HIV, HBV and HCV in people who inject drugs and are placed on methadone maintenance therapy, Yangon, Myanmar

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Setting: Two drug treatment centres (DTCs) for people who inject drugs (PWID) and are enrolled in methadone maintenance therapy (MMT), Yangon, Myanmar.

Objectives: To determine, in PWID enrolled for MMT from 2015 to 2017, 1) testing uptake and results for human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV); 2) risk factors for infection; and 3) retention in care and risk factors for loss to follow-up (LTFU).

Design: Cohort study using secondary data.

Results: Of 642 PWID, 578 (90.0%) were tested for HIV, HBV and/or HCV. Overall, 404 (69.9%) were infected: 316 (78.2%) had one infection and the remainder had dual/triple infections. Testing uptake was generally better in 2015 and 2016 than in 2017. Prevalence of HIV infection was 15–17%, for HBV it was 4–7%, and for HCV it was 68–76%. Age >30 years, being single and duration of drug use were independent risk factors for infection. Retention in MMT at 6 months was 76% and declined thereafter. Experimental use of drugs and needle sharing were independent risk factors for LTFU.

Conclusion: PWID enrolled in MMT in Yangon had high rates of HIV, HBV and HCV, and retention in care declined with time. Ways to improve individual tracing, programmatic retention and linkage to care are needed.

There are an estimated 15.6 million people aged 15–64 years who inject drugs (PWID) worldwide,¹ with the largest proportion (estimated at 4 million) living in East and South-East Asia.² Among the most important risks faced by PWID are infection from human immunodeficiency virus (HIV) and hepatitis viruses B and C (HBV and HCV). There are an estimated 2.8 million (18%) PWID worldwide living with HIV, about 600 000 of whom are in East and South-East Asia.¹ HIV prevalence in PWID varies substantially within and between countries, but is lower where comprehensive harm reduction and prevention measures have been implemented.³ Over half of PWID worldwide are infected with HCV, but fewer PWID are infected with HBV, with global estimates ranging from 8% to 9%.^{1,4} Among several effective interventions available to prevent and manage these infections, methadone maintenance therapy (MMT) is recommended as a critical component of a comprehensive package of harm reduction interventions.^{5,6}

Myanmar is a large South-East Asian country, where the area bordering Thailand and Laos is known as the ‘golden triangle’—a fertile poppy and, there-

fore, heroin-producing region. Injecting drug use increased from an estimated 75 000 PWID in 2010 to 83 000 in 2014.^{7,8} Prevalence rates of HIV and hepatitis vary within the country: a 2013 study in Mandalay reported anti-HCV antibody prevalence and HBV prevalence among PWID at respectively 47% and 10%.⁹

In Myanmar, MMT is one of the most important components of a comprehensive package for care and treatment of PWID. Under the MMT programme, it is recommended to test all newly enrolled PWID for HIV, HBV and HCV with a view to offering care and treatment to those found to be infected. There is no published literature about how these recommendations are implemented in the country.

In Yangon, the capital city, there are two drug treatment centres (DTCs), one in the mental health hospital and one in Sanpya Hospital, that provide MMT services and care for PWID. The centres have good monitoring and evaluation systems. We conducted a study aimed at determining testing uptake, prevalence of HIV, HBV and HCV, risk factors for infection and programmatic retention in care and loss to follow-up (LTFU) among PWID enrolled for MMT in Yangon between January 2015 and November 2017.

METHODS

Study design

This was a retrospective cohort study using secondary individualised data.

Setting

General setting and MMT Programme in Myanmar

Myanmar is the second largest country in South-East Asia, with a population of 51.5 million according to the 2014 census.¹⁰ The MMT programme was started with four pilot centres in 2006;¹¹ by March 2018, it had expanded to 51 DTCs providing methadone to more than 13 000 patients.⁸ These DTCs are distributed in Yangon, Mandalay and Sagaing Region and Shan and Kachin State.

Methadone maintenance therapy for PWID in Yangon

Briefly, the system in Yangon works as follows: PWID can self-present or be referred to the DTC at the mental health hospital where they are assessed by psychiatrists for MMT eligibility.¹² Those enrolled and registered for MMT are hospitalised for 2 weeks to ensure that they are stable on methadone, after which they can continue either in the DTC at the mental health hospital or at the Sanpya Hospital DTC.

