30/07/2018

Improving the Hepatitis Cascade: Assessing Hepatitis Testing and its Management in Primary Health Care in China

RUNNING TITLE: Improving Hepatitis Testing and Management in China's Primary Care

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KEY MESSAGES

- Primary care facilities could be capacitated to meet the high demand for diagnosis, treatment, and prevention of HBV and HCV infection in China.
- Majority of community health centers (CHCs) in China have the facilities to offer HBV testing, with around half offering HCV testing. In addition, most doctors and nurses in CHCs recognize the benefits of offering hepatitis testing.
- Clear policies and guidelines for the roles of primary care in delivery of hepatitis care could improve access to treatment throughout China.

KEYWORDS: Hepatitis; testing; clinical management; Primary Health Care; China

MANUSCRIPT WORD COUNT: 3008

ABSTRACT

Objective The study aimed to decentralize hepatitis testing and management services to primary care in China.

Methods A nationwide representative provider survey amongst community health centers using randomized stratified sampling methods was conducted between September and December 2015. 180 community health centers and frontline primary care practitioners from 20 cities across three administrative regions of western, central and eastern China were invited to participate.

Results One-hundred-and-forty-nine clinicians-in-charge (79%), 1,734 doctors, and 1,846 nurses participated (86%). Majority of community health centers (80%, 95% CI: 74-87) offered hepatitis B testing, but just over half (55%, 95% CI: 46-65) offered hepatitis C testing. The majority of doctors (87%) and nurses (85%) felt there were benefits for providing hepatitis testing at community health centers. The major barriers for not offering hepatitis testing were lack of training (54%) and financial support (23%). Multivariate analysis showed that the major determinants for community health centers to offer hepatitis B and C testing were the number of nurses (AOR 1.1) and written policies for hepatitis B diagnosis (AOR 12.7-27.1), and for hepatitis B the availability of reproductive health service.

Conclusion Primary care providers in China could play a pivotal role in screening, diagnosing, and treating millions of people with chronic hepatitis B and C in China.

Abstract Word count: 208

Key words:

INTRODUCTION

Hepatitis B and C are responsible for nearly half a million deaths in the Western Pacific Region (the "Region")— a toll outnumbering deaths from HIV, tuberculosis and malaria combined (1). Effective antiviral treatment of chronic hepatitis B virus (HBV) and hepatitis C virus (HCV) can halt or even reverse progression to liver cirrhosis and cancer and reduce hepatitis-related mortality(2, 3, 4, 5). Because of this high disease burden, countries have endorsed a regional action plan on viral hepatitis which established 2020 targets that 30% of people living with HBV and HCV would be diagnosed and, 50% of eligible people begin treatment and have sustained viral suppression(1). WHO globally now calls for elimination of hepatitis as a public health threat by 2030(6). Yet, only a fraction of people living with hepatitis are being diagnosed and receiving treatment in this Region (7, 8).

Health services in low and middle-income countries have limited capacity to provide specialized care such as for hepatitis and other gastroenterological disease conditions (9, 10). However primary care providers can play a pivotal role in diagnosis and engagement in care for these diseases traditionally managed in specialty services (11). The American Association for the Study of Liver Diseases (AASLD) and the United States Centers for Disease Control and Prevention (US CDC) emphasized the importance of a multidisciplinary approach to HCV care calling for engaging primary care providers to improve both prevention and treatment effectiveness (12).

China's burden of chronic HBV and HCV is among the highest in the world, accounting for 25% of the global burden of hepatitis B and 7% of those with hepatitis C (7, 13). There are an estimated 74 million people living with chronic hepatitis B and up to 10 million people living with chronic hepatitis C in China (7, 13). Half (51%) of the global burden of new liver cancers and deaths due to liver cancer occur in China. Approximately seven million people chronically

infected with hepatitis B are estimated to urgently need treatment because of advanced liver disease and are at high risk of developing liver cancer. Among people chronically infected with hepatitis C, 2.5 million people are the priority for treatment but most are not even aware of their infection (14).

