

Uptake of HIV, Hepatitis B and Hepatitis C testing among injection drug users in Thailand

Roongnapa Khampang^{1,2}, Sawitri Assanangkornchai², Linda B Cottler³.

¹Epidemiology Unit, Faculty of Medicine, Prince of Songkhla University, Hatyai, Thailand; ²Health Intervention and Technology Assessment Programme, Department of Health, Ministry of Public Health, Nonthaburi, Thailand; ³College of Public Health and Health Professions and College of Medicine, University of Florida, Gainesville, USA.

Correspondence email: Roongnapa.k@hitap.net, Skhampang@gmail.com

Abstract

Background: Behaviour related to injection drug use such as needle and syringe sharing and unsafe sex contribute to the transmission of blood-borne viral infections such as Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), and Hepatitis C Virus (HCV). Therefore, it is recommended that ongoing Injection Drug Users (IDUs) should receive screening for HIV, HBV and HCV at least once every 6 to 12 months. This study aims to estimate prevalence of HIV, HBV and HCV testing uptake among IDUs living in Songkhla Province, Thailand, and explore its associated factors.

Methods: A cross-sectional study was conducted among 157 male IDUs living in Songkhla, in southern Thailand, between July 2013 and January 2014. Participants were recruited through a snowball technique where they were given a unique coded coupon. Face-to-face interviews were conducted using a structured questionnaire.

Results: The most common test reported was HIV (72%), followed by HBV (44.6%) and HCV (39.5%) respectively. Over one quarter (26.1%) reported not having been tested in the past 12 months while 35.7% reported having been tested for all three viruses. IDUs who had visited an NGO-run drop-in centre, knew the risks of injection drug use, had completed secondary or higher education, had used heroin or amphetamine less than weekly, had received targeted information or education, or were married, and had a greater likelihood to report receiving all three tests.

Discussion and conclusions: There is room for improvement in the utilisation of testing for blood-borne viral infections. More attention must be given to those participants who have never visited a health facility or a drop-in centre, do not know the risks of injection drug use and do not receive targeted information or education. Particularly, IDUs who use drugs more frequently should be the first priority.

القبول على فحص ملازمة فقدان المناعة المكتسب و إلتهاب الكبد B و C بين متعاطي المخدرات عن طريق الحقن في تايلاندا

رونجنابا كامينج و ساواتيري اسانانجور تشاي و ليندا ب. كوتلر
جامعة أمير سونجلا، هاييتياي، سونجتلا 90110، تايلاندا
جامعة فلوريدا، 2004

Mory Drive, PO Box 100231, Gainesville, FL 32611،

الملخص:

لمحة عن الموضوع: تساهم السلوكيات المتعلقة بتعاطي المخدرات عن طريق الحقن كتبادل الإبر و المحقنة و الممارسة غير الآمنة للجنس في الإلتهابات الفيروسية المتنقلة عن طريق الدم كملازمة فقدان المناعة و الإلتهاب الكبدي B و C. و بناءا على ذلك ينصح أن يفحص المتعاطين الدائمين للمخدرات عن طريق الحقن لأمراض فقدان المناعة المكتسب و الإلتهاب الكبدي B و C مرة على الأقل كل 6 إلى 12 شهرا. و تهدف الدراسة هذه إلى تقدير إنتشار القبول على فحص أمراض فقدان المناعة المكتسب و الإلتهاب الكبدي B و C

بين متعاطي المخدرات عن طريق الحقن الذين يعيشون في مقاطعة سونجلا بتايلاندا و بحث العوامل الأخرى ذات العلاقة.

الطريقة: أجريت الدراسة المتعددة الفئات على 157 شخص متعاطي عن طريق الحقن يعيشون في مقاطعة سونجلا بجنوب تايلاندا في الفترة بين يوليو 2013 و يناير 2014. و تم تجنيد المشاركين باستخدام تقنية كرة الثلج و التي اعطيت لهم من خلالها كوبونات مشفرة. و أجريت بالإضافة إلى ذلك حوارات و جهها لوجه استخدمت خلالها استبيانات منظمة.

النتائج: أكثر الحالات التي تم كشفها شيوعا كانت حالات فقدان المناعة المكتسب (72%) يليها الإلتهاب الكبدي B (44,6%) ثم C (39,5%) و ذكر أكثر من ربع العينة (26,1%) أنهم لم يتلقوا أي فحص خلال الـ 12 شهر الماضية بينما ذكر 37,7% أنهم مصابون بالأمراض الثلاث. و يدرك متعاطو المخدرات عن طريق الحقن الذين كانوا يترددون على مراكز تابعة لمنظمات غير حكومية مخاطر تعاطي المخدرات عن طريق الحقن و أتموا أو تعدوا الطور التعليمي الثانوي و يتعاطون الهيروين أو الأمفيتامين في أقل من أسبوع و تحصلوا على معلومات أو تعليم متخصص أو كانوا متزوجين و كانوا أكثر احتمالية لتلقي الفحوصات الثلاث.