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At enrolment, all PWID except those with known and documented infection are offered testing for HIV, HBsAg (surface antigen of the hepatitis B virus) and anti-HCV antibody using the following rapid diagnostic tests according to national guidelines: Determine HIV-1/2 (Abbott Laboratories, IL, USA) for screening and Uni-Gold™ (Trinity Biotech, Bray, Ireland) and Chembio HIV-1/2 STAT-PAK™ Assay (Chembio Diagnostic Systems, Inc, Medford, NY, USA) for HIV confirmation; and Wondfo HBsAg and anti-HCV antibody (Guangzhou Wondfo Biotech Co, Guangzhou, China) for HBV and HCV, respectively.¹² If PWID are HIV-positive, they are referred to Sanpya Hospital for HIV care and treatment that includes assessment for antiretroviral therapy (ART) initiation according to national guidelines.¹³ If they are positive for HBsAg or anti-HCV antibody, PWID are referred to their nearest hospital for further management in line with national guidelines.^{14,15} If they are HBsAg-negative, PWID are given HBV vaccination free of charge.

A registration number is assigned to each enrolled patient, and clinical/laboratory information and all follow-up information are recorded in the paper-based MMT registers. Most PWID attend for daily follow-up visits to collect their methadone, while some attend weekly, and follow-up information is recorded in paper-based registers. PWID who attend regularly for follow-up visits are classified as 'retained in care'. PWID who miss 5 consecutive days after the next scheduled appointment are classified as LTFU. Data at the two DTCs are routinely entered by a dedicated focal staff officer into an electronic database.

Study population

The study population included all PWID consecutively enrolled for MMT in the DTCs in Yangon from 1 January 2015 to 30 November 2017.

Data variables, sources of data and data collection

Data variables included baseline characteristics, whether tested for HIV, HBV and HCV and the results, programmatic outcomes (retained on MMT or LTFU) and date of last attendance for MMT—any date between 1 January 2015 and 30 November 2017. Data variables were extracted from the DTC electronic Excel (Microsoft, Redmond, WA, USA) database and processed and exported for analysis.

Analysis and statistics

STATA v 14.0 (StataCorp, College Station, TX, USA) was used for data analysis. Frequencies and proportions were used to summarise categorical variables, and prevalence rates of HIV, HBV or HCV for those tested were calculated. Bivariate analysis was performed to assess relationships between baseline PWID characteristics and HIV, HBV and HCV prevalence. Variables with $P < 0.2$ were included in a Poisson regression model, and adjusted prevalence ratios (aPRs) with 95% confidence intervals (CIs) were estimated. Cumulative retention in care was presented using Kaplan-Meier survival analysis. LTFU rates per 100 person-years (100 py) were also calculated. Proportional-

ity assumptions were tested using Schoenfeld residuals and log-log plots. A multivariate Cox proportional hazard regression model where bivariate analysis showed $P < 0.2$, was used to adjust for confounders. $P < 0.05$ was regarded as significant.

Ethics

Written permission to conduct the study was obtained from the National Drug Abuse Control Programme and National AIDS Programme of Myanmar. Ethics approval was obtained from the institutional ethics review committee of the Department of Medical Research, Yangon, Myanmar, and the Ethics Advisory Group of the International Union Against Tuberculosis and Lung Disease, Paris, France. The need for informed patient consent was waived as only secondary data were used.

RESULTS

The number of PWID enrolled in MMT between January 2015 and November 2017 was 642. Of these, 627 (97.7%) were male and the median age was 27 years (interquartile range [IQR] 24–34). PWID were also predominantly single and were using intravenous heroin at the time of enrolment. Frequency of drug use was daily in most patients (11% injected once daily, 51% two to three times daily and 38% more than three times daily). The median duration of drug use at enrolment was 4 years (IQR 2–8). The main path to enrolment in the MMT clinic was through self-referral.

Of 642 enrolled PWID, 578 (90.0%) underwent testing for HIV and/or HBV and HCV, with details about the numbers and proportions diagnosed with one, two or three infections shown in Table 1. Of the 578 tested, 404 (69.9%) had ≥ 1 infections, with the majority having a single infection. Enrolment, testing uptake and prevalence of HIV, HBV and HCV between 2015 and 2017 are shown in Figure 1. For HIV and HBV, testing

TABLE 1 Distribution of HIV, HBV and HCV among PWID enrolled for MMT who were tested in Yangon, Myanmar, 2015–2017

Characteristics	<i>n</i> (%)
Tested for HIV, HBV and HCV	578
Diagnosed with ≥ 1 infections	404 (69.9)*
Diagnosed with one infection	316 (78.2)†
HIV	20 (6.3)‡
HBV	7 (2.2)‡
HCV	289 (91.5)‡
Diagnosed with two infections	79 (19.6)†
HIV and HBV	1 (1.3)§
HIV and HCV	63 (79.7)§
HBV and HCV	15 (19.0)§
Diagnosed with three infections	9 (2.2)†

*Denominator = number tested.

