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Implications of high prevalence of recreational drug use among cases of infectious syphilis: insights from state-wide surveillance data, South Australia, July 2022 – September 2023

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Abstract

Background

Both injecting drug use (IDU) and drug use by non-injecting routes only (non-IDU) are recognised internationally as behavioural risk factors for syphilis. In Australia, this association has predominantly been assessed in sexual health services. To generate evidence supporting regular screening and timely symptomatic testing of all at-risk populations, South Australia in 2022 commenced routine collection of drug use information for statutory syphilis surveillance.

Methods

We analysed reported IDU and non-IDU for all cases of infectious syphilis notified during the period 1 July 2022 – 30 September 2023 by demographic, clinical, and diagnosing provider characteristics. We used descriptive analyses and univariable logistic regression to compare IDU cases and non-IDU cases separately to cases reporting no drug use.

Results

There were 450 notifications during the 15-month period. Among the 92% of notifications with available information, IDU was reported for 10% of cases and non-IDU for 17%. Drug use of any kind was more common among females, cases diagnosed outside specialist services, and heterosexual and bisexual cases. Differences by city versus regional or remote location and symptom status were less notable. Only the increased odds of IDU among females (odds ratio (OR): 2.8; 95% confidence interval (95% CI): 1.2–6.3) and the increased odds of either type of drug use among cases reporting sexual partners of a different sex (IDU: OR: 2.5; 95% CI: 1.2–5.3; non-IDU: OR: 3.0; 95% CI: 1.7–5.4) and of partners of both sexes for non-IDU (OR: 3.0; 95% CI: 1.4–6.6) reached statistical significance.

Conclusion

These data demonstrate a high prevalence of IDU and non-IDU amongst syphilis cases diagnosed outside sexual health services. Females and heterosexuals report drug use more frequently than men who have sex with men (MSM). In response, the correctional and drug and alcohol sectors have been engaged to increase routine screening and primary care providers alerted to recreational drug use as a risk factor for syphilis.

Keywords: syphilis; surveillance; re-emerging disease; sexually transmitted disease; infectious disease; drug use; methamphetamine; Australia

Background

Syphilis is a primarily sexually transmitted infection (STI) caused by *Treponema pallidum*, which has re-emerged as a considerable public health concern in Australia and internationally. Over the past ten years, the number of infectious syphilis notifications in Australia has risen more than threefold.[1] In the state of South Australia, this trend has been still more pronounced: case numbers have risen almost sixfold since the state adopted the national surveillance case definition for infectious syphilis, increasing from 56 cases in 2015 to 323 cases in 2023.[i] While notifications have increased among populations of all sexual orientations, the greatest relative increase in the past five years has been observed among women and among men reporting female or bisexual contact.[ii] In Australia, infectious syphilis disproportionately affects men who have sex with men (MSM) and Aboriginal and Torres Strait Islander peoples.[2] Males continue to experience higher notification rates than do females, due to ongoing high rates of syphilis among MSM. Nevertheless, the male-to-female notification rate ratio has narrowed considerably over the past ten years, dropping to 3.8 male cases for each female case in 2023 from 10.8 male cases for each female case in 2014.[3] As a result of the changing epidemiology towards more frequent heterosexual transmission, the state recorded three cases of congenital syphilis between 2017 and 2023, the first such cases since the 1990s.[4]

Recreational drug use is recognised internationally as a behavioural risk factor for syphilis infection. This includes chemsex, defined as the sexualised use of drugs with the specific purpose of enhancing sexual pleasure or performance predominantly among MSM.[5] The intersection between non-sexualised recreational drug use and syphilis among the general population has been documented since the 1980s and 1990s, with highlighting of links between cocaine use and transactional sex with multiple anonymous partners.[6–8] More recently, increases in early syphilis among heterosexual populations in the United States of America (USA) have been attributed to increasing prevalence of drug use, particularly injecting drug use (IDU) and any route of methamphetamine consumption.[9,10]