مناقشة و خلاصة: هناك مجال لتحسين الأوضاع فيما يتعلق باستخدام الفحص عن الإلتهابات الفيروسية المتنقلة عبر الدم و يجب التركيز أكثر على المشاركين الذين لم يسبق لهم زيارة مركز صحي أو عيادة صحية و لا يدركون مخاطر التعاطي عن طريق الحقن و لا تصلهم معلومات أو تعليم خاصين بالموضوع و يجب أن تعطى الأولوية بشكل خاص للمتعاطين عن طريق الحقن الذين يتعاطون المخدرات بشكل متكرر.

Keywords: HIV testing, HBV testing, HCV testing, IDU

Introduction

Injection Drug Use remains a serious public health issue around the globe with an estimated 15.9 million IDUs in 2007. The largest numbers were estimated to be living in China, the USA, and Russia.¹ In Thailand, the number of IDUs between 2009 and 2011 was approximately 40,300.² Behaviours related to injection drug use such as needle and syringe sharing and unsafe sex contribute to the transmission of blood-borne viral infections such as Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), and Hepatitis C Virus (HCV). Globally, 19% were estimated to be HIV-positive (among 15.9 million IDUs) (1).¹ The prevalence of HIV varies greatly, with the highest rate being found in Southeast Asia and Sub-Saharan Africa. However, the transmission of HCV infection attributable to those same high risk practices is even greater. Further, around 80% of IDUs exposed to HCV will develop a chronic infection, and 3-11% will develop liver cirrhosis within 20 years.^{3,4} The global prevalence of HCV among all IDUs was 67% in 2010, with the largest number of HCV-positive IDUs living in eastern Europe, and East and Southeast Asia. Hepatitis B globally was estimated to be 8.4%, with the highest prevalence being found in East and Southeast Asia.⁵

Due to overlapping modes of transmission, co-infection of viruses is commonly found among IDUs, with HCV being the most common among HIV-positive IDUs.⁶ Further, HBV is more common among IDUs than in the general population.⁶ Co-infection is an emerging concern because it increases the risk of disease related co-morbidities, severity and progression of the disease, and mortality.^{7,8,9} Therefore, a comprehensive package of prevention and care for IDUs has included testing and counselling for HIV, Hepatitis B and Hepatitis C.

Testing and counselling are regarded as secondary prevention activities focusing on early case findings of asymptomatic diseases in order to benefit communities, health care providers and IDUs).¹⁰ With early detection, infected IDUs have a greater chance for successful treatment resulting in increased well-being and decreased morbidity and mortality. Pre and post-test counselling may help patients avoid high risk behaviours that transmit diseases if testing is linked to appropriate prevention, treatment, care and support services.^{11,12,13}

IDUs and individuals involved in ongoing high-risk sexual activities should receive all three tests at least once every 6 to 12 months,¹⁴ regardless of their ability to pay, socio-economic status, or contextual circumstances. Unfortunately, IDUs often fear prosecution, stigma, and negative attitudes of health providers.^{15,16,17,18}

Studies have investigated the utilisation of HIV, HBV and HCV testing in opioid treatment programmes. A study in China found that among drug users attending methadone clinics in Guangdong Province, over three quarters revealed being tested for both HIV and HCV⁽¹⁹⁾, concluding that methadone clinics provided an opportunity for screening. A study in the Netherlands similarly found annual screening uptake among users receiving methadone to be 61-62%, 34-69%, and 53-66% for HIV, HBV and HCV, respectively. The findings highlighted that a significant proportion of drug users had not received HBV screening.²⁰ Another study conducted in Switzerland found that nearly all methadone recipients had been tested for HIV (99%) or HCV (91%)²¹ Several studies in India and Thailand have explored HIV and HCV uptake and its associated factors among IDUs recruited through peer-referral and targeted outreach.^{22,23} These studies are focused on a single screening that may have overlooked the importance of co-infections. The studies reviewed focused on users in treatment; thus, there is a gap in knowledge related to screening uptake among other drug users who are not currently on Methadone Maintenance Therapy (MMT).

This study reported in this article is aimed at estimating prevalence of HIV, HBV and HCV testing uptake among IDUs living in Songkhla Province, Thailand, and a compared history of drug use, and related factors between the three groups: IDUs who had never been tested for HIV, HBV or HCV; IDUs who had been tested for either HIV, HBV or HCV; and IDUs who had been tested for all three viruses. Primarily, we hypothesised that testing was positively associated with knowledge of risks of injection drug use. IDUs with all three tests would be more likely to have knowledge of the risks. Our second hypothesis was that those with all three tests would be the most likely to have attended either MMT clinics or a drop-in centre in the past six months, and those who were not tested would be the least likely to have attended either MMT clinics or a drop-in centre.