†Denominator = number diagnosed with ≥ 1 infections.

‡Denominator = number diagnosed with one infection.

§Denominator = number diagnosed with two infections.

HIV = human immunodeficiency virus; HBV = hepatitis B virus; HCV = hepatitis C virus; PWID = people who inject drugs; MMT = methadone maintenance therapy.

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FIGURE 1 Enrolment, testing uptake and prevalence of HIV, HBV and HCV infections among PWID enrolled for MMT in Yangon, Myanmar, 2015–2017. Percentages refer to the proportion of those enrolled who were tested and proportion of those tested with a positive result. 2015 and 2016 are full years; 2017 includes January to November. **A)** Enrolment, testing uptake and prevalence of HIV; **B)** enrolment, testing uptake and prevalence of HBV; **C)** enrolment, testing uptake and prevalence of HCV. PWID = people who inject drugs; MMT = methadone maintenance therapy; HBV = hepatitis B; HCV = hepatitis C.

uptake was above 90% in 2015 and 2016 and 78% in 2017 (Figure 1A and 1B). HIV prevalence varied from 15% to 17% and HBV prevalence from 4% to 7%. For HCV, testing uptake was 76% in 2015, 91% in 2016 and 79% in 2017 (Figure 1C), and HCV prevalence varied from 68% to 76%.

Characteristics associated with HIV, HBV and HCV prevalence among PWID who underwent testing are shown in Tables 2, 3 and 4. Based on adjusted analyses, significant risk factors for HIV and HBV were age >30 years; for HIV alone the risk factor was

duration of drug use. Being single was the only risk factor independently associated with HCV.

PWID retention rates in the MMT programme between 2015 and 2017 are shown in Figure 2. Retention at 6 months was 76%, at 1 year it was 65%, at 2 years it was 53% and at 3 years it was 46%. LTFU per 100 py was 37 (95%CI 33–42). Characteristics associated with LTFU are given in Table 5. Based on adjusted analyses, significant risk factors for LTFU were using drugs for experimental or other reasons, administering drugs using routes other than intravenous (e.g., inhalation), and a history of needle sharing.

DISCUSSION

This study, conducted within a large and ongoing MMT programme for PWID in Yangon, Myanmar, identified some interesting issues.

First, nearly three quarters of PWID tested for HIV, HBV and HCV had ≥ 1 of these infections. Most had single infections, predominately HCV, with just over 20% having dual or triple infections. HBV and HCV share common routes of transmission with HIV, and coinfection may therefore be frequent. Two factors (duration of drug use and age) associated with HIV in our study were consistent with the literature.¹⁶

Second, testing rates among PWID were high in the first 2 years (2015 and 2016), and for HIV and HBV they exceeded 90% in both years. However, in 2017, testing rates for all three infections declined to 79%. The reasons for this are not clear, but may be due to incomplete and missing data. Previous studies in Myanmar and neighbouring Thailand have shown that PWID who inject frequently and engage in high-risk behaviours are less likely to accept HIV testing;^{17,18} the same reasons might also apply to testing acceptance for the hepatitis viruses.

Third, the predominant infection in PWID was HCV, with anti-HCV prevalence rates in our cohort at about 70%, followed by HIV and HBV, with prevalence rates of about 15% and 6%, respectively. These findings are comparable with a recent systematic review showing global estimates of 52% for HCV prevalence, 18% for HIV infection and 9% for HBV.¹ Prevalence rates of HCV in PWID vary within the country and are always higher than HIV and HBV rates.^{9,19} Increasing age and duration of drug use were independent risk factors for HIV and HBV. High rates of HCV infection were observed across all strata of PWID, although being single was an independent risk factor for HCV. Previously established risk factors for HCV in this region, however, include injecting more than one type of drug, needle sharing and unsafe sex.¹⁹ While the rapid diagnostic serological tests used in this study define active HIV and active HBV infection, the presence of anti-HCV antibodies indicates past or present infection. As some of those infected with HCV will spontaneously clear the infection, nucleic acid amplification of HCV-RNA is required to confirm the presence of active chronic HCV infection, which is amenable to treatment with direct-acting antivirals (DAA).²⁰