Non-injecting, non-methamphetamine drug use such as cannabis consumption has also been linked to an increased frequency of sexual risk taking, such as a greater number of partners and a higher likelihood of previous STI diagnoses.[11]

In Australia, the role of non-sexualised recreational drug use in syphilis transmission has predominantly been assessed among clients of specialist sexual health services. A retrospective cohort study of MSM attending Melbourne Sexual Health Centre identified IDU as an independent risk factor for incident syphilis.[12] The association was stronger for use in the previous 12 months than for use that ceased more than 12 months ago.[12] An analysis of data from sexual health clinics participating in the Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmissible Infections and Blood Borne Viruses (ACCESS) found a significantly higher rate of infectious syphilis among women who reported IDU in the previous twelve months than among other women, with a similar but less pronounced association among heterosexual males.[13]

Against the backdrop of increasing heterosexual transmission of syphilis and mounting international evidence of recreational drug use as one of the drivers of this epidemiological shift, the State Government of South Australia Department of Health (SA Health) commenced routine collection of information on drug use as part of statewide syphilis surveillance in 2022. The intention of the change in surveillance practice was to generate local data to strengthen the case for system and service-specific changes in support of regular screening and timely symptomatic testing of all at-risk populations. To our knowledge, this is the first Australian report of state-wide patterns of drug use among syphilis cases regardless of the diagnosing service.

i Government of South Australia Department of Health, Communicable Disease Control Branch. Unpublished data.

ii ibid.

Material and methods

Syphilis is a notifiable condition under the South Australian *Public Health Act 2011*.[14] The state has a dual notification system, which requires notification by the testing laboratory and the diagnosing medical practitioner. The *Public Health Act* does not prescribe which information can be sought from medical notifiers, instead delegating this determination to the Chief Public Health Officer.[14] Within this statutory framework, at the end of April 2022, South Australia introduced a new syphilis notification form for medical practitioners. The new form for the first time collected data on drug use in the past 12 months. Specifically, the form prompts notifiers to indicate whether reported drug use consisted of IDU and/or non-injecting drug use (non-IDU) and asks them to specify the drugs consumed, if known.[15] Where any of these data were missing, information regarding drug use ascertained from the case as a result of partner notification was substituted. This occurred as part of a regular case conference between the Communicable Disease Control Branch at SA Health and the statewide Partner Notification Service located at the Adelaide Sexual Health Centre that is standard practice in South Australia. During the case conference, any missing surveillance data from the medical notification that was obtained by the partner notification officers during the case interview is added to the surveillance database and subsequently becomes undistinguishable from data obtained from the original medical notifier.

We extracted standardised surveillance data from the SA Health Notifiable Infectious Disease Surveillance database (NIDS) for all probable and confirmed cases of infectious syphilis notified between 1 July 2022 and 30 September 2023. The study period commenced on 1 July 2022 to allow two months for notifiers to adopt the new notification form and ensure greater completeness of newly introduced data items. Drug use was categorised by route of administration into IDU and drug use by any other route (non-IDU). We analysed reported drug use by demographic, clinical, and diagnosing provider characteristics using descriptive analysis and assessed the overall difference in frequency distribution using χ^2 and Fisher's exact tests. We then conducted separate univariable logistic regression analyses for IDU and non-IDU. For both the difference in proportions and the logistic regression models, we analysed drug use outcomes separately by route of administration, i.e. we compared cases reporting IDU (regardless of whether they also consumed non-injected drugs) to cases reporting no drug use, and cases reporting non-IDU only to cases reporting no drug use. For the descriptive and univariable regression analyses by drug use status, we excluded cases with missing data in the relevant categories. The diagnosing service was classified as a specialist sexual health service where there is stand-alone centralised expertise in sexual health: in South Australia this includes Adelaide Sexual Health Service, SHINE SA, and O'Brien Street Practice. All analyses were undertaken in Stata 17.

Data were collected and analysed as part of routine statutory disease surveillance and quality assurance. Ethical review was therefore not required. We obtained data custodian approval for the use of de-identified routine surveillance data for the purpose of this report.