Methods

A cross-sectional study was conducted among 157 male IDUs living in Songkhla Province in southern Thailand, between July 2013 and January 2014. The eligibility criteria included being able to communicate in Thai, being at least 18 years of age, currently living or working in Songkhla for more than six months, and having been injected with a non-prescription drug within the last six months of the interview. The exclusion criteria were: showing clinically significant signs of cognitive impairment or reporting a severe illness that would reduce the ability to participate in the study. Approval for this study was issued by the Ethics Committee and Institutional Review Board of the Faculty of Medicine at Prince of Songkhla University.

In short, the participants were recruited through a snowball technique where they were given a unique coded coupon. The snowball technique is commonly used to recruit hard-to-reach populations where a sampling frame does not exist and where participants are likely to have strong privacy concerns. To build trust and seek the cooperation of the community, one investigator (RK) spent a month in the field before collecting data. Meetings were held with health care providers, staff from a drop-in centre, outreach workers and IDU representatives to plan the data collection process. Four places in Songkhla town, Chana and Hat-Yai districts, considered safe and accessible for IDUs, were chosen for recruiting and interviewing participants.

In each recruitment centre, several IDUs were purposively selected as initial seeds according to the eligibility criteria. Seeds were given a clarification on the study objectives and procedures, their rights as a participant and the confidentiality of the data given. All participants were requested to submit their written consent. Next, the seeds completed the interview and received an incentive of USD5. After that, participants were instructed to recruit other IDU peers using unique coded coupons. An incentive of USD1.5 was given for each successful peer recruited.

Data was collected via face-to-face interviews by RK and one trained research assistant using a structured questionnaire. The questionnaire addressed socio-demographic characteristics including age, education level, religion, current marital status, occupation, place of residence, frequency of heroin or amphetamines use, age of onset, and high risk behaviours. Knowledge of HIV, HBV or HCV risk was assessed along with history of visiting an NGO-run drop-in centre, utilisation of MMT, and receiving targeted information or education about risk in the previous six months. Three variables, including having been tested for HIV, HBV or HCV in the past 12 months, were used as a main outcome variable for the current analyses.

Analyses were performed with data from 157 male IDUs. The *Epic* package in the R language and environment was used for data analysis of three groups: 1) IDUs who had never been tested for HIV, HBV or HCV, 2) IDUs who had been tested for either HIV, HBV or HCV and 3) those who had been tested for all three. Pearson's chi-squared statistic and Fisher's exact test for small cell counts were used to examine the significant differences. To assess factors associated with uptake of all three tests, a multivariate logistic regression model was conducted. Independent variables (knowledge of HIV, HBV or HCV risk, socio-demographic characteristics, substance use patterns and frequencies, high risk behaviours, attending MMT, receiving targeted information or education, and visiting a drop-in centre) that had a p-value less than 0.2 in the bi-variate analyses were included in a prototype model. This model was then fitted using a backward elimination approach until a final model was accomplished.

Results

Participant characteristics

A total 180 male IDUs were approached and screened for eligibility. Three were not eligible. Among the 177 eligible IDUs, 20 refused to participate due to privacy concerns, lack of time and refusal to answer the questions. About two thirds (65.6%) of the final sample (157 participants) were 36-66 years of age. Over half (55.4%) had completed secondary or higher education. The majority were not married (63.7%), was Buddhist (51.6%) or resided in a rural area (60.5%). Around 40% were labourers or construction workers.

Uptake of HIV, HBV and HCV testing

The most common test reported was HIV (72%), followed by HBV (44.6%) and HCV (39.5%), respectively. The past 12-month utilisation of testing and the respondents' characteristics by test are shown in Table 1. Over one quarter (26.1%) of the participants reported not having any test in the past 12 months while 35.7% reported having been tested for all three viruses. There were statistically significant differences in demographic characteristics between the three groups. Specifically, those tested for all three viruses were more likely to be older than those who had none or only one or two tests. Buddhist IDUs were more likely to report receiving all three tests than Muslim IDUs.