Since 2009, the Chinese government has committed themselves to re-establishing primary healthcare and by 2014, there has been a network of 8,669 community health centres (CHCs) employing over 300,000 health professionals. CHCs are providing basic public health services, diagnosis and treatment, nursing, rehabilitation for common disease and frequently-occurring diseases (15). Transforming hepatitis tertiary care services offered by gastroenterology, infectious disease and few hepatology specialists to primary care workers could devolve the high volume of people seeking care at tertiary level whilst improving the continuity of care (16, 17, 18). Some CHCs are already testing for hepatitis B and C and could be capacitated to meet the high demand for hepatitis care and treatment, and chronic disease management. Currently, we do not know the extent to which hepatitis testing and management are taking place in primary care in China.

The objectives of this survey were to determine availability of hepatitis testing and care services in community health centers (CHCs); to assess the barriers and facilitating factors for offering hepatitis screening; and, to identify needs of primary care practitioners (PCPs) in China.

MATERIALS AND METHODS

A nationwide representative provider survey amongst CHCs using stratified random sampling methods was conducted between September and December 2015. CHCs (180) from 20 cities across three administrative regions of western, central and eastern China were randomly selected. Further details of the sampling methods are published elsewhere (19). The provider survey instrument was developed by study investigators and consisted of two questionnaires, one for the clinician-in-charge who would provide organizational and service details of CHCs as well as patient characteristics, and another for all PCPs (nurses and doctors) responsible for direct patient contacts in the selected CHCs. Questions were asked about availability of hepatitis testing and experiences of

testing and managing patients with HBV and HCV, and identifying barriers and facilitators for initiating screening and management of HBV and HCV. The surveys were pilot-tested twice in three CHCs and amongst 25 PCPs. Ethics Committee approvals from a local board (HKU/HAW IRB: UW15-350) and the World Health Organization Regional Office for the Western Pacific (2016.4.CHN.1.HSI) were obtained.

Descriptive analyses were conducted to provide percentages and frequencies of key parameters. Confidence intervals for the sample proportions were calculated using the Agresti-Coull (adjusted Wald) method. The statistical modelling focused on determining factors associated with CHCs offering hepatitis screening. Univariate logistic regression was performed to assess explanatory factors such as CHC composition of staff, available medical services and availability of onsite testing. Purposeful selection was used to select explanatory variables ($p<0.25$) used in an overall multivariate logistic regression model. The Hosmer-Lemeshow test, a statistical test for goodness-of-fit for logistic regression model was performed. To evaluate the sensitivity of the model to individual effects, we performed logistic regression diagnostics and did not find any individuals influencing the final model. Data were analyzed using STATA (StataCorp. 2013. *Stata Statistical Software: Release 13.* College Station, TX: StataCorp LP).

RESULTS

One hundred and forty-nine clinicians-in-charge (response rate of 79% for CHCs) and, 1,734 doctors and 1,846 nurses participated in the survey (response rate 86% for PCPs). Table 1 summarizes the demographics of the doctors and nurses working in CHCs. Table 2 summarizes the key characteristics of the CHCs. Of note, the majority of CHCs (80%, 95% CI: 74-87) offered hepatitis B testing onsite, but just over half of those surveyed (55%, 95% CI: 46-65) offered hepatitis C testing onsite.

Table 3 describes the experience of CHC doctors and nurses in dealing with patients with HBV and HCV. Amongst the doctors surveyed, 19% had diagnosed HBV but only 5% had diagnosed HCV within the last one month. Similarly amongst the nurses, 15% were involved in diagnosis of HBV but only 5% with HCV testing within the preceding month. In terms of

management, the figures were even lower: 15% of doctors have managed HBV patients and 4% have managed HCV patients within the preceding month. More than half (56%, 95% CI: 51-61) of doctors who had diagnosed HBV cases did not continue further management in the last one month. Similarly, about half (45%, 95% CI: 35-54) of doctors who had diagnosed HCV cases did not manage it in the last one month.

