The impact of COVID-19 public health measures on attendance and overdose at supervised injecting facilities in Australia

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Abstract

Objectives: The COVID-19 pandemic disrupted service provision of harm reduction and drug treatment services for people who inject drugs in many countries. The two supervised injecting facilities (SIFs) in Sydney and Melbourne were differentially impacted by the pandemic, requiring local procedural changes in each service. We aimed to examine the impact of pandemic responses (including restrictions on movement, known as 'lockdowns') on service use and key parameters such as client reports of drug injected and recorded overdose rates.

Study Design: Time series analysis of weekly client visits and monthly overdoses occurring at each service.

Methods: Administrative client data from the two SIFs (Sydney data from 1 January 2018-30 April 2022; Melbourne data 1 July 2018-30 April 2022) were examined using interrupted time series analyses with lockdown dates in each state entered as interruption terms. We analysed weekly SIF visits overall and by drug type, and monthly rates of opioid overdose at each service.

Results: Lockdowns resulted in decreased visits to both services. The number of weekly client visits decreased during the first national lockdown for both the Sydney (trend change = -57.9; 95% CI [-109.4, -31.2]) and Melbourne SIF (near sig trend change= -54.8 [-110.8, 1.05]). Trends in visit numbers increased after lockdowns were lifted in each city, however visits in Sydney have not returned to numbers recorded prior to the pandemic. Visits to the Melbourne SIF related to heroin use declined at each lockdown (trend 1=-42.7 [-81.5, -3.9]; trend 2=-56.1 [-94.6, -17.7]; trend3=-33.8, [-94.6, -17.7]); heroin visits to the Sydney SIF declined during the first lockdown and remained low (trend =-55.6; [-82.8, -28.3]). Methamphetamine visits to the Sydney SIF fluctuated, surpassing heroin visits at several timepoints. Rates of monthly opioid overdoses at both services declined immediately following the start of the first lockdown (Sydney=-16.6 [-26.1, -6.8]; Melbourne=-6.4 [-8.7, -4.1]), with increasing trends recorded at the end of the final lockdown in each jurisdiction (Sydney=2.8 [0.6, 5.0]; Melbourne=1.3 [0.72, 3.2]).

Conclusions: Public health restrictions related to the COVID-19 pandemic were associated with reduced client visits to, and overdoses in, Australian SIFs. Variations were noted in drugs injected, likely reflecting changes in local drug markets. Shifts to other drugs during these

periods were evident; methamphetamine in Sydney; co-injection of heroin and diphenhydramine in Melbourne.

Introduction

The pandemic resulted in major disruptions across many countries, impacting treatment and harm reduction sectors providing services for people who inject drugs (1, 2). Internationally, needle and syringe distribution services (NSPs), drug consumption rooms and supervised injecting facilities (SIFs) were required to close at times due to staff shortages and/or the inability to comply with physical distancing requirements (3-6). Both Australian SIFs, the Uniting Medically Supervised Injecting Centre (MSIC) in Sydney and the North Richmond Community Health Medically Supervised Injecting Room (MSIR) in Melbourne, remained open throughout the pandemic; however, substantial procedural changes were implemented in compliance with public health requirements (7). Changes included limiting the number of injecting booths to comply with physical distancing, requiring staff and clients to wear masks, COVID-19 screening of clients and staff on service entry, and amending overdose response protocols to administer naloxone earlier (7).

A range of broader public health measures were implemented in Australia and internationally, including travel restrictions, border closures, stay-at-home directions and physical distancing requirements to reduce the transmission of COVID-19 (8, 9). Stay-at-home directions (known as 'lockdowns') involved restricting people from leaving home except for 1) accessing medical care; 2) attendance at essential services; 3) engaging in essential work; and 4) engaging in exercise (10). In many countries lockdowns were in place for extended periods (e.g. up to 12 weeks in Melbourne, Australia), impacting access to and use of essential services (6). People who inject drugs and those experiencing homelessness were increasingly visible to law enforcement during lockdowns, particularly when attending NSPs and SIFs (11-13). Research in Victoria, Australia showed that people who inject drugs received fines for breaching public health orders during lockdown at a rate higher than the general population (14).

Service disruption throughout the pandemic highlighted several concerns for people who inject drugs including; 1) potential risks in relation to re-use of injecting equipment (increasing the risks of bloodborne viral transmission and injecting-related injuries) (15); 2) increases in the likelihood of injecting episodes taking place in unsupervised environments; and 3) people injecting alone, increasing overdose risk (16).

This paper aims to assess the association between COVID-19 public health measures in Melbourne and Sydney and client visits to each facility. Acknowledging that a range of other

measures (e.g. border closures) were also in place, we analyse the association between the dates each city was in 'lockdown' and client visits to each service.

Prior to the pandemic, heroin was the drug injected onsite by the largest proportion of clients across both services (17) (personal communication MB – Research Co-ordinator MSIC). Previous disruptions to the Australian heroin market were associated with declines in opioid-related harms (18) and shifts to other drug use (19). It was anticipated that border closures implemented internationally and in Australia early in the pandemic would disrupt heroin supply (15, 20). Accordingly, we hypothesised lockdowns would be associated with:

1) A decline in injecting visits related to heroin across both SIFs;
2) A shift to injecting other drugs; and
3) A decline in rates of opioid overdose occurring onsite at both SIFs.

Methods

Study design

Setting: The Sydney and Melbourne SIFs. Data on client visits were extracted from administrative health care records collected at both services. Data from the Sydney SIF were extracted from 1 January 2018 to April 2022, representing two years prior to the pandemic and the first two years of the pandemic. Data from Melbourne were extracted from 1 July 2018 (the service opening date) to April 2022, representing 18-months prior to the pandemic and the first two years of the pandemic.