Table 1. Number of patients taking HIV, HBV and HCV testing in the past 12 months among male IDUs in Songkhla (n=157)

Independent variables	Testing			Total	P-value
	None n (%)	HIV/ HBV/ HCV n (%)	HIV+ HBV+ HCV n (%)		
Total	41 (26.1)	60 (38.2)	56 (35.7)		
Demographic characteristics					
Age group					
Young adult (18-35 years)	23 (56.1)	21 (35.0)	10 (17.9)	54 (34.4)	<0.01
Adult (36-66 years)	18 (43.9)	39 (65.0)	46 (82.1)	103 (65.6)	
Education level					
Primary education	20 (48.8)	32 (53.3)	18 (32.1)	70 (44.6)	0.06

Independent variables	Testing			Total	P-value
	None n (%)	HIV/ HBV/ HCV n (%)	HIV+ HBV+ HCV n (%)		
Total	41 (26.1)	60 (38.2)	56 (35.7)		
Secondary education or higher	21 (51.2)	28 (46.7)	38 (67.9)	87 (55.4)	
Religion					
Buddhist	12 (29.3)	35 (58.3)	34 (60.7)	81 (51.6)	<0.01
Muslim	29 (70.7)	25 (41.7)	22 (39.3)	76 (48.4)	
Marital status					
Not married	29 (70.7)	41 (68.3)	30 (53.6)	100 (63.7)	0.14
Married	12 (29.3)	19 (31.7)	26 (46.4)	57 (36.3)	
Occupation					
Trader/unemployed	8 (19.5)	13 (21.7)	9 (16.1)	30 (19.1)	0.91
Labourer/ construction worker	17 (41.5)	23 (38.3)	26 (46.4)	66 (42.0)	
Farmer	16 (39)	24 (40)	21 (37.5)	61 (38.9)	
Residence					
Rural	30 (73.2)	37 (61.7)	28 (50.0)	95 (60.5)	0.07
Sub urban	11 (26.8)	23 (38.3)	28 (50.0)	62 (39.5)	
Drug use and high risk behaviours					
Frequency of heroin or amphetamines use					
Less than weekly	6 (14.6)	18 (30)	21 (37.5)	45 (28.7)	
Weekly or more	35 (85.4)	42 (70)	35 (62.5)	112 (71.3)	0.04
Age of onset					
Before 18	17 (41.5)	16 (26.7)	13 (23.2)	46 (29.3)	0.05
18 or above	24 (58.5)	44 (73.3)	43 (76.8)	111 (70.7)	
Re-using syringers					
No	25 (61)	29 (48.3)	43 (76.8)	97 (61.8)	<0.01
Yes	16 (39)	31 (51.7)	13 (23.2)	60 (38.2)	
Sharing syringers					
No	34 (82.9)	46 (76.7)	41 (73.2)	121 (77.1)	0.53
Yes	7 (17.1)	14 (23.3)	15 (26.8)	36 (22.9)	
Different sex partner					
No	27 (65.9)	40 (66.7)	39 (69.6)	106 (67.5)	0.91
Yes	14 (34.1)	20 (33.3)	17 (30.4)	51 (32.5)	

Independent variables	Testing			Total	P-value
	None n (%)	HIV/ HBV/ HCV n (%)	HIV+ HBV+ HCV n (%)		
Total	41 (26.1)	60 (38.2)	56 (35.7)		
Condom use during sex					
No	31 (75.6)	46 (76.7)	41 (73.2)	118 (75.2)	0.91
Yes	10 (24.4)	14 (23.3)	15 (26.8)	39 (24.8)	
Services utilisation					
Knowledge of HIV, HBV, or HCV risk					
No	19 (46.3)	22 (36.7)	4 (7.1)	45 (28.7)	<0.01
Yes	22 (53.7)	38 (63.3)	52 (92.9)	112 (71.3)	
Visiting a drop-in centre in the past 6 months					
No	33 (80.5)	35 (58.3)	16 (28.6)	84 (53.5)	<0.01
Yes	8 (19.5)	25 (41.7)	40 (71.4)	73 (46.5)	
Receiving targeted information, education and communication in the past 6 months					
No	27 (65.9)	26 (43.3)	12 (21.4)	65 (41.4)	<0.01
Yes	14 (34.1)	34 (56.7)	44 (78.6)	92 (58.6)	
Attending MMT^b in the past 6 months					
No	20 (48.8)	11 (18.3)	2 (3.6)	33 (21.0)	<0.01*
Yes	21 (51.2)	49 (81.7)	54 (96.4)	124 (79.0)	

a. Needle and syringe exchange programme

b. Methadone Maintenance Therapy

* Fisher exact test for count data

Regarding drug use, male IDUs who re-used injection equipment were less likely to report having all three tests than male IDUs who did not. Male IDUs, who knew that by injecting drugs they were at higher risk of acquiring blood-borne viral infections were more likely to report receiving all three tests than those without knowledge. Likewise, IDUs who had visited a drop-in centre, or had attended the MMT or received targeted information or education in the past six months, were more likely to report all three tests compared to their counterparts.

Multi-variate analyses

Table 2 presents the results of the multivariate analyses of factors associated with being tested for all three tests in the past 12 months. IDUs who had visited an NGO-run drop-in centre were 5.92 times more likely to report having undergone all three tests, nearly identical to the knowledge of risks for HIV, HBV, or HCV (OR = 5.91). IDUs who completed secondary or higher education were more than four times as likely to report being tested for HIV, HBV and HCV (OR=4.39) than those with lower educational levels. IDUs that used drugs less frequently were 3.56 times more likely to report being tested for all three viruses. Additionally, IDUs who received targeted information or education or who were married were 2.92 and 2.76 times more likely to report receiving all three tests compared to their counterparts, respectively.

