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Blood-borne virus transmission in an urban, culturally diverse neighbourhood: results from a cross-sectional bio-behavioural survey using innovative outreach methods in a hard-to-reach population.

Peach E[A], Cogger S[A], Byron K[B], Francis P[C], O'Keefe D[A], Higgs P[A,D], Stoove M[A], Elmore K[C], Dietze P[A, E], Hellard M[A,E,F].

[A] Centre for Population Health, Burnet Institute, Melbourne, [B] Victorian Aboriginal Community Controlled Organisation, Melbourne, [C] North Richmond Community Health Centre, Melbourne, [D] School of Psychology & Public Health, Department of Public Health, La Trobe University, Melbourne, [E] Department of Epidemiology and Preventive Medicine, Monash University, Melbourne, [F] Infectious Diseases Unit, Alfred Hospital, Melbourne.

Corresponding author: Elizabeth Peach
Section 90 Allotment 1, Takubar, Kokopo, ENB Province, Papua New Guinea
liz.peach@burnet.edu.au

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Abstract

Background

Following a HIV outbreak among Aboriginal people in a culturally diverse inner-city suburb of Melbourne, we undertook a blood-borne virus (BBV) screening program to inform public health interventions to prevent transmission and facilitate timely diagnosis and linkage to care.

Methods

In August–September 2014, community health workers recruited people who inject drugs (PWID) from a local needle and syringe program. Participants were tested for hepatitis C (HCV), hepatitis B (HBV), HIV and syphilis and completed a bio-behavioural questionnaire.

Results

In total 128 PWID participated in the study. Serological evidence of exposure to HCV and HBV was detected among 118 (93%) and 57 participants (45%) respectively. Five

participants were HIV positive. Independent risk factors for needle sharing were Aboriginality (AOR=6.21, p<0.001), attending healthcare for mental health problems (AOR=2.79, p=0.023) and inability to access drug treatment in the previous six months (AOR=4.34, p=0.023).

Conclusions

BBV prevalence in this sample was much higher than reported in other recent Australian studies. This local population is at high risk of further BBV transmission, particularly Aboriginal PWID. Individual and service-related factors associated with risk in the context of a dynamic urban drug culture and HIV outbreak suggest an urgent need for tailored harm reduction measures.

Introduction

Early and comprehensive harm reduction measures, including needle and syringe programs (NSPs), peer education, outreach and opioid substitution therapy (OST) have successfully minimised blood-borne virus (BBV) transmissions among people who inject drugs (PWID) in Australia. However, some PWID populations, including ethnic and cultural minorities, remain disproportionately vulnerable to BBV infections [1-3].

Australians of Aboriginal and/or Torres Strait Islander origin (henceforth, Aboriginal Australians) suffer a disproportionate and increasing burden of BBV disease. In 2014, HIV and hepatitis C virus (HCV) notification rates were 5.9 and 164 per 100,000 in Aboriginal persons versus 3.7 and 35 per 100,000 in non-Aboriginal persons respectively [1]. Rates of HCV diagnosis among Aboriginal people have also risen disproportionately: population rates were triple those for non-Aboriginal Australians in 2013 and quintuple in 2014 [1]. In Victoria, the second most populous Australian state, 48 HIV notifications occurred in Aboriginal Australians in 1984–2014; in 2013-2014 alone 10 (21%) occurred,, all with injecting drug use (IDU) as a risk factor. Before 2013–2014, most Aboriginal cases solely reported male-male sex as a risk factor, with few reporting injecting drug use (communication from Health Protection Branch, Department of Health and Human Services, Victoria: data from the Victorian HIV Register).

Between 2010- 2014, the proportion of HIV attributable to injecting drug use was 16% among Indigenous Australians but 3% in the Australian-born non-Indigenous general population [1]. Probable explanations include higher rates of injecting risk behaviours among Aboriginal PWID, culturally unacceptable service models, poor access to healthcare and harm reduction services, discrimination, and unemployment and low education [3-6] resulting from socio-economic, political and historical drivers of ill health.

In May 2014 HIV notifications increased among PWID of Aboriginal origin in an inner-urban suburb of Melbourne, Victoria. Concurrently, high risk injecting behaviours were reported to and observed by local community health centre (CHC) staff among Aboriginal clients in their community. The CHC is located on a large public housing estate, near an active street drug market, and provides healthcare and harm reduction services to an ethnically and culturally diverse population.