Results

There were 450 probable and confirmed cases of infectious syphilis notified during the 15-month study period. Females accounted for 14% of cases (n = 62/450) during this time period, and 57% of cases (n = 257/450) were diagnosed outside specialist sexual health services. Information on drug use was available for 92% of notifications (n = 412/450). Data completeness varied significantly by provider type, ranging from no missing data for notifications received from prison health services to 67% of notifications from Aboriginal health services missing drug use data (Table 1).

Table 1: Notifications of probable and confirmed cases of infectious syphilis by reported drug use and diagnosing service, South Australia, 1 July 2022 – 30 September 2023

Diagnosing service	Drug use, n (%)[a]				
	None reported	IDU only	Non-IDU only	IDU and non-IDU	Not stated
Specialist service[b]	150 (78%)	10 (5%)	25 (13%)	6 (3%)	2 (1%)
Aboriginal health service[c]	4 (17%)	4 (17%)	0	0	16 (67%)
General practice	114 (70%)	4 (3%)	29 (18%)	3 (2%)	12 (7%)
Prison health service	5 (31%)	4 (25%)	4 (25%)	3 (19%)	0
Other services[d]	31 (56%)	3 (5%)	10 (18%)	3 (5%)	8 (15%)

a IDU: injecting drug use; non-IDU: non-injecting drug use. Percentages are calculated by diagnosing service type.

b The following services are considered to specialise in sexual health and STI management: Adelaide Sexual Health Centre (ASHC), SHINE SA and O'Brien Street Practice.

c Includes both community-controlled services and other services.

d Includes hospital outpatient departments.

Among the cases with available information, IDU only was reported for 6% of cases (n = 25/412) and non-IDU only for 17% of cases (n = 68/412). A combination of both IDU and non-IDU was reported for 3% of cases (n = 15/412). In the following analyses, the categories of IDU-only and both IDU and non-IDU are reported together in the IDU category, accounting for a combined 10% of syphilis cases (n = 40/412).

The frequency of case and provider characteristics by drug use status is summarised in Table 2. Drug use was more common among female syphilis cases (18% vs. 9% for IDU; 22% vs. 16% for non-IDU); among cases diagnosed outside specialist services (11% vs. 8% for IDU; 19% vs. 13% for non-IDU); and among heterosexual and bisexual cases compared to cases among MSM (14% vs. 7% and 13% vs. 7% for IDU, respectively; both 25% vs. 11% for non-IDU). Higher prevalence of reported drug use was also observed for cases residing outside metropolitan Adelaide (13% vs. 9% for IDU; 23% vs. 16% for non-IDU). The presence of symptoms compatible with infectious syphilis at the time of diagnosis was the only characteristic with diverging trends for injecting and non-injecting drug use, with symptomatic cases slightly more likely than asymptomatic cases to report non-IDU (18% vs. 15%), but less likely to report IDU (8% vs. 12%). The difference in the overall frequency distribution was statistically significant only for the category sex at birth for IDU compared to no drug use (p = 0.014) and for sexual exposure for both routes of drug administration compared to no drug use (p = 0.033 for IDU, p = 0.001 for non-IDU).

In univariable logistic regression (Table 3), statistical significance was reached only for the increased odds of IDU among females compared to males (odds ratio, OR: 2.8; 95% CI: 1.2–6.3); for the increased odds of both IDU and non-IDU among cases reporting sexual partners of a different sex compared to cases among MSM (IDU: OR: 2.5; 95% CI: 1.2–5.3; non-IDU: OR: 3.0; 95% CI: 1.7–5.4); and for the increased odds of non-IDU among cases reporting partners of a different sex compared to cases reporting partners of more than one sex (OR: 3.0; 95% CI: 1.4–6.6). The elevated odds of non-IDU among cases diagnosed outside specialist sexual health services (OR: 1.7; 95% CI: 0.97–2.9) also approached statistical significance.

