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ORIGINAL ARTICLE

Community-based and HIV integrated testing for hepatitis B and C among key populations in Vietnam

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INTRODUCTION

Vietnam estimates 8.8 million persons living with hepatitis B (HBV) and C virus (HCV) infection and reports 40,000 deaths annually; however, 80%–90% infected people remain undiagnosed, and 95% of treatment eligible people remain untreated.[1–5] Limited community awareness about the disease, passive case finding approaches, and low availability of hepatitis services at the primary health care level present barriers to testing scale-up. There have been calls for the decentralization and integration of hepatitis testing to improve access to testing, linkage to care and treatment,[6–9] but limited empirical evidence on effective hepatitis testing service delivery models exists. In this paper, we present preliminary results from the HepLINK project, funded by The Hepatitis Fund, and implemented by PATH and Vietnam's Ministry of Health (MOH).

PROJECT INTERVENTION

HepLINK implements community-based (CBT) and facility-based testing (FBT) for HBV/HCV through integration with HIV services in Hanoi and Ho Chi Minh City to accelerate HBV/HCV testing uptake and treatment access among key populations (KPs) including people who inject drugs (PWID), non-injecting drug users (DU), men who have sex with men (MSM), female sex workers (FSW), and transgender women (TGW). We engaged 9 KP-led community-based organizations (CBOs), 6 KP-led private clinics, and 12 public outpatient and methadone maintenance treatment (MMT) clinics in providing systematic screening for HBV/HCV and making referral/linkage to HCV/HBV confirmatory testing, diagnosis, and treatment. Targeted HBV/HCV demand creation activities were co-created and implemented with CBOs and clinics. Clients seeking HIV testing, pre-exposure prophylaxis (PrEP), non-occupational post-exposure prophylaxis (nPEP), antiretroviral therapy (ART), and MMT received counseling and testing for HBsAg and anti-HCV, using a single finger prick rapid diagnostic test (i.e., Alere Determine™ HBsAg and SD Bioline HCV). Those with a reactive test result were linked to the nearest health facility for further care (Figure 1).

Effectiveness of community-based and facility-based HBV/HCV screening

From April to October 2021, we reached 8840 people, of which the great majority of people (86.9%) accepted HBsAg testing, yielding 689 (9%) positive cases. Key reasons for not accepting HBsAg included low awareness of HBV/HCV risk, not yet having tested for HIV, fear of having another disease (ART patients), low knowledge of HBV/HCV treatability/curability, and craving for drugs (PWID). Among the 7683 people tested, 16.1% were aged 15–24 years old and 78.7% were aged 25–49 years old, and 85.1% self-identified as KP (PWID 37.5%, MSM 30%, DU 13.3%, FSW 2.7%, and TGW 1.6%).

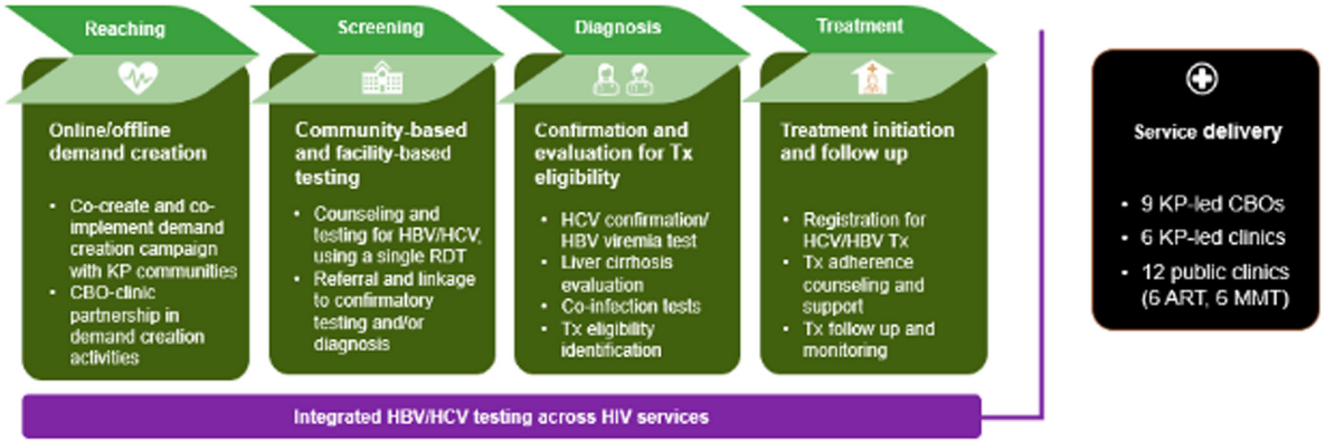

FIGURE 1 Model of community-based and facility-based HBV/HCV testing and linkage to care