We undertook a BBV screening program among these PWID to inform a public health response to the outbreak, to increase viral testing and diagnosis, and to facilitate linkage to care for those who were newly diagnosed. This paper reports the results of that program.

Methods

Participants who were known to CHC workers as regular service users were recruited on four separate days in August and September 2014 in the NSP or during active outreach in the community.

Eligibility criteria were injecting at least monthly, Victorian residence in the past six months, and being aged 18 years or more. All participants gave informed consent.

Study questionnaires were administered and venepuncture was performed by Burnet Institute fieldworkers from an unmarked mobile van parked in a discrete location close to the CHC. Study questionnaires consisting of a range of bio-behavioural questions relevant to injecting risk and sexual health took approximately 20 minutes to administer using handheld and laptop computers. Blood samples were transported to St Vincent's Pathology, a National

Association of Testing Authorities (NATA)-accredited service, which performed standard laboratory diagnostic testing for HCV, HBV, HIV and syphilis.

Participants were reimbursed AU$40 for completing the questionnaire and a further AU$20 upon receiving their pathology results.

Each participant was given the option of receiving their results from the fieldworkers in the mobile van on a specified date in the same location, or assisted to make an appointment with a general practitioner (either at the local CHC or another clinical service of choice). Fieldworkers encouraged participants to attend an appointment with a general practitioner in order to facilitate linkage to further care and treatment.

Approval for the study protocol was granted by the Alfred Hospital Ethics Committee (project 361/14).

Measures

HCV exposure was defined as HCV antibody positivity (positive anti-HCV), and current HCV infection as HCV RNA positivity. Evidence of HBV exposure was defined as either having current HBV infection (positive HBV surface antigen (HBsAg)) and/or evidence of previous HBV infection (positive core antibody; anti-HBc). Participants who were HBV surface antibody (anti-HBs) positive but HBsAg and anti-HBc negative were considered vaccinated. HIV infection was defined by a positive HIV antibody test and a confirmatory Western blot. Active syphilis infection was defined as a positive antibody test followed by a reactive rapid plasma reagin test.

The questionnaire asked about socio-demographic characteristics, recent BBV risk behaviours (injecting/sexual), and recent healthcare and harm reduction service access.

Additional qualitative information on reasons for needle sharing and inability to access drug treatment was collected if reported.

Statistical analysis

Descriptive analysis was performed on key socio-demographics, BBV prevalence, reported BBV risk behaviours and indicators of service access. Bivariate and multivariate logistic regression tested predictors of BBV infection and needle sharing (receptive; using a needle after someone else had already used it, and/or distributive; sharing a used needle with someone else) within the past three months.

As few participants were born elsewhere than Australia or New Zealand, ethnicity was defined as Aboriginal origin or not.

Participants with serologic evidence of HBV vaccination were excluded from HBV analyses. Due to the small proportion of participants unexposed to HCV, regression models testing predictors of HCV and predictors of HBV exposure were limited to variables with known associations: age, sex and ethnicity (Table 2) [7, 8]. Additional covariates in the final multivariable model of predictors of needle sharing (receptive and/or distributive; Table 3) in the previous three months was reached through backwards stepwise elimination, removing variables insignificant at $p<0.1$.

All analyses were performed using STATA version 13.1 (StataCorp, TX, USA).

Results

Participant characteristics

The sample of 128 PWID had a median age of 37 years (IQR 31–44 years) and 86 (67%) were male. Despite the diversity in the underlying population only a minority were born outside of Australia; 108 (84%) were born in Australia or New Zealand, with Vietnam reported as the next most common country of birth (n=7, 5%). Of those who were Australian-born, 42 (40%) identified as Aboriginal. : Only 12 participants (9%) were employed (full-time, part-time or casual) and 24 (19%) had completed secondary education.

Table 1 summarises socio-demographic, behavioural and service access characteristics of the study sample.

BBV/STI sero-prevalence

Approximately one-third of participants reported not having been tested for HIV (n=40, 31%), HCV (n=46, 36%) or either BBV (n=36, 28%) in the year before the study.

HCV and HBV serology results were available for 127 participants (99%), and HIV serology results for all (Table 2). Almost all (n=118, 93%) had evidence of HCV exposure with 80 (63%) having current HCV infection. Participants born in Vietnam had the highest HCV prevalence (100%), followed by Aboriginal participants (n=40, 98%). Fifty-two (41%) participants reported having not received the full course of three HBV vaccinations in their lifetime. Fifty-seven (45%) participants had serological evidence of exposure to HBV. Similar proportions of Aboriginal and non-Aboriginal participants had serological evidence of exposure to HBV.