Participants: People ('clients') who visited the Sydney and Melbourne services to inject during the dates listed.

Outcome measures:

Number of weekly injecting visits (henceforth visits)*:* The number of client visits to each service that proceeded through to the injecting area.

Number of weekly visits by drug type: The number of client visits to each service by self-reported drug the client intended to inject as follows:

- heroin;
- methamphetamine; and
- heroin and diphenhydramine.

Differences in drug markets in Melbourne and Sydney necessitated different analyses of visits by drug type. While the largest proportion of clients across both services report injecting heroin (17, 21), a larger proportion of Sydney clients report injecting methamphetamine (personal communication with the MSIC Research Coordinator) than Melbourne clients and a larger proportion of Melbourne clients report co-injecting heroin and diphenhydramine (an antihistamine) (17). Accordingly, the additional outcome measure of interest for Melbourne was weekly visits where heroin and diphenhydramine were co-injected.

Rate of opioid overdoses per 1,000 visits per month (henceforth rates of overdose)**:** Opioid overdose comprises 97% of overdose managed at the Sydney SIF (personal communication with the MSIC Research Co-ordinator) and opioids are the drug injected in the majority of visits at the Melbourne SIF (17). Consequently, the focus of analysis was opioid overdose. Rates were calculated by counting the number of client opioid overdoses occurring onsite divided by the number of monthly injecting visits, then multiplied by 1,000. Client self-report of drug intended for injection is used to determine the drug implicated in an overdose. Studies

have shown close agreement between client self-report and toxicology analysis of injecting paraphernalia (22).

Statistical analysis: We assess trends in weekly injecting visits (overall and by drug) to both services for the time periods noted. We assess trends in monthly rates of overdose given that some weeks there was insufficient data to detect an effect. Both cities experienced extended lockdowns through 2020 and 2021, and varying levels of COVID-19 community transmission (7). Figure 1 displays the major lockdown periods by city. Lockdown dates were drawn from the Centre for Alcohol Policy and Research (CAPR) timeline (10), and only lockdowns extending beyond two weeks were included to enable more robust analysis of changes in visits.

Trends in injecting visits and overdoses were analysed using interrupted time series regression analyses. We used the approach described in Linden (23), which is based on an ordinary least-squares (OLS) regression model (adjusting for autocorrelation) regressing the outcomes on time. We were interested in the changes occurring at the introduction of each lockdown, trends during lockdown, changes at the conclusion of each lockdown, and trends outside of lockdown periods. Given the increasing visibility of clients of both services during lockdowns, we hypothesised we would see declines in visits specifically during these periods. Four interruption terms were included in the model for weekly Sydney visit data representing 1) the onset of the national lockdown; 2) the end of the first lockdown in Sydney; 3) the onset of the second lockdown in Sydney; 4) the end of the second lockdown in Sydney (Figure 1). Two effects are estimated at each interruption: one representing an absolute change in visit numbers (level change) and one representing a change in slope (trend change). Two interruption terms were included in the model for monthly Sydney overdose data representing the onset of two lockdowns. Six interruption terms (representing the onset and the end of three lockdowns) were included in the model for weekly Melbourne visit data (Figure 1) and three interruption terms (the onset of each lockdown) for monthly Melbourne overdose data.

Insert Figure 1 here

Sensitivity analysis – changes in service capacity at the Sydney SIF

To determine whether there was any association between client visits and reduced service capacity we undertook post hoc sensitivity analyses of service changes implemented at the Sydney SIF. Figure A1 in the appendices displays the dates major service changes that would be likely to influence client visits (reductions in the number of injecting booths and monitoring entry to the services) were implemented. Four interruption terms were included in the models assessing service changes in Sydney; Monitoring entry to the service – the introduction, and

end of these changes; Reduced (from a maximum of 16) injecting booths to less than 16– the introduction and the end (returning to 16 booths) of these changes. Entry monitoring and reductions in booths commenced at the same time as the first and second lockdowns so we present changes in trends occurring outside of these dates (Figure A1). It was not possible to model service changes at the Melbourne SIF as they were in effect from the commencement of the pandemic (March 2020) through to December 2021.

The assumption of independence of the linear regression model was assessed using the Durbin-Watson statistic, and residual plots were examined to assess autocorrelation. All statistical analysis was performed using Stata v17 (24).

Results

Changes to Sydney client visits

Prior to the first lockdown in Sydney, the trend in the number of injecting visits was stable. Visits declined significantly immediately following the start of both lockdowns and continued to decline for the duration of the first (on average by 58 visits per week; 95% CI: [-109.4, -6.4]) and second (on average by 16 visits per week; [-28.1, -3.7]) lockdown (Figure 2a; Table A1A). Declines during the first lockdown were largely driven by fewer visits where clients intended to inject heroin (reducing on average by 56 visits per week; [-82.8, -28.3]) (Figure 2b; Table A2A); declines during the second lockdown were driven by fewer visits where clients intended to inject methamphetamine (reducing on average by 10 visits per week; [-15.3, -5.3]) (Figure 2c; A3A).