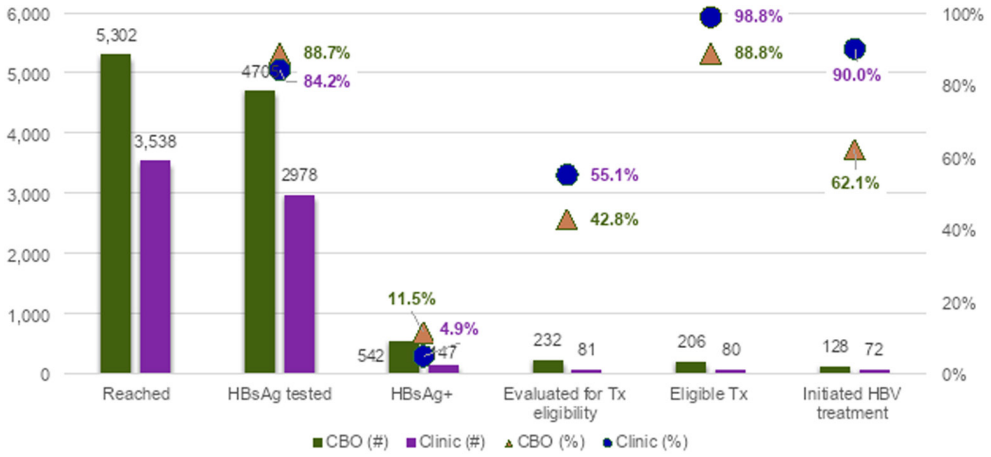

FIGURE 2 HBV cascade of CBT and FBT models

As shown in Figure 2, CBT reached more clients and yielded a higher HBsAg positivity rate than FBT (11.5% and 4.9%, respectively), whereas FBT diagnosed more persons with current HCV infection and enrolled a higher rate of eligible persons on treatment (90% and 62.1%, respectively).

Of 8840 people offered testing, nearly all (94%) accepted anti-HCV testing, yielding 941 (11.3%) positive cases. People who did not uptake anti-HCV testing shared the same reasons as those who did not accept HBsAg testing. CBT reached and tested more clients, but unlike with HBV, yielded lower positivity rate than FBT (6.7% and 18.4%, respectively). CBT had lower rate of anti-HCV positive clients receiving HCV virologic testing but achieved a higher rate of HCV-confirmed cases compared to FBT (42.7% and 88.2% compared to 62.3% and 62%) (Figure 3).

HBV/HCV infection among KPs

HBV (HBsAg+) infection rate was highest in FSW (20.8%; 44/212), followed by PWID (11.1%; 319/2878), DU (9.5%; 97/1022), MSM (5.9%; 136/2312), and TGW (2.6%; 3/117). HBV-HIV co-infection rate was 9.6% (169/1761). A multivariable analysis (Table 1) showed a significant association between HBV positivity and older age of clients tested with those 50+ years old at three times greater odds of HBV infection (adjusted odds ratio [aOR] = 2.96; 95% confidence interval [CI]: 1.99–4.42); using CBT (aOR = 2.67; 95%CI: 2.09–3.40); being a FSW (aOR = 2.56; 95%CI: 1.62–4.05); not being HBV vaccinated (aOR = 2.24; 95%CI: 1.43–3.51); and being an nPEP user, ART patient, or HIV testing client.