Five participants were HIV positive, with an overall HIV prevalence of less than 4%. The proportion of Aboriginal PWID who were HIV positive was eight times higher than in non-Aboriginal PWID (further characteristics of these cases are not reported due to concerns

around identifiability). All participants who tested positive for HIV reported their sexual orientation as heterosexual, and each reported only having had sexual partners of the opposite sex in the year preceding the study. Four were either first diagnosed as a result of study participation or within the 24 months prior to the study.

All HIV-positive participants had evidence of exposure to HCV and 56 (44%) participants had evidence of exposure to both HCV and HBV. One participant had evidence of active syphilis infection.

After adjusting for sex and Aboriginal status, older age (above median) significantly predicted HCV and HBV sero-positivity (AOR 11.84, p=0.027 and AOR 7.06, p=0.001 respectively). Although the odds of HCV exposure were higher among older participants, serological evidence of HCV exposure was at near saturation across both age groups; 60 participants (98%) in the older age group had serological markers of HCV exposure, with 59 (88%) in the younger age group.

Due to small numbers, it was not possible to model predictors of HIV or syphilis.

BBV/STI risk behaviours

Being of Aboriginal origin was significantly associated with self-reported needle sharing (AOR 6.21, p<0.001). Among Aboriginal participants, 19 (45%) reported receptive sharing, versus 12 non-Aboriginal participants (14%). Among Aboriginal participants, 21 (50%) reported distributive sharing, versus 18 (21%) non-Aboriginal participants. Eleven Aboriginal participants (26%) reported both receptive and distributive sharing, versus seven non-Aboriginal participants (8%). Twenty-nine Aboriginal (69%) and 23 non-Aboriginal participants (27%) reported any needle sharing (receptive and/or distributive) in the

preceding three months. Among participants reporting any needle sharing in the previous three months, the most commonly given reason was difficulty accessing sterile injecting equipment outside NSP hours (n=32, 62%). Additional reasons included incarceration preventing access to new needles and syringes (n=3, 6%), inability to contact the after-hours NSP (n=2, 4%) and inability to buy new needles and syringes from pharmacies (n=2, 4%).

Reports of having consulted a health professional for a mental health problem in the previous six months and/or unsuccessfully attempting to access drug treatment in the previous three months were both associated with reporting receptive and/or distributive needle sharing. The most common reasons reported by participants for not being able to access drug treatment when they needed it were long waiting lists (n=9, 60%) and being rejected by their programme of choice (n=5, 33%). Multivariate logistic regression models of predictors of needle sharing are presented in Table 3.

Linkage to care

Most (n=71, 55%) participants saw a general practitioner at the local CHC to receive their results. Around one-quarter (n=29, 23%) opted to receive results from fieldworkers and 19 (15%) elected to see another clinician of choice. Nine (7%) participants were unable to be located and did not receive their results. The five participants with HIV were either already linked into care and treatment services or linked into care as a result of study participation.

Discussion

We found very high prevalence of BBVs in this local PWID population. HCV prevalence was particularly high among Aboriginal and ethnic Vietnamese PWID. We know of no other study to report such high HCV exposure prevalence among Australian Aboriginal PWID, or

in an Australian sample of PWID generally. We found higher a prevalence of HCV and HIV than state and national averages [1] and those reported in other recent Australian studies, including populations with well-documented high-risk behaviours [2, 9]. Similar prevalence rates have been found in other high-risk PWID populations, such as in India and Pakistan, where availability of harm reduction and health care services is much lower [10, 11]. Our findings occur in the context of surveillance data that show recent increases in numbers of new HIV notifications among Aboriginal PWID. International experience with the rapidity of BBV transmission in settings with a similar history of colonisation and disadvantage among Aboriginal people such as in Canada highlights an importance of strengthening the Australian public health response to avert even more widespread transmission among vulnerable Aboriginal PWID. [3, 12].