Fourth, we observed that 6-month retention in this MMT programme setting was high compared to that found in a systematic review in China.²¹ However, the decreasing trend for retention over the next 3 years was similar to other studies conducted in China.^{21,22} LTFU was an important cause of decreasing retention. We were unable to systematically obtain the reasons for LTFU, but according to previous studies these might include returning to work, relapse, self-withdrawal from treatment, receiving treat-

TABLE 2 Prevalence of HIV and associated characteristics among PWID enrolled for MMT who were tested in Yangon, Myanmar, 2015–2017

Characteristics	Tested <i>n</i>	HIV-positive <i>n</i> (%)	PR (95%CI)	aPR (95%CI)	<i>P</i> value
Total	573	93 (16)			
Age, years					
≤20	39	5 (13)	1.1 (0.5–2.7)	1.2 (0.5–2.9)	0.659
21–30	328	37 (11)	1	1	
31–40	158	37 (23)	2.1 (1.4–3.1)	1.7 (1.1–2.7)	0.016
>40	48	14 (29)	2.6 (1.5–4.4)	2.1 (1.2–3.6)	0.012
Sex					
Male	560	92 (16)	2.1 (0.3–14.2)	—	—
Female	13	1 (8)	1	—	—
Marital status					
Single	325	58 (18)	1.4 (0.9–2.1)	—	—
Married	228	29 (13)	1	—	—
Divorced/widowed	20	6 (30)	2.4 (1.1–5)	—	—
Drugs at enrolment					
Heroin	566	91 (16)	1	—	—
Other*	7	2 (29)	1.8 (0.5–5.8)	—	—
Reasons for drug use					
Experiment	350	54 (15)	1 (0.6–1.8)	—	—
Peer pressure	88	13 (15)	1	—	—
Other†	135	26 (19)	1.3 (0.7–2.4)	—	—
Route of administration					
Intravenous	561	90 (16)	1	—	—
Other‡	12	3 (25)	1.6 (0.6–4.2)	—	—
Frequency of drug use at enrolment					
Daily	538	86 (16)	1	—	—
Weekly	33	7 (21)	1.3 (0.7–2.6)	—	—
Unknown	2	0	—	—	—
Drugs at first exposure					
Heroin	470	79 (17)	—	—	—
Other*	103	0	—	—	—
Age at first exposure, years					
≤20	292	48 (16)	1.1 (0.7–1.6)	—	—
21–30	230	36 (16)	1	—	—
31–40	51	9 (18)	1.1 (0.6–2.2)	—	—
Duration of drug use, years					
<2	148	15 (10)	1	1	
2–4	153	27 (18)	1.7 (1–3.1)	1.8 (1–3.3)	0.049
5–8	139	13 (9)	0.9 (0.5–1.9)	0.9 (0.5–1.9)	0.828
>8	133	38 (29)	2.8 (1.6–4.9)	2.2 (1.2–3.9)	0.008
Type of referral to MMT clinic in Yangon					
Self	442	71 (16)	1	—	—
Non-governmental organisation	124	21 (17)	1.1 (0.7–1.6)	—	—
Others	7	1 (14)	0.9 (0.1–5.5)	—	—
Needle sharing					
No	469	74 (16)	1	—	—
Yes	101	19 (19)	1.2 (0.8–1.9)	—	—
Unknown	3	0	—	—	—
Previous MMT exposure					
No	550	90 (16)	2.3 (0.3–15.3)	—	—
Yes	14	1 (7)	1	—	—
Unknown	9	2 (22)	—	—	—

*Includes cannabis and marijuana.

†Includes curiosity and self-treatment for anxiety.

‡Includes inhalation or oral intake of drugs.

HIV = human immunodeficiency virus; PWID = people who inject drugs; MMT = methadone maintenance therapy; PR = prevalence ratio; CI = confidence interval; aPR = adjusted PR.