Similarly, HCV (anti-HCV) infection rate was highest in PWID (20.9%; 637/3044), followed by DU (6.8%; 88/1289), FSW (3.9%; 8/205), TGW (2.6%;3/115), and MSM (1.9%; 47/2427). HCV-HIV co-infection rate was exceptionally high (28.4%; 556/1957). A multivariable analysis (Table 2) confirmed a significant association between HCV sero-positivity and older age of clients tested with those 25+ years old (aOR = 1.81; 95%CI: 1.18–2.78); being a PWID (aOR = 11.37; 95%CI: 8.73–14.81), DU (aOR = 3.44;

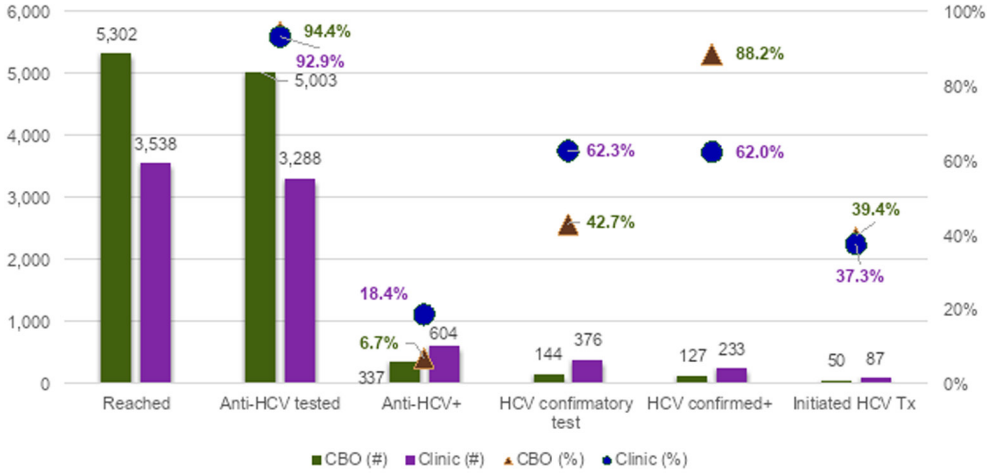

FIGURE 3 HCV cascade of CBT and FBT models

95%CI: 2.49–4.77), FSW (aOR = 2.34; 95%CI: 1.05–5.23), or PLHIV (aOR = 5.85; 95%CI: 4.15–8.23); and using PrEP (aOR = 4.21; 95%CI: 2.08–8.52) or nPEP(aOR = 3.13; 95%CI: 1.33–7.35). It also confirmed a significant inverse association between HCV sero-positivity and being MSM (aOR = 0.31; 95%CI: 0.22–0.46) and using CBT (aOR = 0.16; 95%CI: 0.13–0.20).

Linkage to HBV/HCV care and treatment

Although FBT diagnosed and enrolled a higher rate of eligible treatment people on HBV treatment, ART (TLD regimen) and PrEP (TDF/FTC regimen) than CBT, CBT enrolled more clients on HBV treatment, ART, and PrEP (15, 103 and 10 compared to 8, 63 and 1, respectively) (Figure 4). Only around half of HBsAg+ clients (42.8% and 55.1%) received HBV treatment eligibility evaluation due to the unavailability of viremia confirmatory testing and fibrosis testing at the district level. As a result of advocacy from the HIV program, Vietnam's social health insurance (SHI) circular was recently revised to allow transportation of blood samples for viremia confirmatory testing for both outpatients and inpatients from district health facilities (effective from February 2022). We expect this will increase uptake of viremia confirmatory testing and subsequent linkage to HBV treatment (Figure 4).

Similarly, the fall off from anti-HCV+ to HCV confirmatory testing was associated with complex requirements by SHI on referring clients for HCV confirmatory test. As an advantage of linkage to care FBT successfully linked a higher rate of anti-HCV+ clients to confirmatory testing than CBT (62.3% and 42.7%, respectively). HCV treatment access was limited in both CBT and FBT (39.4% and 37.3%, respectively) due to the current cost of DAAs and co-payment required by SHI (Figure 5).

DISCUSSION

Our community-based and HIV integrated HBV/HCV testing model showed high acceptability among KPs and can be a powerful tool for increasing HBV/HCV uptake by targeting the same populations, at the same time, and in the same location.[2,3,10–12] Access to viremia testing and treatment remains challenging; consequently, progress toward HBV/HCV elimination is still far off.

This approach is effective in detecting HBV/HCV infected people and showing which KPs may be at highest risk of HBV/HCV infection in particular settings. Both CBT and FBT achieved high positivity yield of HBV and HCV infection. This suggests that the model successfully reached and tested populations at increased risk of HBV/HCV infection. The multivariable analysis identified client groups with the highest rates of infection, which can inform targeted hepatitis testing programming for a high positivity yield.