At the end of the first and second lockdowns, a significant and positive change (increasing on average by 56 [3.1, 108.1] and 27 [11.4, 42.8] respectively) in the trend of weekly visits was recorded (Figure 2a; Table A1A); driven largely by increases in visits to inject heroin (increasing on average by 53 [24.8, 80.8]) at the end of the first lockdown, and by both heroin and methamphetamine visits (increasing on average by 13 [1.5, 24.4] and 13 [6.3,18.6] respectively) at the end of the second (Figure 2b and Figure 2c; Table A2A and Table A3A). Overall, the average number of weekly visits at the end of April 2022 represented just over half (58%) of the injecting visits recorded in the month prior to the pandemic.

Insert Figure 2 here

A crossover of heroin and methamphetamine injecting visits occurred at several points during the pandemic at the Sydney service (Figure 3). The number of methamphetamine visits exceeded numbers for heroin in January 2021 (outside of lockdown), and the inverse occurred

(with heroin injecting dominating) in November 2021, at the end of the second Sydney lockdown. Heroin and methamphetamine visits converged in January 2022 and remained equivalent through to May 2022.

Insert Figure 3 here

Rates of overdose - Sydney SIF

Prior to the first lockdown, trends in overdoses were stable. In the month following the first lockdown, the rate of overdoses dropped significantly on average by 17 per 1,000 visits [-26.1, -6.8]. While there was no immediate change in the rates of overdose following the start of the second lockdown, there was a significant increasing trend (on average by 3 per 1,000 visits [0.6, 5.0]) per month through to April 2022 (Figure 4; Table A4A). To date, rates of overdose at the Sydney service have not returned to those recorded prior to the pandemic.

Insert Figure 4 here

Sensitivity analyses - Sydney SIF service changes and client visits

There was no change in the trend in weekly visits at the end of the first period of service entry monitoring (September 2020), however a significantly increasing trend in weekly (on average 14 extra [1.5, 27.0]) visits following the end of the second period of monitoring (between December 2021 to April 2022) was recorded. There was no change in the trend of visits following the end of the first period of reduced injecting booths (9 March 2021), and no change in visits when the number of injecting booths were halved (from 16 to 8 booths) on 23 June 2021. The number of booths returned to the maximum on 16 December 2021 (the same time entry monitoring ceased) and a significant increase in weekly (14 extra – noted above) visits was recorded (Data shown in Appendices, Table A5A; Figure A2; Figure A3).

Changes to Melbourne client visits

Prior to the first lockdown in Melbourne, injecting visits to the service were steadily increasing by approximately 15 visits each week. Weekly injecting visits were unstable throughout the first lockdown (with a near-significant decline of 55 recorded [-110.8, 1.0]), declining significantly (by 63 [-120.7, -5.1]) throughout the second lockdown, and again throughout the third lockdown (by 62 [-119.2, -5.3]) (Figure 5a; Table A1B). Declining trends across lockdowns one and two were largely driven by weekly heroin visits (lockdown one;

significant decline of 43 visits [-81.5, -3.9]; lockdown two; significant decline of 56 visits [-94.6, -17.7]) (Figure 5b; Table A2B). Methamphetamine visits, although lower in number, also contributed to the declining trend (8 visits fewer [-14.1, -1.2]) throughout the first lockdown (Figure 5d; Table A3B). Declines recorded throughout the third lockdown were driven by both heroin (34 fewer [-67.4, -0.2]) and heroin and diphenhydramine (28 fewer [-40.4, -15.1]) visits.

No significant change in overall visits was recorded at the end of the first lockdown, however significant increases were recorded at the end of the second and third lockdowns (increases on average of 44 [15.8, 73.0] and 75 [3.3, 146.2] visits respectively), driven largely by heroin at the end of the second lockdown (36 more visits [11.0, 62.0]), and by both heroin (50 more visits [12.6, 87.2]) and heroin and diphenhydramine (25 more visits [11.0, 38.7]) at the end of the third (Figure 5; Table A2B; Table A2B1). Overall, the number of visits at the end of April 2022 were still only approximately two-thirds (65%) of the visits recorded in the month prior to the pandemic.

Rates of overdose - Melbourne SIF

Prior to the first lockdown, trends in overdoses were stable. In the month following the first lockdown, the rate of overdoses dropped significantly by 6 per 1,000 visits [-8.7, -4.1] and continued to decline for the duration of this lockdown. While there was no immediate change in the rates of overdose following the start of the second and third lockdowns, there was a significant change (increasing) in trend for the duration of the second (approximately 4 [1.6, 5.8] per 1,000 visits per month) and third lockdowns (approximately 1 [0.7, 3.1] per 1,000 visits per month) to April 2022 (Figure 5e; Table A4B). Overall rates of overdose occurring at the Melbourne service in April 2022 were slightly higher compared to the rate recorded in the month prior to the pandemic.

Insert Figure 5 here

Comparative analysis of overall visits Sydney and Melbourne

Two years after the first lockdown, client visits to the Sydney SIF remained disproportionately lower than pre-pandemic visits in comparison to visits to the Melbourne service during the same period (CHISQ 1df $p<0.00001$).

Discussion

The introduction of COVID-19 public health measures (specifically lockdowns) was associated with reduced client visits to both Australian SIFs, with diverging trends evident. The reduction in visits to the Sydney SIF was significantly more pronounced during the first lockdown (38% lower than the month prior to the pandemic) than for Melbourne (19% lower). Both services recorded significant reductions in visits during subsequent lockdowns, followed by a significant increase at the end of the final lockdown in each city. Visits to the Sydney SIF remained disproportionately lower than pre-pandemic visits in comparison to visits to the Melbourne service during the same period.