Table 2: Drug use among cases of infectious syphilis by key characteristics, South Australia, 1 July 2022 – 30 September 2023

Category	Characteristic	No drug use reported	IDU[a]	*p* value (χ^2)[b]	non-IDU[a] only	*p* value (χ^2)[b]
Sex at birth	Male	275 (76%)	31 (9%)	0.014	57 (16%)	0.110
	Female	29 (59%)	9 (18%)		11 (22%)	
Location at time of diagnosis	Metropolitan Adelaide	283 (74%)	36 (9%)	0.513[c]	61 (16%)	0.339
	Rest of South Australia	21 (66%)	4 (13%)		7 (23%)	
Diagnosing service	Specialist service[d]	150 (79%)	16 (8%)	0.266	25 (13%)	0.060
	Non-specialist service	154 (70%)	24 (11%)		43 (19%)	
Sexual exposure (by sex at birth)	Same sex	197 (82%)	17 (7%)	0.033[c]	26 (11%)	0.001[c]
	Other sex	73 (62%)	16 (14%)		29 (25%)	
	Partners of more than one sex	30 (63%)	6 (13%)		12 (25%)	
	Other or not stated	4 (67%)	1 (17%)		1 (17%)	
Symptom status at time of diagnosis	Asymptomatic	134 (73%)	22 (12%)	0.192	28 (15%)	0.663
	Symptoms of syphilis	170 (75%)	18 (8%)		40 (18%)	
Total	—	304 (74%)	40 (10%)	—	68 (17%)	—

a IDU: injecting drug use; non-IDU: non-injecting drug use. For purposes of calculation, 'IDU' includes also those cases reporting both IDU and non-IDU. Row percentages are shown for reported case numbers.

b Overall difference in frequency distribution in comparison to cases with no reported no drug use.

c For variables containing a value of less than five cases in any cross-tabulation, Fisher's exact test was substituted.

d The following services are considered to specialise in sexual health and STI management: Adelaide Sexual Health Centre (ASHC), SHINE SA and O'Brien Street Practice.

Table 3: Drug use among cases of infectious syphilis by key characteristics, under a univariable logistic regression analysis, South Australia, 1 July 2022 – 30 September 2023

		Model 1: IDU[a] compared to no drug use			Model 2: non-IDU[a] only compared to no drug use		
Category	**Characteristic**	**OR[b]**	**95% CI[c]**	***p* value**	**OR[b]**	**95% CI[c]**	***p* value**
Sex at birth	Male	Ref.	—	—	Ref.	—	—
	Female	2.8	1.2–6.3	0.017	1.8	0.9–3.9	0.114
Location at time of diagnosis	Metropolitan Adelaide	Ref.	—	—	Ref.	—	—
	Rest of South Australia	1.5	0.5–4.6	0.481	1.5	0.6–3.8	0.342
Diagnosing service	Specialist service[d]	Ref.	—	—	Ref.	—	—
	Non-specialist service	1.5	0.7–2.9	0.268	1.7	0.97–2.9	0.062
Sexual exposure (by sex at birth)	Same sex	Ref.	—	—	Ref.	—	—
	Other sex	2.5	1.2–5.3	0.013	3.0	1.7–5.4	< 0.001
	Partners of more than one sex	2.3	0.8–6.3	0.102	3.0	1.4–6.6	0.006
	Other or not stated	2.9	0.3–27.4	0.353	1.9	0.2–17.6	0.574
Symptom status at time of diagnosis	Asymptomatic	Ref.	—	—	Ref.	—	—
	Symptoms of syphilis	0.6	0.3–1.3	0.195	1.2	0.7–2.0	0.663

a IDU: injecting drug use; non-IDU: non-injecting drug use. For purposes of calculation, 'IDU' includes also those cases reporting both IDU and non-IDU.

b OR: crude odds ratio; Ref.: reference.

c 95% CI: 95% confidence interval.

d The following services are considered to specialise in sexual health and STI management: Adelaide Sexual Health Centre (ASHC), SHINE SA and O'Brien Street Practice.