A system for linkage from screening to appropriate care and treatment for HBV/HCV was established and facilitated by HepLINK-supported KP-led CBOs and clinics. The hepatitis-HIV integrated model created a tremendous opportunity for people living with HBV to access free ART or PrEP using a tenofovir regimen that is also effective for HBV treatment. Continuing efforts to ensure low cost or free treatment will be essential to increasing uptake of treatment and care.

Limitations

The implementation research included only clients using HIV services. This restricted our ability to determine the true impact of the intervention on key outcomes. A follow-up-controlled study would be ideal to examine the impact of the intervention. Routine

TABLE 1 Factors associated with HBV positivity among KPs screened for HBsAg

Factors	*n* (%)	aOR	95% CI	*p*-Value
Age (in years)				
Median age	35			
<15	0 (0%)	(Empty)		
15–24	65 (5.3%)	Ref		
25–49	559 (9.2%)	1.41	1.06–1.88	0.020*
50+	65 (16.2%)	2.96	1.99–4.42	<0.001***
Residence				
Hanoi	342 (8.2%)	Ref		
Ho Chi Minh City	347 (9.8%)	1.22	1.02–1.45	0.026
Testing model				
Facility-based	147 (4.9%)	Ref		
Community-based	542 (11.5%)	2.67	2.09–3.40	<0.001***
KP group				
Others	90 (7.9%)	Ref		
PWID	319 (11.1%)	1.06	0.76–1.47	0.727
DU	97 (9.5%)	0.96	0.68–1.35	0.795
FSW	44 (20.8%)	2.56	1.62–4.05	<0.001***
MSM	136 (5.9%)	1.24	0.87–1.76	0.226
TGW	3 (2.6%)	0.46	0.14–1.53	0.207
HIV status				
Negative	463 (8.7%)	Ref		
Positive	169 (9.6%)	1.40	0.89–2.19	0.141
Unknown	57 (9.2%)	1.22	0.87–1.71	0.259
HBV vaccinated status				
Yes	23 (3%)	Ref		
No	501 (10.5%)	2.24	1.43–3.51	<0.001***
Do not know	165 (7.6%)	1.44	0.9–2.32	0.128
PrEP users				
No	678 (9.1%)	Ref		
Yes	11 (5.2%)	0.75	0.39–1.45	0.393
nPEP users				
No	678 (9%)	Ref		
Yes	11 (9.6%)	2.26	1.12–4.56	0.023*
STI clients				
No	673 (9.1%)	Ref		
Yes	16 (5.1%)	0.99	0.57–1.74	0.982
ART users				
No	523 (8.7%)	Ref		
Yes	166 (9.9%)	1.70	1.03–2.82	0.039*
MMT users				
No	595 (8.9%)	Ref		
Yes	94 (9.3%)	1.23	0.86–1.77	0.259
HIV testing clients				
No	340 (8.8%)	Ref		
Yes	349 (9.1%)	1.39	1.02–1.89	0.035*

Abbreviation: STI, sexually transmitted infections.

*$p < 0.05$; ***$p < 0.001$.

TABLE 2 Factors associated with HCV sero-positivity among KPs screened for anti-HCV

Factors	*n* (%)	aOR	95% CI	*p*-Value
Age (in years)				
Median age	40			
<15	0 (0%)	Omitted		
15–24	27 (2.1%)	Ref		
25–49	820 (12.5%)	1.81	1.18–2.78	0.006**
50+	94 (20.8%)	1.70	1.02–2.83	0.042*
Residence				
Hanoi	606 (14.3%)	Ref		
Ho Chi Minh City	335 (8.2%)	0.70	0.59–0.83	0.000
Testing model				
Facility-based	604 (18.4%)	Ref		
Community-based	337 (6.7%)	0.16	0.13–0.20	<0.001***
KP group				
Others	158 (13%)	Ref		
PWID	637 (20.9%)	11.37	8.73–14.81	<0.001***
DU	88 (6.8%)	3.44	2.49–4.77	<0.001***
FSW	8 (3.9%)	2.34	1.05–5.23	0.038*
MSM	47 (1.9%)	0.31	0.22–0.46	<0.001***
TGW	3 (2.6%)	1.13	0.33–3.84	0.84
HIV status				
Negative	344 (6.1%)	Ref		
Positive	556 (28.4%)	5.85	4.15–8.23	<0.001***
Unknown	41 (5.8%)	1.14	0.77–1.68	0.505
PrEP users				
No	929 (11.5%)	Ref		
Yes	12 (5%)	4.21	2.08–8.52	<0.001***
nPEP users				
No	919 (11.2%)	Ref		
Yes	22 (18.3%)	3.13	1.33–7.35	0.009**
STI clients				
No	931 (11.7%)	Ref		
Yes	10 (3%)	1.47	0.72–3.01	0.290
ART users				
No	444 (6.9%)	Ref		
Yes	497 (26.7%)	1.27	0.82–1.97	0.288
MMT users				
No	705 (9.8%)	Ref		
Yes	236 (21.3%)	1.38	0.95–1.99	0.090
HIV testing clients				
No	772 (18.1%)	Ref		
Yes	169 (4.2%)	0.95	0.66–1.36	0.775