Table 2. Multi-variate logistic regression of factors associated with being tested for HIV, HBV and HCV within the past 12 months among male IDUs in Songkhla (n=157).

Variable	Odds ratios	95% CI	P-values
Visiting a drop-in centre in the past 6 months	5.92	(2.32-15.08)	<0.01
Knowledge of HIV, HBV, or HCV risk	5.91	(1.66-21.09)	<0.01
Secondary or higher education	4.39	(1.64-11.76)	<0.01
Using heroin or amphetamines less than weekly	3.56	(1.31-9.68)	0.01
Receiving targeted information or education in the past 6 months	2.92	(1.10-7.73)	0.03
Marital status (married vs unmarried)	2.76	(1.09-6.97)	0.03

a Methadone Maintenance Therapy

Discussions and conclusions

This study shows a large gap in the uptake of testing for HIV, HBV and HCV among IDUs in Songkhla, southern Thailand, revealing that a quarter of participants, who were at high risk, reported not having undergone any test within the past 12 months. Despite a strong attempt to link all IDUs to services in Thailand, these results indicate that more work needs to be done to improve methods for screening.

Among the three blood-borne viral infection tests, the HIV test was utilised the most, followed by HBV and HCV testing. Since the chance of HCV transmission is the greatest, it is both important and urgent to expedite the HCV test. Since all screening tests can be taken at the same visit, integrating all tests into one service package is recommended).¹⁴ Findings reveal that two thirds of participants reported not undergoing all three tests. Although HCV and HBV tests have been recently provided along with HIV test for IDUs in Thailand, around 17% of IDUs who were on MMT reported having never been tested for all three viruses, and about 40% reported having been tested for one or two. The reluctance to do all tests might be a result of poor communication between patients and the hospitals.

We found that IDUs with the following characteristics were more likely to report having been tested for all three viruses: visiting a drop-in centre, knowledge of the risk of injection drug use, having a secondary or higher education, using drugs less than weekly, receiving targeted information or education, and being married. To increase the prevalence of IDUs screened for all three tests, the services would need to be adjusted and developed using the earlier mentioned IDU characteristics as evaluation criteria.

Having visited an NGO-run drop-in-centre in the study area had positive effects on the uptake of HIV, HBV and HCV test. The drop-in-centres have been established to promote healthier behaviours for IDUs, providing free harm reduction services such as sterile injecting equipment, condoms, water-based lubricants, VCT and a comprehensive system of referrals for care and treatment. An outreach programme providing peer education is also offered at these centres).²⁵ A number of studies reveal that outreach programmes are effective to reach active, out of treatment, and hidden populations of IDUs.^{26,27,28} Similarly, peer educator has been proven to be more acceptable, more credible and less judgmental than non-peers.²⁹ Peer-based education is also important to increase the uptake of HCV testing among IDUs.²³ Receiving targeted information or education was associated with the uptake of all three tests. Information may help raise awareness among IDUs about transmission routes of the blood-borne viral infections through risky behaviour. However, the finding shows a high percentage (41%) of IDUs reported not receiving targeted information or education in the previous six months. This figure may reflect the inadequacy of service provisions or that the services did not reach the target group. Thus, effective communication and pre and post test counselling between service providers and IDUs may help improve the uptake of the screening services, with diverse, clear and understandable formats.

Knowledge of risks of injection drug use such as HIV, HBV and HCV was highly associated with the uptake of all three tests, with those who knew the

risks tending to utilize all three tests more than those who did not. On the one hand, knowledge of risks influences the decision to take the tests.^{30,31} However, not knowing the risks is one of the most important barriers to utilize Voluntary Counselling and Testing (VCT).³² On the other hand, receiving pre and post test counselling may help IDUs to be aware of the risks associated with injection drug use. Knowing their risks may increase the willingness to take all three tests. Thus, intervention to raise awareness of risks are vital.

Demographic factors associated with the uptake of all three tests included secondary or higher education and being married. Secondary or higher educated participants were more likely to utilize all three tests than primary educated participants. Education plays an important role in the access to health information among IDUs and how information is processed. For better understanding of the benefits of the tests, diverse and simple communication formats are recommended. Married participants, compared to those not married, were more likely to utilize the three tests because they presumably receive more family support, which could influence IDUs to take the tests. Studies have shown that a lack of family support is one of the strongest barriers to utilize HIV prevention and treatment services.^{33,34,35} A tailored service delivery model that includes family members in the pre and post-test counselling process may be useful.