An important finding in our study is the high prevalence of HCV infection across age groups. Being older (>37 years) was associated with increased odds of both HCV and HBV sero-positivity, while younger participants were more likely to report recent needle sharing. These findings are consistent with the epidemiology of HCV in Australia where higher prevalence of HCV infection is observed in older age groups and in those with a longer injecting history, whereashigher rates of HCV incidence and risky injecting behaviours are observed in younger PWID [1, 9, 13]. This study found a near saturation of HCV infection in both older and younger age groups, possibly indicating a particularly high incidence of HCV infection and/or early initiation to injecting among young people in this population. Aboriginal Community Controlled Health Organisations (ACCHOs) have identified targeted funding for harm reduction information and services as a critical unmet need for Aboriginal young people at risk of injecting-related harm[14].

Overall prevalence of risky injecting practices was high in this population. Of particular concern was Aboriginal participants' relatively high reporting of needle sharing. Other studies have described high rates of injecting risk behaviours – including receptive needle sharing, more frequent injecting, younger age of initiation and injecting in public – among Aboriginal PWID [3, 5, 15]. Most participants in our study reported that inability to access sterile injecting equipment when needed was the main reason for sharing needles. These data suggest that 24-hour access to sterile injecting equipment is needed. Service delivery models should expand to incorporate a broad range of options, including peer-led interventions, pharmacy NSPs, mobile outreach services, NSP workers in ACCHOs and Aboriginal health workers in mainstream organisations. Syringe vending machines have already been implemented in Australian jurisdictions, and are particularly effective for hard-to-reach, marginalised PWID populations [16]. In Australia, some Aboriginal people have reported a preference for syringe vending machines as a service delivery model, due to concerns around anonymity [14]. Since this study was conducted, a syringe vending machine has been installed at the CHC site. The Victorian Department of Health also issued a statement to health professionals, including those providing sexual health and alcohol and other drug (AOD) services, to encourage HIV testing for PWID, link PWID testing positive for HIV into care and treatment services, and promote primary prevention through safe sex and harm reduction information and education [17]. The local CHC was also provided with some funding to increase engagement with the at-risk community and trial rapid testing for HIV. Some participants were unable to access treatment for drug use when they wanted it, and this was significantly associated with reporting recent needle and syringe sharing. Deficiencies in the Victorian OST system must be addressed, especially inadequate numbers of prescribers and problems with coordination between specialist, community and other AOD services [18].

OST and other essential harm reduction initiatives have much larger impact on BBV transmission than single interventions [19, 20]. Integrated, multidisciplinary, community-based models of care increase access to a comprehensive set of proven interventions including primary prevention, BBV screening, drug treatment, BBV treatment, social support services and psychiatric and medical care [21]. Importantly, this study found that innovative community-based outreach methods can successfully reach and deliver services to high-risk, hard to reach PWID populations, and link them into clinical services. Similarly, studies from other settings have demonstrated that the offer of voluntary testing and counselling from community settings like mobile outreach units can increase BBV testing rates and early diagnosis among marginalised populations who do not access traditional clinical services [22-25]. This highlights the importance of employing more innovative and responsive methods of service delivery that are combined with culturally meaningful prevention and education interventions, in addition to traditional services.

Indicators of socio-economic status, educational and employment levels reveal that study participants were almost universally disadvantaged, a common finding among PWID across many settings. Social and economic inequalities and a multitude of adverse health and social outcomes, including drug dependence and mental health problems, are strongly correlated [26-28]. Social and health disparities between Aboriginal and non-Aboriginal PWID are also evident, as vulnerability arising from social determinants of health are compounded by current and past injustices, including intergenerational effects of colonisation and child removal, experiences of racism and services that are culturally insensitive [6, 29]. Young Aboriginal people and Aboriginal women are often particularly vulnerable to high-risk injecting practices due to marginalisation, shame and disempowerment [3]. Aboriginal

people may not feel comfortable accessing available services due to fear of stigma or identifiability concerns, or lack of culturally sensitive services [4, 14, 30]. Aboriginal people in some communities may also be more likely to pool resources to acquire drugs and use them in a group setting (where individualistic behaviour can be seen as selfish), which can pressure Aboriginal injectors to share needles and equipment . For initiatives to be effective, they must acknowledge an Aboriginal definition of health [5, 31], be responsive to community-identified needs, and overcome the specific barriers faced by Aboriginal PWID including shame accessing harm reduction, BBV treatment and AOD services [14] and geographical inaccessibility of services [4]. Models of care must be affordable, culturally safe, and actively address the dual stigma Aboriginal PWID often face [30]. Individual and service-related factors associated with risk in the context of a dynamic local urban drug culture and a clustered HIV outbreak suggest a pressing need for funding for targeted harm reduction initiatives, tailored to the needs of specific high-risk groups, in combination with efforts to address the upstream social and structural drivers of risk that perpetuate these inequities.