The majority of doctors (87%) and nurses (85%) felt there was a benefit for providing hepatitis testing at CHC. For those not offering hepatitis testing, the major barriers were the lack of appropriate training (54%) and lack of financial support (23%). Equally, the nurses also cited the lack of training (66%) as the biggest barrier but lack of financial incentives (17%) was also of concern. Both doctors and nurses called for more training (50-53%) and provision of guidelines (24-26%). However, 58% of doctors perceived that offering hepatitis testing to people that self-identify or are being identified as drug users or men-having-sex with men (MSM) would be too difficult to manage and 34% of doctors were worried that such patients might drive other patients away. 56% of nurses felt that these patients could be too difficult to manage, 42% were worried about getting infected by them and 41% worried that they might drive other patients away.

Multivariate analysis showed that the major determinants for CHC to offer hepatitis B testing were the number of nurses (AOR 1.1), having a written policy for hepatitis B diagnosis (AOR 12.7) and a CHC that also offered reproductive and sexually transmitted infection (STI) services (AOR 3.6)(Table 4). Similarly, CHCs offering hepatitis C testing were more likely to have more nurses (AOR 1.1) and had a written policy for hepatitis C diagnosis (AOR 27.1)(Table 5).

DISCUSSION

This is the first ever national representative survey studying hepatitis services in primary health care and the needs of PCPs in China. Our surveys showed that hepatitis B testing and management are already offered in a significant proportion of CHCs in China but much less so for hepatitis C. Nonetheless, having the right staffing, policies, guidelines and training seem to be the prerequisite for introducing HBV and HCV testing at primary care level. On the ground,

the health care providers recognized benefits of offering hepatitis testing but expressed the need for specific training, guidelines, and support.

A lack of studies from Asia

A recent systematic review on hepatitis interventions showed that only one of 56 studies included was from an Asian country but there were ten studies, all from high-income countries addressing hepatitis testing in primary care settings(17). Most of these studies were focused on HCV testing and care as it is the most prevalent infection in Western Europe, Canada and the United States. These studies show that engaging primary care providers through issuing hepatitis testing policies, making system adjustments, training of PCPs and education of patients increased uptake and yield of HBV and HCV and improved linkage to care (9, 18, 20, 21, 22, 23, 24, 25, 26, 27). Hepatitis testing has been integrated into primary care clinics in the Netherlands which provides a range of other related services such as HBV immunization, HIV testing, viral hepatitis and HIV prevention education and medical care (28). Hepatitis testing combined with liver cancer screening in primary care clinics in rural Mongolia has started in 2011. To date, this project has provided testing for 2489 individuals in six provinces of Mongolia, with a seropositive rate of 14% for HBV and 25% for HCV (29).

The China Center for Disease Control (CDC) has conducted an evaluation on HCV antibody testing and availability of HCV RNA testing in CHCs in China and found that 70% of CHCs in fact have capacity to conduct HCV antibody testing but only 49% of those offering antibody testing were able to conduct HCV RNA testing (30). Patients having to pay for hepatitis testing and lack of HCV RNA testing may be major limiting factors for linking patients to care and treatment in CHCs.

Hepatitis C and primary health care

HCV is concentrated among former injecting drug users in Western Europe, Canada and the United States of America (U.S.A.) and they are most likely to present in general practice or primary care settings (18, 20, 21, 22, 23, 24, 27, 31). The proportion of people living with HCV

knowing their status is low in all these countries. Therefore a number of studies are designed to improve uptake and yield of hepatitis testing in primary care settings. For example, the U.S. CDC's Hepatitis Testing and Linkage to Care initiative promoted HBV and HCV screening, post-test counseling, and linkage to care at 34 U.S. sites. The project showed that offering combination of routine opt-out HCV testing and linkage to care at five primary care centers combined with new written policies in Philadelphia could significantly improve uptake of HCV testing, increase yield and linkage to care (32). A dual-routine HCV/HIV testing model at four CHCs in Philadelphia offering opt-out testing among people living with HIV in a primary care setting showed similar results (33). Our study suggests that having clear written policies were perceived as an important factor for conducting hepatitis testing.