TABLE 3 Prevalence of HBV and associated characteristics among PWID enrolled for MMT who were tested in Yangon Region, Myanmar, 2015–2017

Characteristics	Tested <i>n</i>	HBV-positive <i>n</i> (%)	PR (95%CI)	aPR (95%CI)	<i>P</i> value
Total	564	32 (6)			
Age, years					
≤20	39	3 (8)	1.8 (0.5–5.9)	2 (0.6–6.8)	0.258
21–30	321	14 (4)	1	1	
31–40	156	10 (6)	1.5 (0.7–3.2)	1.3 (0.6–3.1)	0.51
>40	48	5 (10)	2.4 (0.9–6.3)	1.9 (0.7–5.3)	0.247
Sex					
Male	551	32 (6)	1	—	—
Female	13	0	1	—	—
Marital status					
Single	321	22 (7)	1.7 (0.8–3.6)	—	—
Married	223	9 (4)	1	—	—
Divorced/widowed	20	1 (5)	1.2 (0.2–9.3)	—	—
Drugs at enrolment					
Heroin	557	32 (6)	1	—	—
Other*	7	0	1	—	—
Reasons for drug use					
Experiment	346	22 (6)	2.7 (0.7–11.4)	2.7 (0.6–11.2)	0.174
Peer pressure	86	2 (2)	1	1	
Other†	132	8 (6)	2.6 (0.6–12)	2.6 (0.6–12.1)	0.215
Route of administration					
Intravenous	551	31 (6)	1	1	
Other‡	13	1 (8)	1.4 (0.2–9.3)	—	—
Frequency of drug use at enrolment					
Daily	531	32 (6)	—	—	—
Weekly	31	0	—	—	—
Unknown	2	0	—	—	—
Drugs at first exposure					
Heroin	462	25 (5)	—	—	—
Other*	102	7 (7)	—	—	—
Age at first exposure, years					
≤20	287	17 (6)	1 (0.5–2.1)	—	—
21–30	224	13 (6)	1	—	—
31–40	53	2 (4)	0.7 (0.2–2.8)	—	—
Duration of drug use, years					
<2	144	4 (3)	1	1	
2–4	154	11 (7)	2.6 (0.8–7.9)	2.8 (0.9–8.5)	0.076
5–8	138	6 (4)	1.6 (0.5–5.4)	1.8 (0.5–6.2)	0.387
>8	128	11 (9)	3.1 (1–9.5)	3 (0.9–9.8)	0.075
Type of referral to MMT clinic in Yangon					
Self	437	24 (5)	1	—	—
Non-governmental organisation	120	8 (7)	1.2 (0.6–2.6)	—	—
Others	7	0	1	—	—
Needle sharing					
No	459	28 (6)	1	—	—
Yes	102	4 (4)	0.6 (0.2–1.8)	—	—
Unknown	3	0	—	—	—
Previous MMT exposure					
No	541	31 (6)	0.8 (0.1–5.5)	—	—
Yes	14	1 (7)	1	—	—
Unknown	9	0	—	—	—

*Includes cannabis and marijuana.

†Includes curiosity and self-treatment for anxiety.

‡Includes inhalation or oral intake of drugs.

HBV = hepatitis B (HBsAg-positive); PWID = people who inject drugs; MMT = methadone maintenance therapy; PR = prevalence ratio; CI = confidence interval; aPR = adjusted PR; HBsAg = surface antigen of the hepatitis B virus.

TABLE 4 Prevalence of HCV and associated characteristics among PWID enrolled for MMT and who were tested in Yangon, Myanmar, 2015–2017