Both services saw reductions in heroin visits. Melbourne recorded significant declines through all three lockdowns, trends consistent with research showing heroin prices in Melbourne doubled from $50 per point in 2020 to $100 in 2021 (25). Visits to the Melbourne SIF for the co-injection of heroin and diphenhydramine increased between the second and third lockdown, suggesting clients were supplementing/potentiating heroin with diphenhydramine at a time when heroin was more expensive and less available (25). Toxicological analysis of syringe residue from the Melbourne SIF confirms co-injection of heroin and diphenhydramine was prevalent during this time (26).

Methamphetamine visits to the Melbourne SIF, although small in number, were immediately impacted at the beginning of the first lockdown and did not return to pre-pandemic levels. In contrast, methamphetamine visits to the Sydney SIF fluctuated. The period between the first and second lockdowns saw methamphetamine visits surpass heroin visits, suggesting some clients were switching from heroin to methamphetamine injecting during this period. This is consistent with research showing methamphetamine was readily available in Sydney, and cheaper in 2021 compared to 2020 (27). Increases in methamphetamine visits have continued (personal communication with the Medical Director MSIC).

Finally, declines in overdoses were reported at the first lockdown and increases seen in each service after the final lockdown; Sydney rates of overdose have not returned to pre-pandemic levels while Melbourne rates are slightly higher. Overdose trends may partly be explained by reduced heroin availability and potentially lower purity heroin during lockdown periods. Anecdotal evidence in Melbourne suggests tighter travel restrictions made it difficult to buy or sell heroin without greater scrutiny from the police. There is little evidence suggesting widespread adulteration of the heroin supply occurred in Sydney or Melbourne during the study period (22, 28), however, significant supply disruptions were evident (25, 27). High quality heroin appears to have returned to Melbourne, with increases in heroin overdose deaths being

recorded during 2022 (29). The high prevalence of methamphetamine injecting at the Sydney service, consistent with data showing increased numbers of amphetamine-related hospitalisations and declining presentations for opioids in NSW (30), suggests heroin availability has not returned to pre-pandemic levels in Sydney.

International literature shows that lockdown measures and restrictions on people's movement impacted many sectors and influenced client attendance at harm reductions services for a variety of reasons (1, 3-6). Stricter restrictions on distances people were allowed to travel, implemented in Melbourne during the lockdowns, may have impacted client attendance at the Melbourne service. Anecdotally, police presence in the vicinity of both services was high during lockdowns and may also have contributed to reduced visits.

Changes in drug markets in the first two years of the pandemic (2020-2021) were associated with changing use patterns among people who inject drugs in Australia; heroin use declined while methamphetamine use increased in some jurisdictions (31, 32). Changes in the heroin market appeared to impact which drugs were being injected at both SIFs.

These findings have important clinical and public health implications. One of the concerns related to reduced visits to both services is that clients may be injecting in unsupervised environments elsewhere, with less access to sterile injecting equipment and potentially on their own. This concern highlights the importance of providing take-home naloxone across a diverse range of services including NSPs, SIFs and outreach teams to minimise the potential risks of unsupervised injecting episodes.

Supervised injecting facilities play a crucial role in facilitating access to broader health care. Reductions in client visits may mean there is reduced access for these groups to ancillary health care and service support. The pandemic, and the resulting uncertainty around the illicit drug market supply, has highlighted the need for increasing flexibility in service delivery of harm reduction strategies, including outreach programs and SIFs, for people who inject drugs. The model of wraparound services provided at the Melbourne SIF, including onsite hepatitis C testing and treatment, oral health care, and opioid pharmacotherapy/agonist treatment and housing supports is invaluable in providing high-quality care for clients. Likewise, the geographic location of the Sydney SIF, close to other harm reduction services, and the longstanding relationships with these services, is critical in providing comprehensive client care.

Limitations

As we modelled injecting visits by week rather than daily, the lockdown terms modelled, and where they were entered in the interrupted time series analysis, do not map perfectly to lockdown commencement/completion dates. This was also an issue for monthly overdose rates. Melbourne experienced three shorter lockdowns during the study period (https://lockdownstats.melbourne/timeline/) which we were unable to model.

In addition, it was not possible for us to separate the effects of the commencement of lockdown from service changes implemented, some of which occurred on the same dates. Sensitivity analyses of service changes at the Sydney SIF occurring outside of lockdown dates suggest these changes were not as impactful on client visits as lockdowns were.

Trends in visits by drug is based on client self-report of what they think they are injecting before each visit. In the absence of toxicology analysis, we are unable to assess objectively whether they injected that drug or another drug entirely, and whether contaminants were present.

Finally, there may be other changes we have not accounted for that may have contributed to reductions in visits (e.g., periods of incarceration, entering drug treatment, moving out of area, gaining temporary accommodation).

Conclusions

Analysis of changes in client visits to the two Australian SIFs following the introduction of lockdowns during the pandemic confirmed our hypotheses. There was a clear association between lockdown dates and declines in the number of client visits recorded at both services. Clients appeared to shift to injecting drugs other than/in addition to heroin (heroin and diphenhydramine in Melbourne; methamphetamine in Sydney) during lockdowns. Monthly overdose rates also declined. The pandemic and associated lockdowns appear to have had a longer-term impact on the Sydney service with visit numbers remaining lower at the time of writing than prior to the pandemic. The pandemic has highlighted the need for increasing flexibility in delivery of harm reduction services including SIFs. SIFs play an important role in facilitating access to health care, drug treatment and social supports for people who use drugs, and their impact extends beyond responding to overdose.