Another example is the project, The Extension for Community Healthcare Outcomes (ECHO) model which trained PCPs to test and manage underserved populations with complex health problems such as HCV infection. The results of this study showed that the ECHO model was an effective way to diagnosis and manage HCV infection (34). Our study also identified the need for training to test and manage patients infected with hepatitis. A survey conducted among PCPs in San Francisco showed that patient education improved hepatitis C treatment outcomes and virologic response rates and attitude of primary care providers (18).

Policies increase uptake of hepatitis testing in primary care

Studies have suggested that targeted active case finding in general practice in older age groups with a history of injecting drug use was most cost-effective for HCV screening (18, 20, 21, 22, 23, 24, 27, 35, 36). Similarly hepatitis B screening targeting Asian immigrants was considered a cost-effective approach in U.S.A. and Canada (25, 37). HBV screening in European countries among pregnant women and migrants was also considered cost-effective (38). HCV in most Asian countries is found in general population due to past nosocomial transmission and is very high among former and present drug injectors, as well as for plasma donors and people who have received unscreened blood or blood products in the past (31, 39, 40).

Our study suggests that many CHCs do not have any written policies for hepatitis screening. In practice, HBV testing is widespread in most tertiary and secondary health services as hospital standards are well established. Testing guidelines for HCV by China CDC and in healthcare settings have been available since 2008 and 2014, respectively. Traditionally, testing for hepatitis is limited to hospitals and confirmatory testing is conducted in the China CDC. (41, 42). There is a need to have appropriate training for PCPs to provide testing including nucleic acid testing, hepatitis care and treatment. At the same time, further studies of service delivery models and approaches for combined screening, diagnosis and treatment including epidemiological and cost-effectiveness would help determine the optimal screening strategies for both HBV and HCV in China. Differential of labor has been proposed to pilot-test projects when hospitals would screen for HBV/HCV, the China CDC centers conduct confirmatory testing and initiate treatment, and then refer to CHCs for continuation of treatment and adherence counselling. The questions remain whether CHCs are a good place to reach key populations given the prevailing stigma and discrimination.

Shifting roles of primary health care in China

Within the last decade China has implemented strategies to strengthen its primary healthcare system in order to prepare for, or improve on universal health coverage. In fewer than ten years, the Chinese Government has succeeded in establishing a primary medical care service infrastructure composed mainly of rural township centers, village clinics and CHCs in cities. The basic primary care team in China is made up of doctors, including traditional Chinese practitioners, as well as nurses with very few pharmacists, clinical psychologists or social workers which are important in providing comprehensive care to hepatitis B/C patients. CHCs provide management of common ailments, chronic diseases such as hypertension and diabetes, traditional Chinese medicine, maternal and infant healthcare, and vaccinations and can refer to specialist services. With the large number of people living with chronic hepatitis being undiagnosed and unlinked to care, enhancing the role of CHCs could help to meet these needs. Expanding the capacity of primary care for testing and management would be opportunities to improve chronic care as well as reduce the overall health costs. Studies

have shown that PCPs can provide hepatitis drug treatment even for hepatitis C, if adequately supported and trained (43, 44).

In the same survey, we found 88% of doctors had a computer in the consultation rooms and 81% had internet access (19). Therefore, telemedicine consultation is a potential option for those living in rural areas to gain specialist support on hepatitis care. Using audio-visual application (now widely and freely available in China) to connect the patient, PCP and the specialist that based in the hospitals, could allow real time interaction for difficult cases. Success in California have demonstrated its effectiveness in minimizing the gap to specialty care access and strengthen supports to PCPs in managing HCV patients(45). The Implementation of telemedicine can also be utilized in teaching and proved to be more effective than traditional didactic method in increasing PCPs' clinical knowledge regarding HCV (46).