Limitations

Sample size and near saturation of HCV exposure probably precluded detection of some important differences in the analysis. Although the sampling frame was not entirely random, with participants recruited during NSP visits on study days and via active outreach, we believe the study sample is representative of local NSP users. Data collection tools used may not have explored the full extent of possible contributing factors to BBV transmission observed by CHC staff, such as motivation levels to obtain clean injecting equipment, impact of withdrawal on risk taking behaviours, and other complexities of drug use such as paying back outstanding debts with heroin. Finally, none of the data collectors was Aboriginal; this

and the effect of participants' experiences of stigma and discrimination may have limited disclosure of personal information. Although we detected several epidemiologically linked cases of injecting-related HIV in this community, we cannot comment on the overall extent of the cluster.

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Tables

Table 1. Participant socio-demographic, risk behaviour and service access characteristics

Participant characteristics	**n**	**%**
Socio-demographics		
Age group		
37 years and under	67	52
Over 37 years	61	48
Sex		
Male	86	67
Female	42	33
Aboriginal Australian		
Yes	42	33
No	86	67
Educational level		
Less than year 10	52	41
Completed year 10-12	76	59
Currently employed		
Yes	12	9
No	116	91
Injecting risk behaviours		
Drug type injected most in past month		
Opioids	114	89
Amphetamines	14	11
Injecting frequency past month		
Less than once per day	65	51
Once per day or more	63	49
Receptive and/or distributive sharing of needles in past three months		
Yes	52	41
No	76	59
Sexual risk behaviours		
Unprotected sex with casual sex partners previous year		
Yes	27	22
No	96	78
Two or more casual sex partners within previous 12 months		
Yes	36	28
No	91	72
Sexual identity		
Heterosexual	118	92
Gay or bisexual male	4	3
Lesbian or bisexual female	6	5
Healthcare and harm reduction service access		
Had a HIV test within the previous year		
Yes	40	31
No	88	69
Accessed a healthcare professional for a mental health problem within previous six months		
Yes	62	48
No	66	52
Receiving treatment for drug use during previous six months		
Yes	75	59
No	53	41
Seeking but unable to obtain drug treatment during previous three		

months		
Yes	19	15
No	108	85
Total	**128**	**100**

Some covariates may add to less than the column total due to missing data.

Table 2. Detailed HCV, HBV and HIV serology in the study sample

	n	%
HCV serology		
Negative (anti-HCV-, HCV RNA-)	9	7
Current infection (anti-HCV+, HCV RNA+)	80	63
Past exposure (anti-HCV+, HCV RNA-)	38	30
HBV Serology		
Negative (anti-HBs-, anti-HBc-, HBsAg-)	29	23
Immunised (anti-HBs+ only)	41	32
Past infection (anti-HBs+, anti-HBc+, HBsAg-)	44	35
Past or current infection (anti-HBc + only)	6	5
Current infection (HBsAg+)	4	3
Likely past infection (anti-HBs+, anti-HBc equivocal)	3	2
HIV serology		
Negative	123	96
Positive	5	4
Total	**128***	**100**

* One participant was unable to be tested for HCV or HBV

Table 3. Factors associated with reported needle sharing (receptive and/or distributive) among study participants

Predictor	Crude OR (95% CI)	*p*-value	Adjusted OR (95% CI)	*p*-value
Age group				
37 years and under	1.00		1.00	
Over 37 years	**0.31 (0.15-0.65)**	**0.002**	**0.31 (0.13-0.77)**	**0.011**
Sex				
Men	1.00		1.00	
Women	**2.76 (0.31-0.76)**	**0.009**	1.95 (0.79-4.84)	0.148
Aboriginal Australian				
No	1.00		1.00	
Yes	**6.11 (2.72-13.73)**	**<0.001**	**6.21 (2.45-15.78)**	**<0.001**
Consulted health professional for mental health problem in previous six months				
No	1.00		1.00	
Yes	1.88 (0.92-3.83)	0.084	**2.79 (1.15-6.76)**	**0.023**

Unable to access treatment for drug dependence in previous three months				
No	1.00		1.00	
Yes	**5.16 (1.73-15.42)**	**0.003**	**4.34 (1.22-15.43)**	**0.023**

CI confidence interval
Results in bold are statistically significant at the 5% level