Figure 1: Major lockdowns dates in Sydney and Melbourne, 2020 to 2021

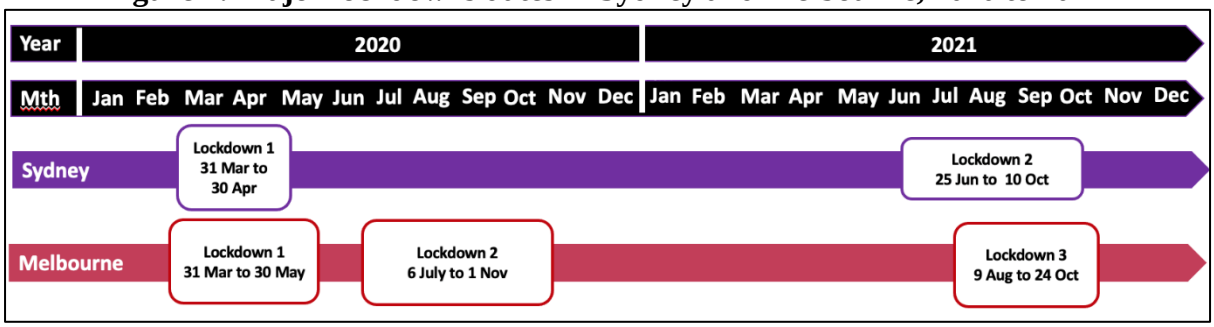


Figure 2: Time series analysis of Sydney lockdowns on injecting visits – Sydney MSIC

Figure 2a: Total injecting visits

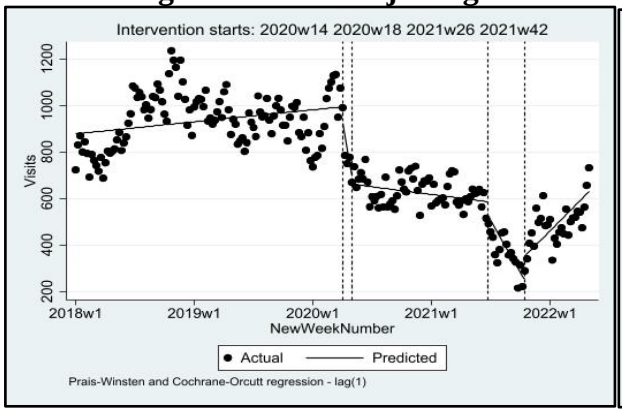


Figure 2b: Heroin injecting visits

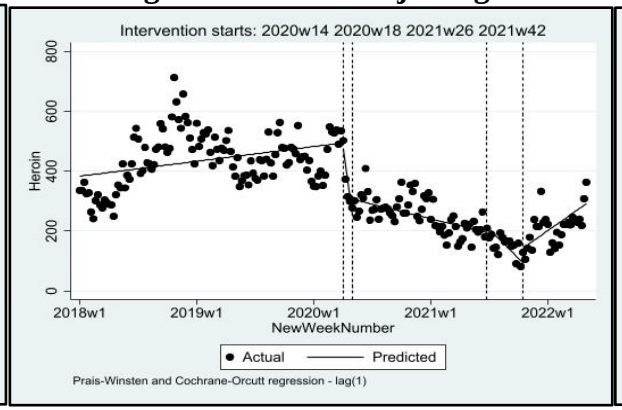
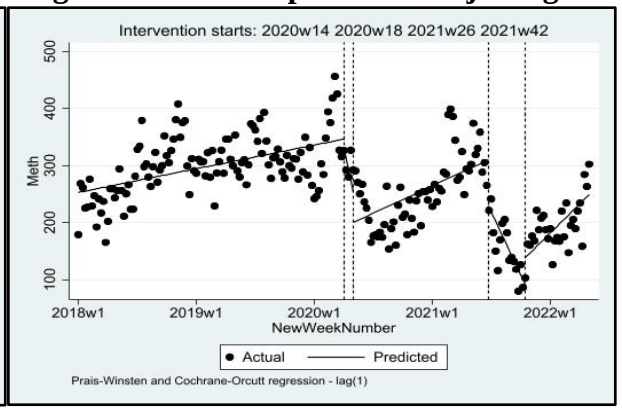


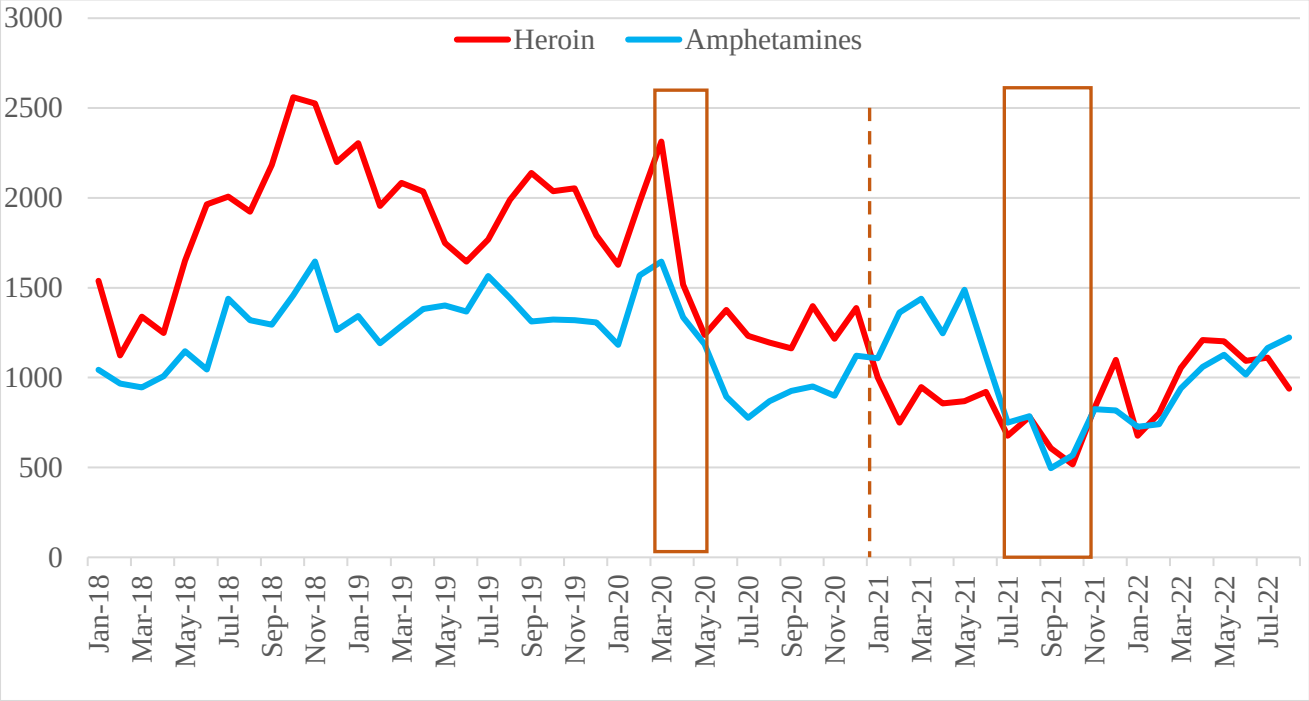
Figure 2c: Methamphetamine injecting visits