Policy and practice implications

Chronic hepatitis B and C are a major public health issues in China, with significant social and economic burden. The economic costs of chronic hepatitis infection and its complications increase with disease progression and with age. China is now facing the challenge of slower economic growth, an aging population and a rapid increase in non-communicable diseases including cancer and other chronic diseases. At the same time, healthcare costs are rising. The health reforms are shifting away from expensive hospital-centric model to one centred on primary care.

Our study shows that PCPs have important roles in providing chronic hepatitis management. However, lack of knowledge and supportive policies to implement better services are challenging. Clear policies and guidelines for the roles of PCPs in delivery of hepatitis care would facilitate expansion of hepatitis management capacities throughout the country. In practice, establishing models where PCPs are linked to higher level medical institutions so as to ensure continuity of care could be a pragmatic approach. Further studies to evaluate the impact of screening as well as system changes to allow decentralization of diagnostic and care services to CHC, and studying client perceptions and willingness to utilize hepatitis services are primary level could revolutionize hepatitis care in China.

Strengths and limitations

The main limitation of this study is that only self-reported information on hepatitis B and C diagnosis and management among PCPs were collected and did not include questions about history taking, hepatitis treatment and patient interviews especially amongst key populations. It is a limitation of this study that we did not ask for common practice in history taking on sexual and injecting behaviors. Moreover, there is a need to hear the views from key populations for their preferences on how and where they would prefer to access services. Nonetheless it is the first step on understanding the delivery of hepatitis service in primary care in China. The strengths are that the data was collected from large sample of both doctors and nurses in CHCs throughout China and hence should be generalizable.

Conclusions and next steps

Primary care providers in China could play a pivotal role in screening, diagnosing and treating the millions or people living with chronic hepatitis. Our study suggests that with minimal investment such as policies, guidelines and training of staff, PCPs would be willing to offer hepatitis testing and management. There are ample opportunities for public health research in China to improve the hepatitis care continuum.

DISCLOSURES

We declare that there are no conflicts of interest.

ACKNOWLEDGEMENTS

We thank the General Practice Society of Chinese Medical Association for offering assistance to organise this study. The biggest thank is given to the experts of General Practice Society of the provinces and municipalities, including Prof. Dongdong Chen (Shanghai), Prof. Bo Xie (Chongqing), Prof. Xiaosong Yu & Prof. Shuang Wang (Liaoning), Prof. Lizheng Fang (Zhejiang), Prof. Mei Feng (Shanxi), Prof. Guangbin Zhao (Sichuan), Prof. Haiqin Tang & Prof. Jing Rui (Anhui), and Prof. Li He (Yunnan), who provided the communication with the CHCs and the investigation implementation. We also thank all the CHCs and doctors/ nurses who have engaged in the survey.

ETHICAL CONSIDERATIONS

Ethics Committee approvals from a local board (HKU/HAW IRB: UW15-350) and the World Health Organization Regional Office for the Western Pacific: (2016.4.CHN.1.HSI) were obtained.

FUNDING

This project is supported by three funding sources: The construction of key subjects of public health in Shanghai (Shanghai Municipal Health and Family Planning Commission. No. 12GWZX1001); Shanghai excellent academic leaders in public health training program

(Shanghai Municipal Health and Family Planning Commission. No. GWDTR201210); and, RGC Seed fund for basic research, University Grant Council, Hong Kong SAR Government, entitled, "Survey of the attitudes and needs of integrated HIV and STI services in community health centres in China (2015-16)." (Project Number 201411159004).