Abbreviation: STI, sexually transmitted infections.
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

monitoring data from e-logbooks were used in the analysis of the intervention's effectiveness, which prevented us from conducting statistical power analysis. Data on confirmatory tests, liver cirrhosis stage, and treatment among clients diagnosed because of the intervention were difficult to track in higher-level health

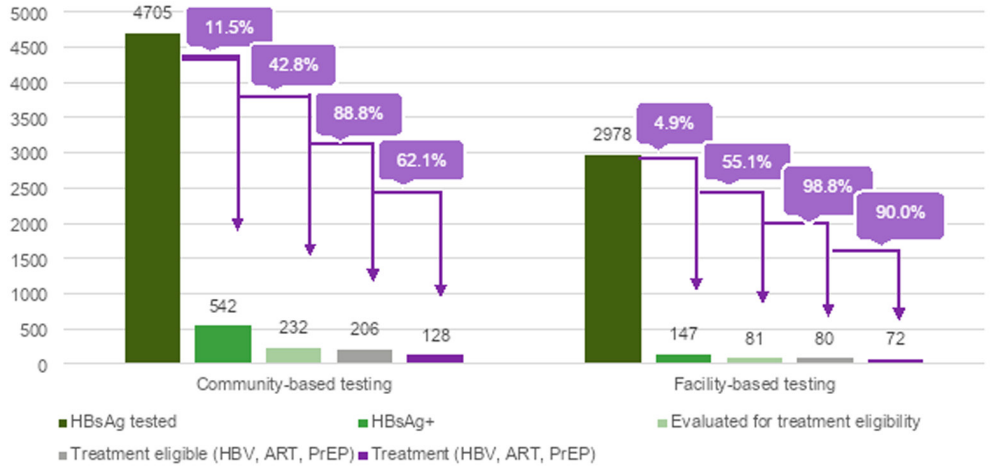

FIGURE 4 Care cascade of CBT and FBT models

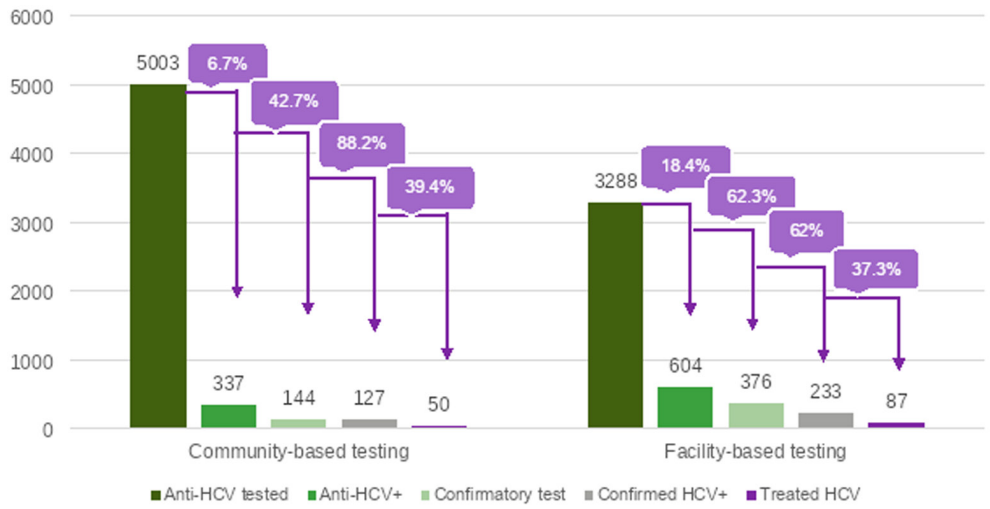

FIGURE 5 Care cascade of CBT and FBT for anti-HCV

facilities. Thus, we were not able to follow-up treatment results.