Injecting visits trend visualisation			Heroin visits trend visualisation			Methamphetamine visits trend visualisation		
LD terms	**Immediate change**	**Trend change**	**LD Terms**	**Immediate change**	**Trend change**	**LD Terms**	**Immediate change**	**Trend change**
LD1	↓	↓	**LD1**	↓	↓	**LD1**	↔	↔
End LD1	↔	↑	**End LD1**	↔	↑	**End LD1**	↔	↔
LD2	↓	↓	**LD2**	↔	↔	**LD2**	↓	↓
End LD2	↑	↑	**End LD2**	↔	↑	**End LD2**	↔	↑

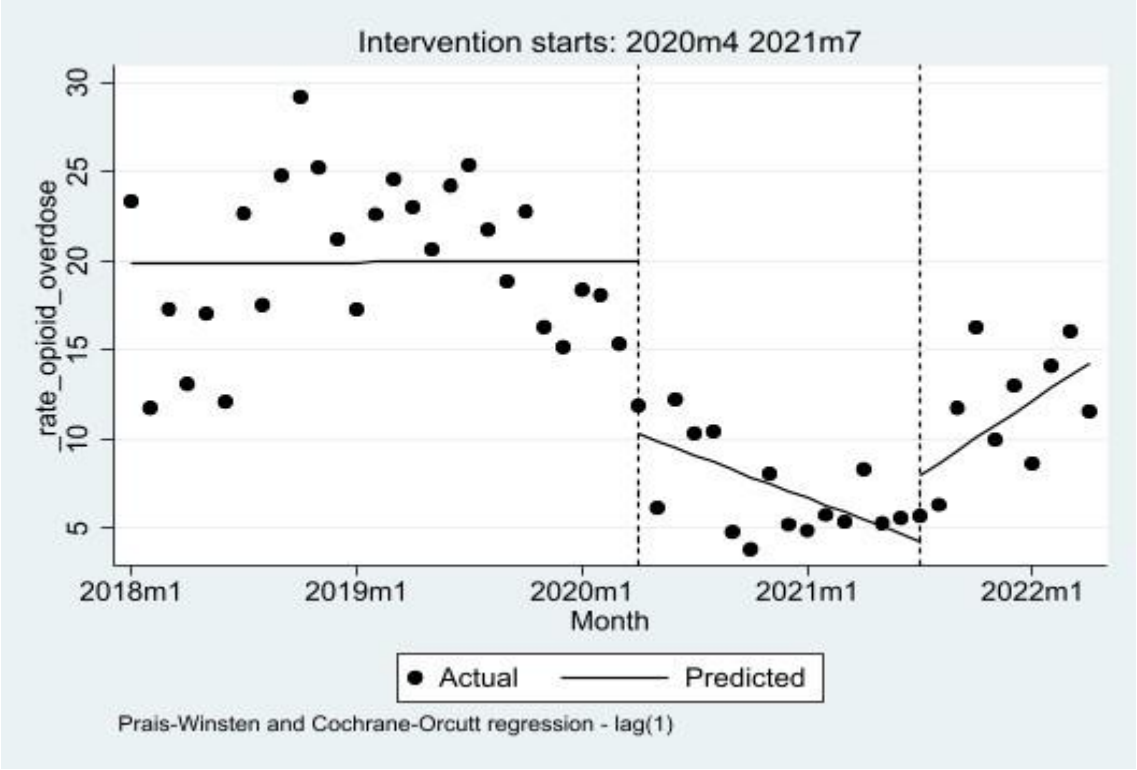
LD=Lockdown Upward arrows denote an increasing trend, downward arrows denote a decreasing trend, and horizontal arrows denote no change.

Figure 3: Numbers of heroin and amphetamine injecting visits, Sydney MSIC



NB: Rectangles represent the periods for Sydney lockdowns. Dashed vertical lines represent points where heroin and methamphetamine injecting crossover (Jan 21 and Aug 21).