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Table 1 – Demographics of CHC doctors and nurses

Variable	Total	% (95 CI)	Doctors (n=1734)	% (95 CI)	Nurses (n=1846)	% (95 CI)
Median age (IQR)	35 (28-43)		38 (32-46)		31 (26-39)	
Male	660/3478	19 (18-20)	650/1675	39 (37-41)	10/1793	0.6 (0.3-1.0)
Han Chinese	3236/3398	95 (95-96)	1562/1637	95 (94-96)	1674/1759	95 (94-96)
Highest qualification						
Lower than associate degree	584	17 (16-19)	202	12 (10-13)	382	21 (19-23)
Associate degree	1502	45 (43-47)	582	34 (32-36)	920	50 (48-53)
Graduate degree	1302	39 (37-41)	832	48 (46-51)	470	26 (24-28)
Graduate degree with post-graduate qualification	167 (3355)	5 (4-6)	108 (1724)	6 (5-8)	59 (1831)	3 (3-4)
Specialty						
Integrative medicine	147	4 (4-5)	145	9 (7-10)	2	0.1 (0-0.4)
General practice	884	25 (24-27)	799	47 (45-49)	85	5 (4-6)
Other Specialty	786	22 (21-24)	749	44 (42-46)	37	2 (1-3)
Nurse	1735	49 (47-51)	23	1 (1-2)	1712	93 (92-94)
Not yet specialized	105 (3,534)	3 (2-4)	75 (1,700)	4 (4-6)	30 (1834)	2 (1-2)
Median years working in above specialty (IQR)	11 (5-20)		14 (7-23)		9 (4-18)	
Title						
Senior title	226	6 (6-7)	180	11 (9-12)	46	3 (2-3)
Intermediate title	1176	33 (32-35)	705	41 (39-44)	471	26 (24-28)
Junior title	1841	52 (51-54)	683	40 (38-42)	1158	64 (62-66)
None	283 (3526)	8 (7-9)	143 (1711)	8 (7-10)	140 (1815)	8 (7-9)
Participation in continuous education	3136/3459	91 (90-92)	1545/1676	92 (91-93)	1591/1783	89 (88-91)
Median number of hours on patient care per week (IQR)	40 (30-42)		40 (28-45)		40 (30-40)	

Table 2 CHC characteristics (n=149)

Median population size of catchment area (IQR)	50,000 (30,000-96,000)
Mean age (standard deviation) of patients	49.9 (11.1)
Median ratio of M:F (IQR) of patients	1 (0.7-1.3)
Appointments can be made in advance	62 (54-70)
Median number of days open (IQR)	7 (7-7)
Median number of doctors per day (IQR)	7 (4-12)
Median number of patients per day (IQR)	70 (28-200)
Median number of nurses (IQR)	13 (8-21)
Median number of pharmacists (IQR)	2 (1-5)
Median number of social workers (IQR)	0 (0-1)
Median number of lab technicians (IQR)	2 (1-3)
Median number of radiographers (IQR)	1 (1-2)
Gender ratio of full time staff male:female	0.3 (0.3-0.6)
Facilities available	
Drug dispensing	84 (78-90)
Treatment/wound dressing room	93 (89-97)
Observation/iv drug room	100 (97-100)
Inpatient beds	87 (81-92)
Onsite testing	
Blood tests – biochem/hematology	95 (91-98)
Doppler/ultrasound	91 (86-95)
Hepatitis B serology	80 (74-87)
Hepatitis C serology	55 (46-65)
Written policies	
Hepatitis B diagnosis	68 (60-75)
Hepatitis B management	31 (23-40)
Hepatitis C diagnosis	43 (35-51)
Hepatitis C management	14 (7-20)