Characteristics	Tested <i>n</i>	HCV-positive <i>n</i> (%)	PR (95%CI)	aPR (95%CI)	<i>P</i> value
Total	531	376 (71)			
Age, years					
≤20	35	25 (71)	1 (0.8–1.2)	—	—
21–30	305	218 (71)	1	—	—
31–40	144	98 (68)	1 (0.8–1.1)	—	—
>40	47	35 (74)	1 (0.9–1.2)	—	—
Sex					
Male	519	369 (71)	1.2 (0.8–2)	—	—
Female	12	7 (58)	1	—	—
Marital status					
Single	302	229 (76)	1.2 (1–1.3)	1.2 (1.1–1.3)	0.005
Married	211	136 (64)	1	1	
Divorced/widowed	18	11 (61)	0.9 (0.6–1.4)	0.9 (0.6–1.4)	0.709
Drugs at enrolment					
Heroin	524	372 (71)	1	—	—
Other*	7	4 (57)	0.8 (0.4–1.5)	—	—
Reasons for drug use					
Experiment	324	234 (72)	1 (0.9–1.2)	—	—
Peer pressure	77	53 (69)	1	—	—
Other†	130	89 (68)	1 (0.8–1.2)	—	—
Route of administration					
Intravenous	521	371 (71)	1	—	—
Other‡	10	5 (50)	0.7 (0.4–1.3)	—	—
Frequency of drug use at enrolment					
Daily	502	355 (71)	1	—	—
Weekly	28	21 (75)	1.1 (0.9–1.3)	—	—
Drugs at first exposure					
Heroin	1	0	—	—	—
Other*	435	312 (72)	—	—	—
Age at first exposure, years					
≤20	96	64 (67)	—	—	—
21–30	267	191 (72)	1 (0.9–1.1)	—	—
31–40	216	151 (70)	1	—	—
Duration of drug use, years					
<2	48	34 (71)	1 (0.8–1.2)	—	—
2–4	138	95 (69)	1	—	—
5–8	140	104 (74)	1.1 (0.9–1.3)	—	—
>8	132	93 (70)	1 (0.9–1.2)	—	—
Type of referral to MMT clinic in Yangon					
Self	121	84 (69)	1 (0.9–1.2)	—	—
Non-governmental organisation	409	283 (69)	1	1	
Others	115	88 (77)	1.1 (1–1.2)	1.1 (1–1.3)	0.076
Needle sharing					
No	7	5 (71)	1 (0.6–1.7)	1.1 (0.7–1.7)	0.726
Yes	438	306 (70)	1	1	
Unknown	90	69 (77)	1.1 (1–1.2)	1.1 (1–1.2)	0.164
Previous MMT exposure					
No	3	1 (33)	—	—	—
Yes	511	362 (71)	1 (0.7–1.4)	—	—
Unknown	14	10 (71)	1	—	—

*Includes cannabis and marijuana.

†Includes curiosity and self-treatment for anxiety.

‡Includes inhalation or oral intake of drugs.

HCV = hepatitis C (anti-HCV antibody-positive); PWID = people who inject drugs; MMT = methadone maintenance therapy; PR = prevalence ratio; CI = confidence interval; aPR = adjusted PR.

TABLE 5 LTFU from care and associated characteristics among PWID enrolled for MMT in Yangon, Myanmar, 2015–2017

Characteristics	Enrolled <i>n</i>	LTFU <i>n</i> (%)	LTFU/100 py (95%CI)	HR (95%CI)	aHR (95%CI)	<i>P</i> value
Total*	634	255 (40.2)	37 (33–42)			
Age, years						
≤20	44	21 (47.7)	46 (30–70)	1.3 (0.8–2.0)	—	
21–30	360	145 (40.3)	36 (31–42)	1	—	
31–40	175	66 (37.7)	37 (29–47)	1.0 (0.8–1.3)	—	
>40	55	23 (41.8)	39 (26–59)	1.1 (0.7–1.7)	—	
Sex						
Male	619	249 (40.2)	37 (33–42)	0.9 (0.4–2.0)	—	
Female	15	6 (40.0)	44 (20–97)	1	—	
Marital status						
Single	361	147 (40.7)	37 (31–44)	1	—	
Married	248	98 (39.5)	38 (31–46)	1.0 (0.8–1.3)	—	
Divorced/widowed	25	10 (40.0)	34 (18–63)	1.0 (0.5–1.8)	—	
Drugs at enrolment						
Heroin	626	250 (40.0)	37 (33–42)	1	—	
Other†	8	5 (62.5)	51 (21–123)	1.5 (0.6–3.5)	—	
Reasons for drug use						
Experiment	393	176 (44.8)	44 (38–51)	2.0 (1.3–3.1)	2.0 (1.3–3.0)	<0.01
Peer pressure	97	27 (27.8)	21 (14–30)	1	1	
Other‡	144	52 (36.1)	33 (25–44)	1.6 (1.0–2.5)	1.6 (1.0–2.5)	0.07
Route of administration						
Intravenous	620	247 (39.8)	36 (32–41)	1	1	
Other§	14	8 (57.1)	104 (52–209)	2.5 (1.2–5.1)	2.3 (1.1–4.6)	0.03
Frequency of drug use at enrolment						
Daily	597	237 (39.7)	37 (32–42)	1	—	
Weekly	35	17 (48.6)	42 (26–68)	1.1 (0.7–1.9)	—	
Unknown	2	1 (50.0)	—	—	—	
Drugs at first exposure						
Heroin	522	212 (40.6)	38 (33–44)	1	—	
Other†	112	43 (38.4)	—	1.5 (0.6–3.5)	—	
Age at first exposure, years						
≤20	325	141 (43.4)	40 (34–48)	1.3 (1.0–1.7)	1.2 (0.9–1.6)	0.17
21–30	253	90 (35.6)	32 (26–39)	1	1	
31–40	56	24 (42.9)	45 (30–68)	1.4 (0.9–2.2)	1.3 (0.8–2.1)	0.28
Duration of drug use, years						
<2	167	67 (40.1)	39 (31–50)	1	—	
2–4	172	69 (40.1)	37 (29–47)	1.0 (0.7–1.4)	—	
5–8	150	59 (39.3)	33 (25–43)	0.9 (0.6–1.2)	—	
>8	145	60 (41.4)	40 (31–51)	1.1 (0.7–1.5)	—	
Type of referral to MMT clinic in Yangon						
Self	498	203 (40.8)	39 (34–45)	1	1	
Non-governmental organisation	129	49 (38.0)	30 (23–40)	0.8 (0.6–1.1)	0.9 (0.6–1.2)	0.32
Other	7	3 (42.9)	37 (12–114)	0.9 (0.3–2.8)	1.0 (0.3–3.2)	0.99
Needle sharing						
No	519	199 (38.3)	34 (30–39)	1	1	
Yes	112	56 (50.0)	55 (42–71)	1.5 (1.1–2.0)	1.5 (1.1–2.0)	0.01
Unknown	3	0	—	—	—	
Previous MMT exposure						
No	611	244 (40.0)	37 (33–42)	1	—	
Yes	14	6 (42.9)	34 (15–75)	0.9 (0.4–2.1)	—	
Unknown	9	5 (55.6)	—	—	—	

