RESEARCH COMMUNICATION

Needs for Hepatocellular Carcinoma Control Policy in the Asia-Pacific Region

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Abstract

Background: Hepatocellular carcinoma (HCC) is particularly burdensome in the Asia-Pacific region, however, cross-country comparisons have been limited to somewhat unreliable epidemiological measures. We conducted a comparative needs assessment for HCC control policy to inform HCC control efforts in the Asia-Pacific region. The aims were to identify regional needs, to compare overall competence across the region, and to identify which needs were concordant across the region. Method: Using the self-explicated method, a stated-preference approach, clinical experts from Australia, China, Japan, Korea, Taiwan, and the United States valued ten previously identified dimensions of HCC control: clinical education; risk assessment; HBV strategy; HCV strategy; life-style risk factors; national statistics; funding for screening; funding for treatment; political awareness; and public awareness. Results were normalized and analyzed using Z-scores and ANOVA, with concordance of need across the region tested via the F-test. Results: Seventy-two respondents, equally drawn from the study sites, completed the survey (response rate: 36%). Respondents were hepatologists (39%), oncologists (21%), radiologists (17%), surgeons (17%), and other specialists (7%) who were involved in liver cancer control at local/regional (35%) national (44%) or international (21%) levels. In aggregate, the most significant needs were political awareness, public awareness, and life-style risk factors (all $p<0.001$). Significant differences in aggregate competence were observed across the region ($p<0.001$), with better than expected competence reported by respondents from Taiwan ($p<0.001$), Japan ($p=0.006$), and Korea (0.041), and close to expected competence reported by respondents from Australia, China, and USA (all $p>0.05$). There were differences in the extent of needs across the region ($p<0.05$) on all dimensions except funding for screening, clinical education and life style risk factors. Conclusions: As the first comparative needs assessment for HCC for the Asia-Pacific region, our results can inform national and cross-national priorities for intervention and facilitate the identification of best practices. Regional efforts to control HCC should adopt as objectives the needs for greater political and public awareness and improved management of lifestyle risk factors because these are the most significant needs, and are shared concerns across the region.

Keywords: Hepatocellular carcinoma (HCC) - liver cancer - needs assessment - public policy - economic evaluation

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Introduction

Hepatocellular carcinoma (HCC) is the third most common cause of death from cancer (Ferlay et al., 2010). The Western Pacific region has the highest incidence and mortality rates from HCC in the world, at around 38 times higher than the Eastern Mediterranean, which is the region with the lowest reported rates (Ferlay et al., 2010). The wide variation in incidence, even among lower-income countries, suggests that the Asia-Pacific region has the potential to reduce the burden of disease significantly with improved policies aimed at controlling HCC.

Given the burden of disease from HCC in the Asia Pacific region, the Western Pacific Region Office (WPRO) of the World Health Organization (WHO) could take a leading role in HCC control efforts across the region. In its Manual for the Prevention and Control of Common Cancers (WHO, 1998) WPRO has made recommendations for liver cancer treatment and primary and secondary prevention through hepatitis B virus (HBV) immunization and screening of HBV carriers. Some individual jurisdictions have made progress in reducing the risk

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of HCC through HBV vaccination and other programs (Chang et al., 1997; Yoo, 2010; Zhou et al., 2009).

Although HBV is an important risk factor in the region, lifestyle risk factors such as alcohol, smoking, obesity, and diabetes are becoming increasingly important in the etiology of HCC, particularly with global increases in the prevalence of obesity (Nordenstedt et al., 2010). Hepatitis C virus (HCV) is also becoming increasingly important (Chen, 2007). The Asia-Pacific Working Party on Prevention of Hepatocellular Carcinoma recognized the need for broader efforts as well as interventions on HBV in its Consensus Statements for Asia-Pacific Countries, which were based on reviews of HCC epidemiology, HBV, HCV, other liver disease and surveillance (Farrell et al., 2010).

The Asia-Pacific Working Party's broader view of HCC prevention represents a significant advance, but its recommendations should be supplemented with information on current capabilities. Tools have been developed and used in the region for assessing needs and improving outcomes for individual cancer patients (Chen et al., 2009; Shim et al., 2010; Lee et al., 2010; Schlairet et al., 2010; .Li et al., 2011; Akechi et al., 2011). In contrast, no systematic analysis of needs for HCC control at a policy level is available to indicate what improvements are needed by individual countries, or whether needs are sufficiently similar across the region to warrant cross-national efforts.

The analysis of the gap between "what is" and "what should be" by identifying the level of existing competencies has been an influential model for educational needs assessment in continuing medical education over the last 30 years (Fox, 2011). In contrast to much of economics which favors positive approaches, this model is normative. A normative approach may be considered appropriate in the case of needs assessment because need is a subjective concept (Blaug, 1998), or at least a concept that is subject to imprecise measurement and conflicting definitions (Williams & Doessel, 2011). In the present study, we assess needs based on a subjective valuation of competence, an approach similar to that in the medical education needs assessment literature (Fox, 2011). Specifically, identified needs by assessing liver cancer clinicians' views of current competencies across ten dimensions that are important in any public policy effort to control HCC. The aims were to identify regional needs, to compare overall competence across the region, and to identify which needs are concordant across the region.

Materials and Methods

Sample selection

Clinical experts in liver cancer from Australia, China, Japan, Korea, Taiwan, and the United States of America (USA) were selected using a two-stage purposive quota sampling process. Initial selection was based on peer reviewed publications, presentations at major liver disease conferences, leadership roles in national societies/centers, government agencies or recommendations from HCC-related research and other advisory groups. In the second stage of selection, respondents were included if they were oncologists, surgeons, radiologists, other HCC and hepatobiliary specialists, hepatologists, pathologists, and other specialists who may be involved in HCC prevention, diagnosis, treatment, and care, or leaders of major medical institutions (including cancer and other liver disease centers). Respondents were excluded if they were not board certified, had been certified for less than one year, had practiced medicine for less than three years, or had lived or practiced in that jurisdiction for less than three years.