Using illicit drugs on a less than weekly basis was associated with the taking of the three tests. Although the IDUs who used drugs more frequently tended to have a higher chance of engaging in high risk injection behaviours, they were less likely to be tested for all three. IDUs may feel reluctant to take the tests because they may fear that they would test positive, consistent with prior work.³² Therefore, service providers could play a role by helping IDUs to understand the consequences and benefits of being screened.

There are a number of limitations in the study. Firstly, the study used a snowball technique to recruit participants. Because this technique does not generate random sampling, IDUs who were well known by many other IDUs were more likely to participate in the study. However, this study tried to minimise this bias by starting the snowball chains with multiple seeds and using multi-site and different types of recruitment settings. Secondly, the study relied on self-report. High risk behaviours may not be fully addressed and recall problems could be an issue. Consequently, over or under estimation of the prevalence of factors may have occurred. Finally, the generalisability may be limited given that only one province was involved in the study. However, these findings may be generalisable to similar contexts.

While there were limitations, the strength of the study includes a focus on co-infections, with participants from communities, rather than a focus only

on IDUs in MMT clinics. It also included informative sessions of factors associated with the taking of all three tests, since HIV, HBV, and HCV are a threat to society in general.

In conclusion, this study indicates that there is room for improvement in the utilisation of testing for blood borne viral infections among IDUs in Songkhla, southern Thailand. As more than a quarter of the study participants had never been tested for any of the three viruses, more attention must be given to those participants who have never visited a health facility or a drop-in-centre, who may not know the risks of injection drug use, or who do not receive targeted information or education. Particularly, IDUs who use drugs more frequently should be the first priority. The findings also indicate an urgent need to improve the recruitment of IDUs to health services. The snowball techniques used by this study could be a good recruitment method along with other strategies. Health planners and health providers should make sure that all three tests are provided in one package. Finally, a better mechanism to create awareness on the risks of injection drug use and how to reduce or prevent those risks is essential. This should start with better communication between patients and health services and pre and post test counselling services along with mass media techniques to be utilised to reduce further transmission of HCV.

Role of funding source

The study was supported by the ‘Health Intervention and Technology Assessment Programme’, Thailand.

Contributors

All authors had full access to all data and have read and approved the content. RK collected data, performed initial analyses and drafted the manuscript. LC supervised the analytical issues, suggested on outline of the manuscript, and revised the manuscript. SA provided feedback and comments on the manuscripts.

Conflict of interest

All authors declare that:

1. Authors do not have support from any companies for the submitted work.
2. Authors have no relationships with companies that might have an interest in the submitted work in the previous three years.

3. Authors' spouses, partners, or children have no financial relationships that may be relevant to the submitted work. and
4. Authors have no non-financial interests that may be relevant to the submitted work.

Acknowledgement

We would like to express our deep gratitude and sincere appreciation to Mr. Saichon Kloyiam for his research and administrative assistance, Dr. Suput Hasuwannakij for his support in conducting fieldwork, Mr. Edward McNeil and Dr. Alan Geater for their statistical guidance. Additionally, we would like to express our special thanks to the study participants for their contribution to the study, present and past staff at Chana, Songkhla and Hat Yai Hospitals, and outreach workers and staff at Ozone house in Chana.

References

1. Mathers BM, Degenhardt L, Phillips B, Wiessing L, Hickman M, Strathdee SA, et al. Global epidemiology of injecting drug use and HIV among people who inject drugs: a systematic review. *Lancet*. 2008;372(9651):1733-45.
Doi: [http://dx.doi.org/10.1016/S0140-6736\(08\)61311-2](http://dx.doi.org/10.1016/S0140-6736(08)61311-2)
2. ATLAS of Substance Use Disorders Resources for the Prevention and Treatment of Substance Use Disorders (SUD) Country Profile: THAILAND [database on the Internet]. 2012. Available from: http://www.who.int/substance_abuse/publications/atlas_report/profiles/thailand.pdf.
3. Dore GJ, Freeman AJ, Law M, Kaldor JM. Is severe liver disease a common outcome for people with chronic hepatitis C? *Journal of Gastroenterology and Hepatology*. 2002;17(4):423-30.
Doi: <http://dx.doi.org/10.1046/j.1440-1746.2002.02730.x>
4. Te HS, Jensen DM. Epidemiology of hepatitis B and C viruses: a global overview. *Clinics in Liver Disease*. 2010 Feb;14(1):1-21, vii.
Doi: <http://dx.doi.org/10.1046/10.1016/j.cld.2009.11.009>.
5. Nelson PK, Mathers BM, Cowie B, Hagan H, Des Jarlais D, Horyniak D, et al. Global epidemiology of hepatitis B and hepatitis C in people who inject drugs: results of systematic reviews. *Lancet*. 2011;378(9791):571-583.
Doi: [http://dx.doi.org/10.1016/S0140-6736\(11\)61097-0](http://dx.doi.org/10.1016/S0140-6736(11)61097-0)