Table 3 Experience with hepatitis patients in the CHC

	Total	% (95 CI)	Doctors (n=1734)	% (95 CI)	Nurses (n=1846)	% (95 CI)
In the last month, diagnosed patients with						
Hepatitis B	663/3490	19 (18-20)	403/1698	24 (22-26)	260/1792	15 (13-16)
Hepatitis C	188/3453	5 (5-6)	107/1680	6 (5-8)	81/1773	5 (4-6)
In the last month, managed patients with						
Hepatitis B	548/3497	16 (15-17)	257/1692	15 (14-17)	291/1805	16 (15-18)
Hepatitis C	148/3471	4 (4-5)	61/1684	4 (3-5)	87/1787	5 (4-6)
Barriers to providing Hepatitis testing at CHC*						
Not interested	96	5 (4-6)	53	7 (5-8)	43	4 (3-6)
Lack of relevant medical training	1106	61 (58-63)	444	54 (50-57)	662	66 (63-69)
Lack of financial support	353	19 (18-21)	187	23 (20-26)	166	17 (14-19)
Lack of support from senior colleagues or management	132	7 (6-9)	57	7 (5-9)	75	8 (6-9)
Others（no treatment available at CHCs, easy to be infected etc.）	137 (1824)	8 (6-9)	86 (827)	11 (8-13)	51 (997)	5 (4-7)
Benefit of offering hepatitis testing at CHC						
Expand clinical services	1261	36 (34-38)	597	35 (33-38)	664	37 (35-39)
Enhance income	171	5 (4-6)	85	5 (4-6)	86	5 (4-6)
Improve job satisfaction	517	15 (14-16)	286	17 (15-19)	231	13 (11-14)
Earning trust from patients	926	27 (25-28)	432	26 (24-28)	494	27 (25-30)
Others	142	4 (3-5)	77	5 (4-6)	65	4 (3-5)
No benefit	482 (3499)	14 (13-15)	215 (1692)	13 (11-14)	267 (1807)	15 (13-17)
Resources needed before hepatitis testing offered at CHC*						
More medical training	1210	53 (51-55)	553	50 (47-53)	657	53 (50-56)
Guidelines	590	26 (24-28)	264	24 (22-27)	326	26 (24-29)
Better support from hospitals	376	17 (15-18)	198	18 (16-20)	178	14 (13-16)
Direct hotline to specialists	105	5 (4-6)	57	5 (4-7)	48	4 (3-5)
Other	55 (2265)	3 (2-3)	24 (1096)	2 (1-3)	31 (1240)	3 (2-4)
Worries about offering hepatitis testing to key populations						
Drive other patients away	1293	38 (36-39)	566	34 (32-37)	727	41 (38-43)

Patients too difficult to manage	1947	57 (55-58)	948	58 (55-60)	999	56 (54-58)
Get infected by them	1237	36 (34-38)	479	29 (27-31)	758	42 (40-45)
Not interested	209	6 (5-7)	93	6 (5-7)	116	7 (5-8)
Hate these people	180	5 (5-6)	78	5 (4-6)	102	6 (5-7)
Others	270 (3437)	8 (7-9)	164 (1647)	10 (9-11)	106 (1790)	6 (5-7)

95% CI = 95% confidence interval, IQR = interquartile range, STIs = sexually transmitted infections,
* In those not providing hepatitis testing

Table 4 Multivariate analysis of variables associated with CHCs offering Hepatitis B testing

	Hepatitis B testing N (%)	Crude OR (95% CI)	p value	Adjusted OR** (95% CI)	p value
Population size catchment area	-	1.00 (1.00-1.00)	0.34	1.00 (0.99-1.00)	0.09
Number of nurses	-	1.11 (1.04-1.18)	<0.01	1.13 (1.05-1.22)	<0.01
Written policy for Hepatitis B diagnosis	87 (92)	7.70 (2.97-20.00)	<0.01	12.70 (3.58-45.07)	<0.01
Reproductive and STI care	93 (86)	4.01 (1.58-10.21)	<0.01	3.61 (0.99-13.15)	0.05
				Hosmer-Lemeshow test $\chi^2(8)=6.73$, *p=0.566*	

Table 5 Multivariate analysis of variables associated with CHCs offering Hepatitis C testing

	Hepatitis C testing N (%)	Crude OR (95% CI)	p value	Adjusted OR** (95% CI)	p value
Population size catchment area	-	1.00 (1.00-1.00)	0.84	1.00 (0.99-1.00)	0.28
Number of nurses	-	1.05 (1.01-1.08)	<0.01	1.06 (1.01-1.10)	0.01
Written policy for Hepatitis C diagnosis	45 (89)	20.4 (7.13-58.13)	<0.01	27.12 (8.09-90.88)	<0.01
				Hosmer-Lemeshow test $\chi^2(8)=9.81$, *p=0.279*	