For cases reporting IDU, details of the drug or drugs consumed were available for 83% of reports (n = 33/40). This includes six cases indicating injection of more than one substance. Methamphetamine injection was reported for 28 cases; an additional three reports referred to amphetamine; and one report specified crystal methamphetamine. Heroin use was reported for five cases. For one case each, the notifying medical practitioner indicated injection of alkyl nitrites or gamma-hydroxybutyrate (GHB), respectively.

There was a greater variety of non-injecting drugs reported. Among the 94% of cases (n = 64/68) for whom only non-IDU was reported and drug details were available, there were 33 reports of methamphetamine use; 28 reports of cannabis use (delta-9-tetrahydrocannabinol or THC); nine reports of cocaine use; six reports of GHB use; and four reports of alkyl nitrite use. In addition, there were three reports each of crystal methamphetamine and MDMA/ecstasy (3,4-methylenedioxymethamphetamine) use, as well as one report each of heroin, lysergic acid diethylamide (LSD), and benzodiazepine use. For 18% of cases (n = 12/68), non-injecting consumption of two substances was reported, and for an additional 9% of cases (n = 6/68), consumption of three or more substances was reported.

Among the 15 cases who reported a combination of injecting and non-injecting drug use, 67% (n = 10/15) had information for both types of drugs used. The most frequent combinations were injecting of an amphetamine (predominantly methamphetamine) and consumption of cannabis/THC (n = 6) and injecting and non-injecting administration of amphetamines (n = 4).

Discussion and conclusion

Although high prevalence of recreational drug use among cases of infectious syphilis has previously been noted internationally, this is the first report of similar findings from state-wide surveillance in an Australian jurisdiction. Our analysis demonstrates a high prevalence of IDU and non-IDU amongst syphilis cases overall: 10% of cases disclosed IDU in the past 12 months and an additional 17% of cases reported non-IDU only. The percentage of cases reporting IDU in South Australia represents double the peak prevalence of 4.9% reported by the United States (US) Centers for Disease Control and Prevention in their analysis spanning the years 2013–2017;[9] it is also higher than the 6.9% observed in Missouri over a similar time period.[10] The markedly higher prevalence of IDU in South Australia compared to US data holds across subgroups by sex at birth and by sexual orientation. Our data also confirms the pattern of higher IDU prevalence among female cases compared to males reported by other research, including in the USA[9,10] and in a previous Australian study.[13] Previous research did not disaggregate drug use patterns by the type of diagnosing service. While not reaching statistical significance, our study demonstrates a clear trend towards higher prevalence of both IDU and non-IDU among cases of syphilis diagnosed outside specialist services in South Australia. This association is stronger for cases reporting non-IDU only. Given that these services disproportionately serve MSM and other priority populations, this finding correlates with the observation that females and heterosexuals diagnosed with syphilis report drug use more frequently than the traditional priority population of MSM.

In South Australia, the results of this research have highlighted the importance of improving access to sexual health care, including comprehensive guideline-based STI testing, for people who use drugs recreationally as a key syphilis prevention strategy. To date, several strategies have been progressed towards this goal, including prioritisation of the correctional and drug and alcohol sectors within efforts to increase routine syphilis testing within the community. Furthermore, noting the long-standing trust, social capital and expertise that community led hepatitis C prevention and health promotion programs have developed with people who use drugs, in South Australia these programs have been re-oriented to routinely integrate syphilis prevention messaging into their engagement with this population.

In addition, efforts have been made to alert mainstream primary care providers to recreational drug use as a risk factor for syphilis infection.