6. Sofian M, Aghakhani A, Banifazl M, Azadmanesh K, Farazi AA, McFarland W, et al. Viral hepatitis and HIV infection among injection drug users in a central Iranian City. *Journal of Addiction Medicine*. 2012;6(4):292-296.
Doi: <http://dx.doi.org/10.1097/ADM.0b013e3182659928>
7. Chen TY, Ding EL, Seage Iii GR, Kim AY. Meta-analysis: increased mortality associated with hepatitis C in HIV-infected persons is unrelated to HIV disease progression. *Clinical Infectious Diseases*. 2009;49(10):1605-15.
Doi: <http://dx.doi.org/10.1086/644771>
8. Graham CS, Baden LR, Yu E, Mrus JM, Carnie J, Heeren T, et al. Influence of human immunodeficiency virus infection on the course of hepatitis C virus infection: a meta-analysis. *Clinical Infectious Diseases*. 2001;33(4):562-569.
Doi: <http://dx.doi.org/10.1086/321909>
9. Thein HH, Yi Q, Dore GJ, Krahn MD. Natural history of hepatitis C virus infection in HIV-infected individuals and the impact of HIV in the era of highly active antiretroviral therapy: a meta-analysis. *AIDS*. 2008;22(15):1979-91.
Doi: <http://dx.doi.org/10.1097/QAD.0b013e32830e6d51>
10. Fitzgerald MA. Primary, Secondary, and Tertiary Prevention: Important in Certification and Practice. *FHEA News*. 2011;12(2). Available from: http://fhea.com/main/content/Newsletter/fheanews_volume12_issue2.pdf.
11. WHO. Guidance on provider-initiated HIV testing and counselling in health facilities. Geneva: WHO Press; 2007.
12. Guidance on prevention of viral hepatitis B and C among people who inject drugs. Geneva: World Health Organization; 2012.
13. Walsh N, Verster A, Rodolph M, Akl EA. WHO guidance on the prevention of viral hepatitis B and C among people who inject drugs. *The International Journal on Drug Policy*. 2014;25(3):363-71.
Doi: <http://dx.doi.org/10.1016/j.drugpo.2014.01.009>
14. EMCDDA. Guidelines for testing HIV, viral hepatitis and other infections in injecting drug users. Luxembourg: Publications Office of the European Union; 2010.

15. Bobrova N, Sarang A, Stuikyte R, Lezhentsev K. Obstacles in provision of anti-retroviral treatment to drug users in Central and Eastern Europe and Central Asia: a regional overview. *The International Journal on Drug Policy*. 2007;18(4):313-8.
Doi: <http://dx.doi.org/10.1016/j.drugpo.2007.01.015>
16. Terlikbayeva A, Zhussupov B, Primbetova S, Gilbert L, Atabekov N, Giyasova G, et al. Access to HIV counseling and testing among people who inject drugs in Central Asia: strategies for improving access and linkages to treatment and care. *Drug and Alcohol Dependence*. 2013;132 (Suppl 1):S61-4.
17. Access to comprehensive package of services for injecting drug users and their female sex partners Identification and ranking of barriers in Northeast India [database on the Internet]. Mensa Design Pvt. Ltd.,. 2012. Available from: http://www.google.co.th/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CCo-QFjAA&url=http%3A%2F%2Fwww.unodc.org%2Fdocuments%2F-southasia%2Fpublications%2Fresearch-studies%2FNE_final_for_web_02-07-12.pdf&ei=JbdxU-u2Edjl8AWOm4KABQ&usg=AFQjCNEoobt0cf9tH-B62rOtHmo8H3_iY7w&sig2=S_fvxMapSygWltj6vyfYUA&bv=vm=bv.66330100,d.dGc.
18. Wolfe D. Paradoxes in antiretroviral treatment for injecting drug users: access, adherence and structural barriers in Asia and the former Soviet Union. *The International Journal on Drug Policy*. 2007;18(4):246-54.
Doi: <http://dx.doi.org/10.1016/j.drugpo.2007.01.012>
19. Xia YH, Chen W, Tucker JD, Wang C, Ling L. HIV and hepatitis C virus test uptake at methadone clinics in Southern China: opportunities for expanding detection of bloodborne infections. *BMC Public Health*. 2013 Sep;13:899.
Doi: <http://dx.doi.org/10.1186/1471-2458-13-899>
20. Schreuder I, Van der Sande MA, De Wit M, Bongaerts M, Boucher CA, Croes EA, et al. Seroprevalence of HIV, hepatitis b, and hepatitis c among opioid drug users on methadone treatment in the netherlands. *Harm Reduction Journal*. 2010 Oct 26;7:25.
Doi: <http://dx.doi.org/10.1186/1477-7517-7-25>
21. Witteck A, Schmid P, Hensel-Koch K, Thurnheer MC, Bruggmann P, Vernazza P, et al. Management of hepatitis C virus (HCV) infection in drug substitution programs. *Swiss Medical Weekly*. 2011;141:w13193.
Doi:<http://dx.doi.org/10.4414/smw.2011.13193>.