We envision that the next steps needed to improve HBV/HCV testing uptake and treatment access among KP in Vietnam may include scaling up CBT and FBT models, piloting HCV self-testing and point-of-care viral load (VL) testing (e.g., GeneXpert), and engaging private sector suppliers through a shared-valued approach to offer more affordable VL testing and DAAs.

CONCLUSIONS

Community-based and HIV integrated testing for HBV/HCV is a promising strategy to accelerate testing uptake, case detection, and linkage to care for KPs that may otherwise not test for HBV/HCV. Further work is needed in Vietnam to improve access to HBV/HCV confirmatory testing, diagnosis, and treatment to achieve viral hepatitis elimination by 2030.

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CONFLICT OF INTEREST

Nothing to report.

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REFERENCES

1. World Health Organization Regional Office for the Western Pacific. Viral hepatitis situation and response in Vietnam. Manila, Philippines: World Health Organization; 2018.
2. Nadol P, O'Connor S, Duong H, Mixson-Hayden T, Tram TH, Xia GL, et al. High hepatitis C virus (HCV) prevalence among men who have sex with men (MSM) in Vietnam and associated risk factors: 2010 Vietnam integrated Behavioural and biologic cross-sectional survey. Sex Transm Infect. 2016 Nov;92(7):542–9. https://doi.org/10.1136/sextrans-2015-052518
3. Van TN. Hepatitis B infection in Vietnam: current issues and future challenges. Asia Pac J Public Health. 2012 Mar;24(2):361–73. https://doi.org/10.1177/1010539510385220
4. Dunford L, Carr MJ, Dean J, Waters A, Nguyen LT, Ta TH, et al. Hepatitis C virus in Vietnam: high prevalence of infection in dialysis and multi-transfused patients involving diverse and novel virus variants. PLoS ONE. 2012 Aug;7(8):e41266.
5. Bui VH, Vernavong K, Nguyen VK. HBV and HCV coinfection among HIV/AIDS patients in the National Hospital of tropical diseases, Vietnam. AIDS Res Treatment. 2014;5:581021. https://doi.org/10.1155/2014/581021
6. Easterbrook P, Johnson C, Figueroa C, Baggaley R. HIV and hepatitis testing: global progress, challenges, and future directions. AIDS Rev. 2016;18:3–14.
7. Ishizaki A, Bouscaillou J, Luhmann N, Liu S, Chua R, Walsh N, et al. Survey of programmatic experiences and challenges in delivery of hepatitis B and C testing in low- and middle-income countries. BMC Infect Dis. 2017;17(Suppl 1):696. https://doi.org/10.1186/s12879-017-2767-0
8. Our E, Trickey A, Shirali R, Kanters S, Easterbrook P. Decentralization, integration, and task-shifting in hepatitis C virus infection testing and treatment: a global systematic review and meta-analysis. Lancet Glob Health. 2021;9:e431–45. https://doi.org/10.1016/S2214-109X(20)30505–2
9. Tran N, Trang P, Loc P, Gary M, Amy T, Diem D, et al. Progressive scale-up of HBV AND HCV testing for hepatitis elimination in Vietnam. Clin Liver Dis. 2021 Dec;18(6):261–65. https://doi.org/10.1002/cld.1186
10. Jones L, Bates G, McCoy E, Beynon C, McVeigh J, Bellis MA. Effectiveness of interventions to increase hepatitis C testing uptake among high-risk groups: a systematic review. Eur J Public Health. 2013;24(5):781–8.
11. Solomon S, Quinn TC, Solomon S, McFall AM, Srikrishnan AK, Verma V, et al. Integrating HCV testing with HIV programs improves hepatitis C outcomes in people who inject drugs: a cluster-randomized trial. J Hepatol. 2020 Jan;72(1):67–74. https://doi.org/10.1016/j.jhep.2019.09.022
12. Robotin MC, George J. Community-based hepatitis B screening: what works? Hepatol Int. 2014;8:478–92. https://doi.org/10.1007/s12072-014-9562-4

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