*Does not include 8 patients for whom there were no outcome data.

†Includes cannabis and marijuana.

‡Includes curiosity and self-treatment for anxiety.

§Includes inhalation or oral intake of drugs.

LTFU = loss to follow-up; PWID = people who inject drugs; MMT = methadone maintenance therapy; py = person-years; CI = confidence interval; HR = hazard ratio; aHR = adjusted HR.

FIGURE 2 Kaplan-Meier plot showing retention rates (and 95% CIs) among PWID enrolled for MMT in Yangon, Myanmar, 2015–2017. CI = confidence interval; PWID = people who inject drugs; MMT = methadone maintenance therapy.

ment in other DTCs, being incarcerated or facing social problems, as reported elsewhere.²¹

Finally, we only focused on assessing the burden of the three infections in those who were tested, and did not assess linkage to care and treatment. Previous studies have shown that engagement between HIV care and the MMT programme can lead to much better HIV prevention and treatment;²³ similar findings have also been reported with respect to HCV prevention and treatment.²⁴

The strengths of the study were the large number of consecutive PWID enrolled and the long 3-year period of follow-up. The conduct and reporting of the study were in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement.²⁵ Limitations relate to the operational nature of the study, with missing data for some variables; the study site being Yangon, which means that the results may not be generalisable to the whole country; and the lack of data on sexual risk behaviour, which is an important contributing factor for HIV, HBV and HCV infections. We also did not include information about linkage of HIV, HBV and HCV diagnosis to care, and this is an area in need of further study.

There are two important programmatic implications from this study. First, given the high rates of infection with HIV and HCV, testing uptake needs to be as near to 100% as possible. This is particularly important in the light of recent recommendations to immediately start ART in all people living with HIV, including PWID,²⁶ and the fact that HCV can be treated and potentially cured with DAA.²⁰ As HIV care and management services are not yet integrated within the MMT programme, it is essential to strengthen the linkage to care. For HCV, there is a need to better identify those with ongoing chronic infection. This will require measurement of HCV-RNA or HCV core antigen after positive HCV serology.²⁰ In this regard, Myanmar already has national strategic plans to establish HCV-RNA testing in the public sector, to harness this with viral load platforms that already exist for HIV/AIDS (acquired immune-deficiency syndrome) and to gradually phase in DAA. Effective treatment of HCV in PWID should have a major impact in reducing morbidity, mortality and HCV transmission in this high-risk group in the country and else-

where.²⁷ Although HBV infection rates are lower than for the other two pathogens, treatment is available, and PWID who are negative for HBsAg will benefit from vaccination.

Second, attempts should be made to improve retention in MMT and reduce LTFU rates. A better understanding of why PWID leave the MMT programme and the development of participant-focused and decentralised services would help. Learning from MMT programmes in other countries where retention rates are high could provide valuable lessons.²⁸ Linking MMT to ART for HIV-infected PWID within a structured public health setting leads to better retention in care,²⁹ and this evidence further emphasises the need to integrate services and ensure good linkage to care for those identified as seropositive through systematic testing.