22. Sarna A, Tun W, Sharma V, Sebastian M, Madan I, Yadav A, et al. High uptake of HIV testing in a cohort of male injection drug users in Delhi, India: prevalence and correlates of HIV infection. *AIDS and Behavior*. 2013;17(7):2479-89.
Doi: <http://dx.doi.org/10.1007/s10461-013-0442-z>
23. Ti L, Kaplan K, Hayashi K, Suwannawong P, Wood E, Kerr T. Low rates of hepatitis C testing among people who inject drugs in Thailand: implications for peer-based interventions. *Journal of Public Health*. 2013;35(4):578-84.
Doi: <http://dx.doi.org/10.1093/pubmed/fds105>
24. Khampang R, Assanangkornchai S, Teerawattananon Y. Perceived barriers to utilise methadone maintenance therapy among male injection drug users in rural areas of southern Thailand. 2014; (manuscript in submission).
25. PSI. PSI Thailand Foundation. [updated 11/5/2014]; Available from: <http://www.psi.org/country/thailand/>.
26. Smyrnov P, Broadhead RS, Datsenko O, Matiyash O. Rejuvenating harm reduction projects for injection drug users: Ukraine's nationwide introduction of peer-driven interventions. *The International Journal on Drug Policy*. 2012 Mar;23(2):141-7.
Doi: <http://dx.doi.org/10.1016/j.drugpo.2012.01.001>
27. Des Jarlais DC, Kling R, Hammett TM, Ngu D, Liu W, Chen Y, et al. Reducing HIV infection among new injecting drug users in the China-Vietnam Cross Border Project. *AIDS*. 2007;21 (Suppl 8):S109-14.
Doi: <http://dx.doi.org/10.1097/01.aids.0000304705.79541.34>.
28. Molitor F, Kuenneth C, Waltermeyer J, Mendoza M, Aguirre A, Brockmann K, et al. Linking HIV-infected persons of color and injection drug users to HIV medical and other services: the California Bridge Project. *AIDS Patient Care and STDs*. 2005 Jun;19(6):406-412.
Doi: <http://dx.doi.org/10.1089/apc.2005.19.406>
29. USAID. Behavioral Interventions: Peer Outreach and Education. 2011 [cited 2014 11]. Available from: http://www.aidstar-one.com/focus_areas/prevention/pkb/behavioral_interventions/peer_outreach_and_education.

30. Tsegay G, Edris M, Meseret S. Assessment of voluntary counseling and testing service utilization and associated factors among Debre Markos University Students, North West Ethiopia: a cross-sectional survey in 2011. *BMC Public Health*. 2013;13(1):243.
Doi: <http://dx.doi.org/10.1186/1471-2458-13-243>
31. Koh KC, Yong LS. HIV Risk Perception, Sexual behavior, and HIV prevalence among men-who-have-sex-with-men at a community-based voluntary counseling and testing center in Kuala Lumpur, Malaysia. *Interdisciplinary Perspectives on Infectious Diseases*. 2014;2014: Article ID 236240, 6 pages
Doi: <http://dx.doi.org/10.1155/2014/236240>
32. Du J, Lombardi C, Evans E, Jiang H, Zhao M, Meng YY. A mixed methods approach to identifying factors related to voluntary HIV testing among injection drug users in Shanghai, China. *International Journal of Infectious Diseases*. 2012 Jul;16(7):e498-503.
Doi: 10.1016/j.ijid.2012.02.013. Epub 2012 Apr 24.
33. Chakrapani V, Velayudham J, Shunmugam M, Newman PA, Dubrow R. Barriers to antiretroviral treatment access for injecting drug users living with HIV in Chennai, South India. *AIDS Care*. 2014;26(7):835-41.
Doi: <http://dx.doi.org/10.1080/09540121.2013.861573>
34. Moyer LB, Brouwer KC, Brodine SK, Ramos R, Lozada R, Cruz MF, et al. Barriers and missed opportunities to HIV testing among injection drug users in two Mexico--US border cities. *Drug and Alcohol Review*. 2008 Jan;27(1):39-45.
Doi: <http://dx.doi.org/10.1080/09595230701710845>
35. Mimiaga MJ, Safren SA, Dvoryak S, Reisner SL, Needle R, Woody G. "We fear the police, and the police fear us": structural and individual barriers and facilitators to HIV medication adherence among injection drug users in Kiev, Ukraine. *AIDS Care*. 2010 Nov;22(11):1305-13.
Doi: <http://dx.doi.org/10.1080/09540121003758515>