age group</b>				
<36	Ref		Ref	
36-45	1.19	0.79-1.79	0.69	0.29-1.69
46+	1.13	0.67-1.89	0.82	0.25-2.61
<b>Female</b>	Ref		Ref	
<b>Male</b>	0.99	0.77-1.29	1.39	0.73-2.68
<b>Australian born</b>	Ref		Ref	
<b>Other</b>	1.25	0.91-1.71	0.62	0.23-1.68
<b>Non-indigenous</b>	Ref		Ref	
<b>Indigenous</b>	0.87	0.62-1.22	0.83	0.38-1.81
<b>Highest grade of school completed</b>				
<year 10	Ref		Ref	
Year 10-11	1.02	0.78-1.33	1.01	0.54-1.89
Year 12+	1.01	0.73-1.40	0.88	0.39-1.99
<b>Drug use characteristics</b>				
<b>Age first injected</b>				
<17 years	Ref		Ref	
17-20 years	0.89	0.67-1.17	1.02	0.52-1.99
20+ years	0.82	0.58-1.16	0.91	0.38-2.19
<b>Length of injecting career</b>				
<16 years	Ref		Ref	
16-25 years	1.57	1.00-2.45*	2.08	0.79-5.48
25+ years	2.01	1.13-3.55*	1.89	0.51-7.09
<b>First drug injected</b>				
Heroin	Ref		Ref	
Meth/amphetamine	0.71	0.56-0.90	1.93	0.99-3.73
Other opioids	0.53	0.28-0.97	8.40	3.53-20.03*
Other	0.84	0.43-1.65	1.06	0.13-8.61

\*statistically significant at  $p < 0.05$

## Correlates of recent opioid overdose

As indicated, 14% of the sample reported experiencing an opioid overdose in the 12 months prior to interview. Table 4 shows that there were few demographic or drug use variables associated with recently experiencing an opioid overdose, with only alcohol and benzodiazepine use associated with increased risk of reporting an overdose. Even here, it was only reports of frequent (daily) alcohol use, recent illicit benzodiazepine use, and recent illicit and licit benzodiazepine use that were significantly associated with increased overdose risk.

## CONCLUSIONS

Opioid overdose is a significant public health issue and PWID are a key population at risk of this drug-related harm. This Bulletin details a preliminary examination of opioid overdose experienced by PWID showing that, while reports of lifetime experience of opioid overdose were relatively frequent in 2016, the frequency of these reports was lower than in previous decades. Few demographic variables were associated with the likelihood of lifetime reports of overdose and even the direction of non-significant effects showed no consistent pattern across the two overdose categories, heroin and other opioids. Longer injecting careers were associated with an increased rate of reporting lifetime heroin overdose, but not other opioid overdose which may be driven by experiences during the heroin glut of the late 1990s, as recent experience of opioid overdose (comprised primarily of heroin overdose, see below) was unrelated to length of injecting career. The only variable associated with reports of lifetime overdose on opioids other than heroin, reporting pharmaceutical opioids as the first drug injected, suggests the possibility of entrenched drug use patterns that may stem from market conditions in which the person initiated injecting. Although previous work has shown that these patterns are only weakly associated with longitudinal patterns of drug use (13), they may reflect harms experienced during the drug market conditions in which they initiated. Further, continued illicit pharmaceutical opioid use has been associated with a range of harms (14).

Reports of recent opioid overdose were around half as frequent compared to the IDRS in the late 1990s into 2001 (15), but not substantially more frequent than those seen recently in the study (16). We found few correlates with recent opioid overdose, apart from established risk factors such as alcohol and benzodiazepine use (7). Reports of a preference for methamphetamine were associated with a reduced risk of recent opioid overdose.

**Table 4. Correlates of recent opioid overdose determined through multivariable logistic regression, IDRS PWID survey, 2016**