Figure 4: Time series analysis of Sydney lockdowns on rates of overdose Sydney MSIC

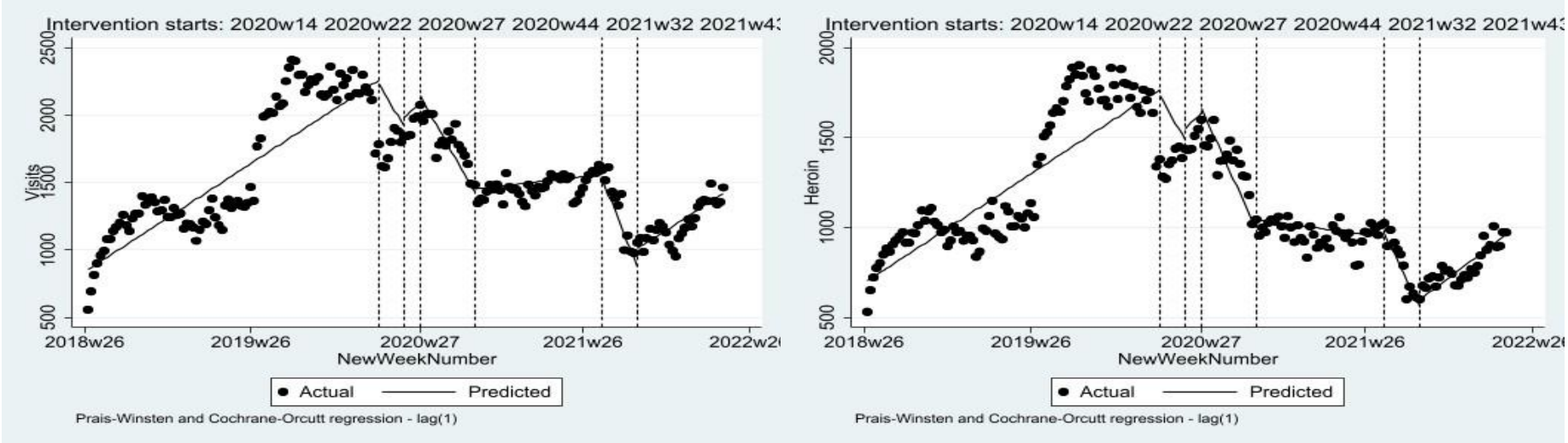


Rates of overdose trend visualisation		
LD terms	**Immediate change**	**Trend change**
LD1	↓	↔
LD2	↔	↑

LD=Lockdown.

Figure 5: Time series analysis of Melbourne lockdowns on injecting visits – Melbourne MSIR

Figure 5a: Total injecting visits **Figure 5b: Heroin injecting visits**



Injecting visits trend visualisation			Heroin visits trend visualisation		
LD terms	**Immediate change**	**Trend change**	**LD Terms**	**Immediate change**	**Trend change**
LD1	↔	↔	**LD1**	↔	↓
End LD1	↔	↔	**End LD1**	↑	↔
LD2	↔	↓	**LD2**	↔	↓
End LD2	↔	↑	**End LD2**	↔	↑
LD3	↔	↓	**LD3**	↔	↓
End LD3	↔	↑	**End LD3**	↔	↑