These results also reinforce the importance of strategies to support consistent implementation of updated recommendations in the current *Australian STI Management Guidelines for Use in Primary Care*. These guidelines now stipulate that HIV and syphilis testing should be offered whenever STI testing is indicated, including as part of all standard asymptomatic STI testing.[2] However, implementation of concurrent syphilis serology when screening for gonorrhoea and chlamydia is only one of the challenges that providers who do not specialise in sexual health face in detecting syphilis in their patient cohorts. The *Australian STI Management Guidelines'* recommendations for people who use drugs stop short of describing drug use, particularly injecting or non-injecting use of methamphetamines and GHB, as an independent indicator for syphilis testing. As a result, the challenge remains for these providers to consider evidence of drug use as a prompt to initiate a discussion of sexual history and recommended syphilis testing according to sexual risk. Conversely, other Australian states such as Western Australia have incorporated clear advice into local guidelines to consider drug use a risk factor for syphilis acquisition in asymptomatic, sexually active people who use drugs in non-sexual contexts.[16]

In addition to the use of surveillance data to provide a state-wide analysis of drug use among syphilis cases, a key strength of this study was high data completeness in relation to drug use. In our study, this information was unavailable for only 8% of cases overall. By contrast, a US national analysis related to drug use reported a missing data range of 18–25% depending on the year and variable;[7] state-level surveillance data in Missouri had 14% missing data.[8] Conversely, in our study, comparatively low data completeness from Aboriginal health services limits relevance of these findings to the sector. The difference in data completeness is in part due to a major Aboriginal health service not utilising the new notification form at the time of data collection and completing all case follow up independently of the public health unit. However, most major Aboriginal health services, particularly in regional and remote South Australia, have long-standing yearly syphilis screening programs.

In addition to differential data completeness, other key limitations of this study relate to the use of surveillance data from a relatively small jurisdiction in terms of population. The use of surveillance data necessarily restricts the denominator for prevalence of drug use to all cases of syphilis and cannot compare prevalence among cases to prevalence among all persons at risk of syphilis acquisition, or among all clients undergoing testing. Data from the 2022–2023 National Drug Strategy Household Survey for South Australia indicates that 17.9% of respondents used any illicit drug in the past 12 months and a combined 1% reported using amphetamines and/or heroin, the two most frequently injected drugs amongst our cohort of syphilis cases.[17] While these figures give an indication of the prevalence in the general population, the survey does not distinguish between injecting and non-injecting drug use and respondents cannot be assumed to be sexually active. Service-based studies, which are able to ascertain the prevalence of drug use among all clients regardless of syphilis status, reported use of injecting drugs in the past 12 months as 2% among MSM attending Melbourne Sexual Health Centre[10] and 2.1 and 3%, respectively, among heterosexual men and women attending specialist services participating in the ACCESS network.[11] This suggests that rather than reflecting a high level of drug use in the underlying population of sexually active persons seeking sexual health care, drug use is indeed elevated among persons diagnosed with syphilis and therefore a useful marker of risk that can help direct service provision.

Owing to the overall small population of our jurisdiction, the small numbers of cases limited the usefulness of the regression analysis and precluded multivariate analysis. Additional years of data collection are needed to further analyse observed differences, including symptom status for which diverging trends were seen among cases reporting IDU and non-IDU that may suggest less frequent asymptomatic testing among patients reporting non-IDU only.

Our findings provide new evidence that both injecting and non-injecting recreational drug use are highly prevalent among cases of infectious syphilis diagnosed in South Australia and may represent one of the drivers of recent increases in cases among women and heterosexual men. These results underscore the importance of improving access to sexual health care, including comprehensive guideline-based STI testing, as a key syphilis prevention strategy for people who use drugs.

Health services and community-led programs which have established links with people who use drugs have an important role to play in pursuit of this aim. More broadly, mainstream healthcare providers not specialising in sexual health or addiction medicine should be alert to drug use as a prompt to discuss sexual history, and to offer syphilis testing. Increased testing of non-traditional risk populations that are currently bearing the brunt of the increased disease burden in all appropriate healthcare settings is a key instrument to limit onward transmission and to control the burgeoning syphilis epidemic in South Australia and nationally.

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Data availability

All data are owned by the Communicable Disease Control Branch at SA Health. All requests for data need to be approved by the data custodian.

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