<i>Demographic characteristics</i>	<b>OR</b>	<b>95% CI</b>
<b>Age group</b>		
<36	Ref	
36-45	1.43	0.69-2.97
46+	1.03	0.38-2.79
<b>Female</b>	Ref	
<b>Male</b>	0.95	0.58-1.56
<b>Australian born</b>	Ref	
<b>Other</b>	1.61	0.85-3.05
<b>Non-indigenous</b>	Ref	
<b>Indigenous</b>	1.00	0.52-1.91
<b>Unstable accommodation</b>	Ref	
<b>Stable accommodation</b>	1.31	0.79-2.16
<b>Highest grade of school completed</b>		
<year 10	Ref	
Year 10-11	0.79	0.46-1.35
Year 12+	0.79	0.41-1.54
<b>Unemployed</b>	Ref	
<b>Employed</b>	0.55	0.26-1.16
<i>Drug use characteristics</i>		
<b>Age first injected</b>		
<17 years	Ref	
17-20 years	1.24	0.72-2.14
20+ years	0.56	0.27-1.16
<b>Length of injecting career</b>		
<16 years	Ref	
16-25 years	0.62	0.29-1.30
25+ years	0.61	0.22-1.73
<b>First drug injected</b>		
Heroin	Ref	
Meth/amphetamine	0.97	0.59-1.58
Other opioids	2.16	0.82-5.71
Other	0.91	0.23-3.49
<b>Drug of choice</b>		
Heroin	Ref	
Meth/amphetamine	0.38	0.18-0.83*
Methadone or buprenorphine	0.28	0.05-1.54
Other pharmaceutical opioids	0.56	0.14-2.18
Other	0.75	0.30-1.85
<b>Current treatment</b>		
None	Ref	
Opioid Substitution Therapy	0.76	0.46-1.25
Other	1.24	0.36-4.28
<b>Recent (past six months) benzodiazepine use</b>		
None	Ref	
Licit	1.46	0.75-2.86
Illicit	1.96	1.07-3.58*
Licit and illicit	2.21	1.17-4.18*
<b>Recent (past six months) alcohol use</b>		
None	Ref	
Monthly or less	0.77	0.38-1.58
>monthly, <daily	1.53	0.88-2.67
Daily	2.42	1.18-4.95*
<b>Injecting frequency</b>		
<daily	Ref	
Daily or more frequent	1.55	0.97-2.49
<b>Drug injected most</b>		
Heroin	Ref	
Methamphetamine	1.04	0.53-2.05
Methadone or buprenorphine	0.98	0.33-2.94
Pharmaceutical opioids	0.37	0.11-1.23

\*statistically significant at  $p < 0.05$

## REFERENCES

1. Dietze P, Jolley D, Cvetkovski S, Cantwell K, Jacobs I, Indig D. Characteristics of non-fatal opioid overdoses attended by ambulance services in Australia. *Australian and New Zealand journal of public health*. 2004;28(6):569-75.
2. Roxburgh A, Hall WD, Dobbins T, Gisev N, Burns L, Pearson S, et al. Trends in heroin and pharmaceutical opioid overdose deaths in Australia. *Drug and alcohol dependence*. 2017;179:291-8.
3. Darke S, Hall W. Heroin overdose: research and evidence-based intervention. *Journal of urban health : bulletin of the New York Academy of Medicine*. 2003;80(2):189-200.
4. Strang J, Bird SM, Dietze P, Gerra G, McLellan AT. Take-home emergency naloxone to prevent deaths from heroin overdose. *Bmj*. 2014;349:g6580.
5. Lenton SR, Dietze PM, Jauncey M. Australia reschedules naloxone for opioid overdose. *The Medical journal of Australia*. 2016;204(4):146-7.
6. Brugal MT, Barrio G, De LF, Regidor E, Royuela L, Suelves JM. Factors associated with non-fatal heroin overdose: assessing the effect of frequency and route of heroin administration. *Addiction*. 2002;97(3):319-27.
7. Dietze P, Jolley D, Fry C, Bammer G. Transient changes in behaviour lead to heroin overdose: results from a case-crossover study of non-fatal overdose. *Addiction*. 2005;100(5):636-42.
8. Dietze P, Fitzgerald J. Interpreting changes in heroin supply in Melbourne: droughts, gluts or cycles? *Drug Alcohol Rev*. 2002;21(3):295-303.
9. Darke S, Ross J, Hall W. Overdose among heroin users in Sydney, Australia: I. Prevalence and correlates of non-fatal overdose. *Addiction*. 1996;91(3):405-11.
10. Darke S, Zador D. Fatal heroin 'overdose': a review. *Addiction*. 1996;91(12):1765-72.
11. Betts KS, McLlraith F, Dietze P, Whittaker E, Burns L, Cogger S, et al. Can differences in the type, nature or amount of polysubstance use explain the increased risk of non-fatal overdose among psychologically distressed people who inject drugs? *Drug and alcohol dependence*. 2015;154:76-84.
12. Stafford J, Breen C. Australian Drug Trends 2016: Findings from the Illicit Drug Reporting System (IDRS). *Australian Drug Trend Series*. No. 163. Sydney: National Drug and Alcohol Research Centre, UNSW, 2017.
13. Horyniak D, Stoove M, Degenhardt L, Aitken C, Kerr T, Dietze P. How do drug market changes affect characteristics of injecting initiation and subsequent patterns of drug use? Findings from a cohort of regular heroin and methamphetamine injectors in Melbourne, Australia. *The International journal on drug policy*. 2015;26(1):43-50.
14. Horyniak D, Agius PA, Degenhardt L, Reddel S, Higgs P, Aitken C, et al. Patterns of, and Factors Associated With, Illicit Pharmaceutical Opioid Analgesic Use in a Prospective Cohort of People Who Inject Drugs in Melbourne, Australia. *Substance use & misuse*. 2015;50(13):1650-9.
15. Darke S, Mattick RP, Degenhardt L. The ratio of non-fatal to fatal heroin overdose. *Addiction*. 2003;98(8):1169-71.
16. Stafford J, Burns L. Australian Drug Trends 2015: Findings from the Illicit Drug Reporting System (IDRS). Sydney: NDARC, 2016.

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