Figure 5c: Heroin and diphenhydramine injecting visits

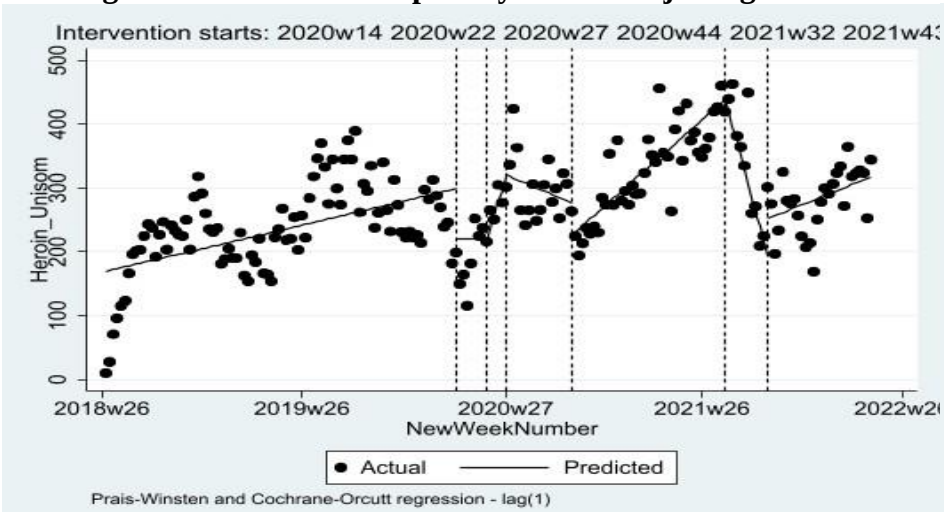
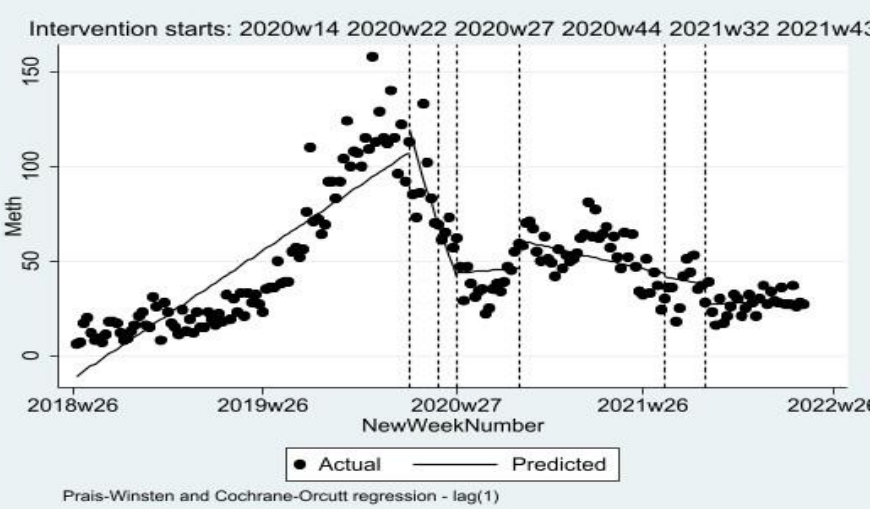
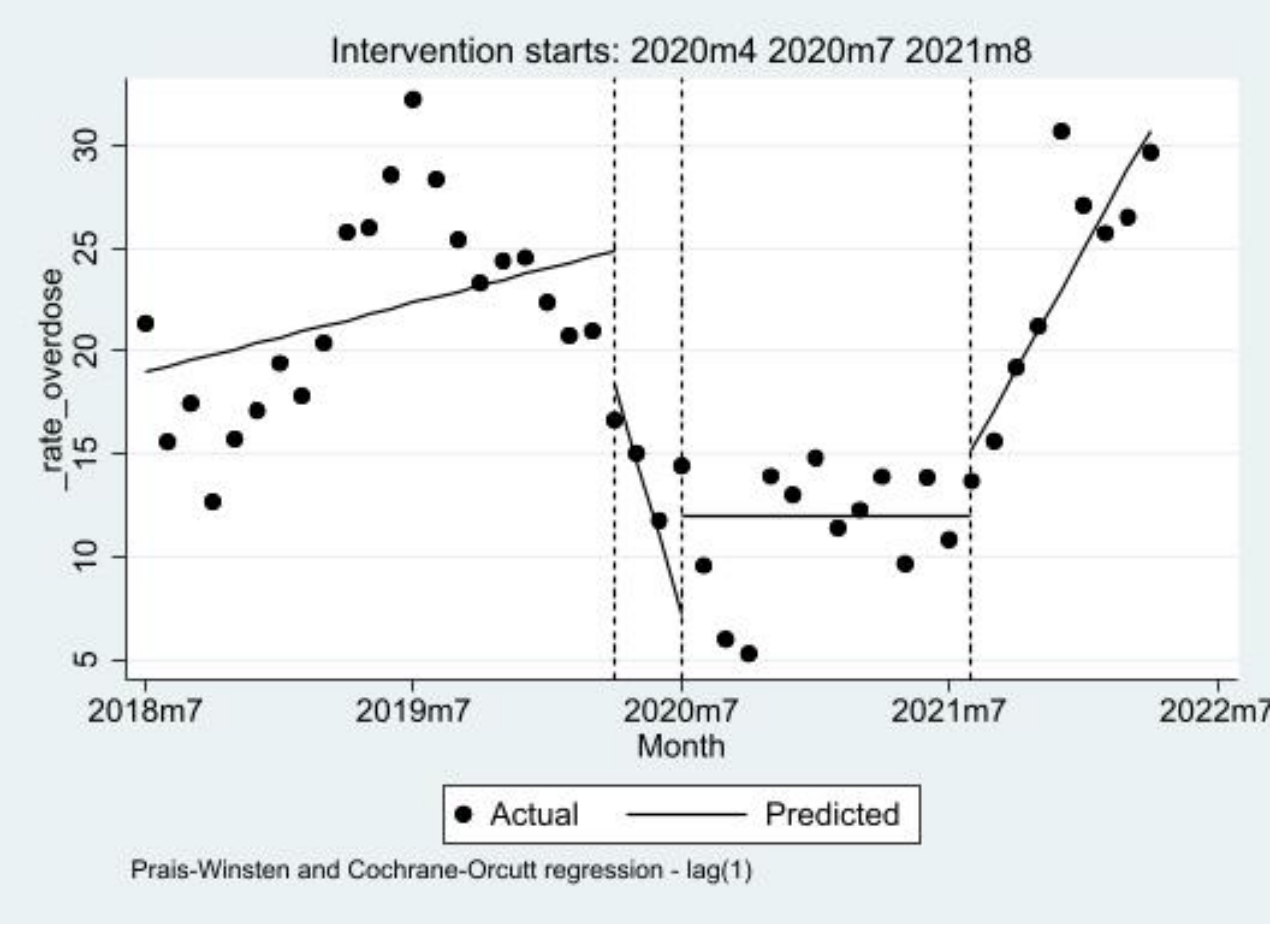


Figure 5d: Methamphetamine injecting visits



Heroin and diphenhydramine visits trend visualisation			Methamphetamine visits trend visualisation		
LD terms	**Immediate change**	**Trend change**	**LD Terms**	**Immediate change**	**Trend change**
LD1	↓	↔	**LD1**	↔	↓
End LD1	↔	↔	**End LD1**	↔	↔
LD2	↔	↔	**LD2**	↔	↔
End LD2	↔	↑	**End LD2**	↔	↔
LD3	↔	↓	**LD3**	↔	↔
End LD3	↔	↑	**End LD3**	↔	↔

Figure 5e: Time series analysis of Melbourne lockdowns on monthly rates of overdose – Melbourne MSIR



Rates of overdose visualisation		
LD terms	**Immediate change**	**Trend change**
LD1	↓	↓
LD2	↔	↑
LD3	↔	↑

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