CONCLUSION

HIV, HBV and HCV infection rates in PWID enrolled in the MMT programme in Yangon were high. Older age was a factor associated with HIV and HBV, while duration of drug use and being single were associated with HIV and HCV, respectively. Retention at 6 months was high, but declined with time. Testing rates and retention in care could be improved by better health education of PWID as they enter the MMT programme. This would not only be important for affected individuals, it would also prevent further transmission of infection within the community.

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Contexte : Deux centres de traitement de l'addiction (DTC) pour les utilisateurs de drogues injectables (PWID) qui sont enrôlés dans un traitement d'entretien à la méthadone (MMT), Yangon, Myanmar.

Objectif : Déterminer parmi les PWID enrôlés en MMT de 2015 à 2017 1) la couverture et les résultats des tests de virus de l'immunodéficience humaine (VIH), de l'hépatite B (HBV) et de l'hépatite C (HCV) ; 2) les facteurs de risque d'infection ; et 3) la rétention en soins et les facteurs de risque de pertes de vue (LTFU).

Schéma : Etude de cohorte basée sur des données secondaires.

Résultats : Il y a eu 642 PWID, dont 578 (90,0%) ont été testés pour le VIH, le HBV et/ou le VHC. Au total, 404 (69,9%) étaient infectés ; 316 (78,2%) avaient une seule infection et le reste avait deux ou trois infections. La couverture des tests a généralement été meilleure en

2015 et 2016 qu'en 2017. La prévalence de l'infection a été de 15–17% pour le VIH, de 4–7% pour le HBV et de 68–76% pour le HCV. Un âge > 30 ans, le fait d'être célibataire et la durée de la consommation de drogues ont été des facteurs de risque indépendants d'infection. La rétention en MMT à 6 mois a été de 76% et a décliné ensuite. L'usage expérimental de drogues et le partage d'aiguilles ont été des facteurs de risque indépendants de LTFU.

Conclusion : Les PWID enrôlés en MMT à Yangon ont eu des taux élevés de VIH, d'HBV et d'HCV et la rétention en soins a décliné avec le temps. Il faut trouver des stratégies visant à améliorer le suivi individuel, la rétention dans le programme et les liens avec la prise en charge.

Marco de referencia: Dos centros de tratamiento de la drogadicción destinados a las personas que consumen drogas inyectables, inscritas en el tratamiento de mantenimiento con metadona de Yangon, en Birmania.

Objetivos: Determinar en las personas que consumen drogas inyectables inscritas en el programa de mantenimiento con metadona del 2015 al 2017 las siguientes características: 1) la utilización de las pruebas diagnósticas de la infección por el virus de la inmunodeficiencia humana (VIH), el virus de la hepatitis B (VHB) y de la hepatitis C (VHC) y sus resultados; 2) los factores de riesgo de contraer la infección; y 3) la proporción de retención en la atención y los factores de riesgo de pérdida durante el seguimiento.

Método: Estudio de cohortes a partir de datos secundarios.

Resultados: Se inscribieron en los centros 642 consumidores de drogas inyectables, de los cuales 578 (90,0%) recibieron las pruebas diagnósticas del VIH, el VHB o el VHC. En general, 404 personas estaban infectadas (69,9%), de las cuales 316 padecían una

monoinfección (78,2%) y el resto una infección doble o triple. En general, la utilización de las pruebas fue mayor en el 2015 y el 2016 que en el 2017. La prevalencia de infección por el VIH fue de 15% a 17%, por el VHB fue de 4% a 7% y por el VHC de 68% a 76%. Los factores de riesgo independientes de padecer una infección fueron la edad superior a los 30 años, el hecho de no tener pareja y la duración del consumo de drogas. La retención en el tratamiento de mantenimiento con metadona a los 6 meses fue 76% y en adelante disminuyó. Los factores de riesgo independientes de pérdida durante el seguimiento fueron el consumo experimental de drogas y el uso compartido de agujas.

Conclusión: Las personas que consumen drogas inyectables que se inscriben en el programa de mantenimiento con metadona en Yangon exhibieron tasas altas de infección por el VIH, el VHB y el VHC y su retención en la atención disminuyó con el transcurso del tiempo. Se precisan estrategias que mejoren el seguimiento individual, la retención en los programas y la vinculación con la atención.