Questionnaire

Each participant ranked his or her country's competence on ten dimensions of HCC control. For example, respondents assigned 1 to the dimension on which their country was most competent, 2 for the next-ranked dimension and so on until 10 was assigned to the dimension on which the country was least competent. The dimensions were selected based on interviews with liver cancer clinicians involved in policy from eleven countries (Bridges et al., 2011a). For each dimension, participants then rated their country's competence using a five point Likert scale (1= poor, 5=excellent). Table 1 shows the dimensions as presented in the choice task along with abbreviated labels and more detailed descriptions of each dimension. Demographic data also were collected.

Data collection

A request for participation was mailed or emailed to potential respondents in English and the local language, if appropriate. Potential respondents who did not respond within two weeks were contacted again by telephone or email. Up to four reminders were sent before a potential respondent was coded as "no response". The survey was administered as a supervised one-to-one survey by telephone or in person between October 2010 and April 2011.

Data analysis

The study used the self-explicated method to conduct needs assessment. The self-explicated method is a relatively simple stated-preference method that allows assessment of both cardinal and ordinal aspects of respondents' preferences and is particularly appropriate for assessing many attributes (Green & Srinivasan, 1990). It was first used in marketing, but recent applications have demonstrated its potential for use in health research (Pavlova et al., 2003; Fraenkel et al., 2010; Bridges et al., 2011b).

For each respondent, ranking (R) and Likert rating (L) values for each dimension were multiplied to give a score between 1 and 50, where lower scores indicated poorer competence and greater needs. The product of the midpoint of the two scales, 16.5, was used as the expected mean score or benchmark. An observed mean score of 16.5 would suggest that respondents answered the ranking and rating scales at random, that they were indifferent, or that they considered competence to be average.

For each dimension, the deviations between observed and expected mean scores were normalized to create z-scores according to:

$$zj = Rj \times Lj - 16.5 / se(Rj,Lj)$$

where *Rj* is the mean ranking for site j, *Lj* is the mean rating for site j, and *se(Rj,Lj)* is the standard error of the product of the mean ranking and rating for site j.

P-values were calculated to assess whether observed mean scores were significantly different from the expected mean. To test for concordance of needs across the region analyses of variance (ANOVAs) and F-tests were conducted. Fisher's exact test was used to test for significant differences in respondent characteristics across the region. Data were analyzed using STATA 11.0 for Windows (StataCorp LP, College Station, TX).

Ethics

All participants were informed about the study and the potential risks and benefits of participation. Respondents participated voluntarily and were not reimbursed. The Johns Hopkins University, Bloomberg School of Public Health Institutional Review Board decided the study did not require human subjects consideration. Local experts were consulted to ensure compliance with any local ethics requirements.

Results

Seventy-two respondents, twelve from each site, completed the survey (response rate 36%). Recruitment results are shown in Figure 1. Respondents identified their main areas of involvement as HCC (67%), hepatitis (22%), transplantation (7%), and metastatic liver cancer (cancer of other organs that has metastasized to the liver) (4%). Thirty-nine percent identified as hepatologists, 21% as oncologists, 17% as radiologists, 17% as surgeons and the other 7% included immunologists, pathologists and researchers. Respondents identified as being involved in liver cancer control at a local/municipality (14%), regional/provincial (21%), national (44%), or international (21%) level. Respondent characteristics by site are shown in Table 1. F-tests for heterogeneity found no significant difference between respondents based on their main area of involvement (p=0.639), specialty (p=0.751), or level of involvement (p=0.502).

Aggregate competence across sites and dimensions was better than the expected benchmark (p<0.001). As shown in Figure 2, average competence across the six sites was significantly below the benchmark for political

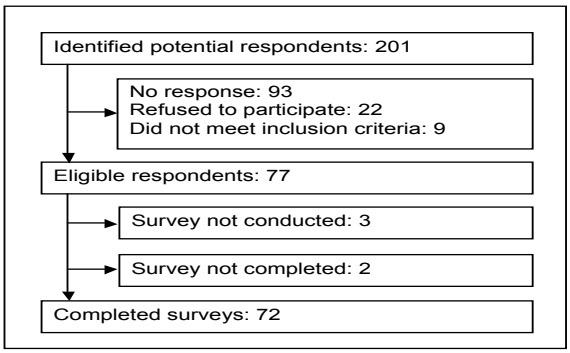

Figure 1. Recruitment Results

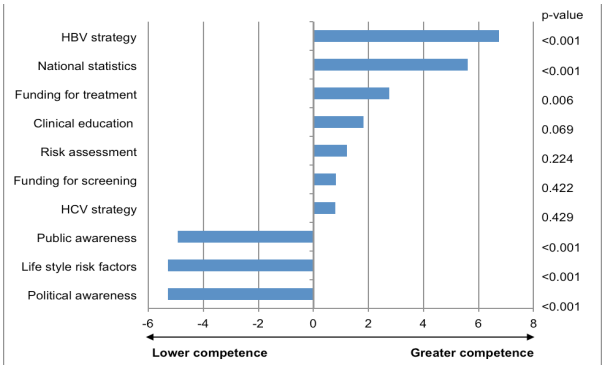

Figure 2. Aggregate Needs for 10 Dimensions of HCC Control

Table 1. Definition of the Dimensions of Liver Cancer Control

Label	Wording in choice task	Definition of dimension
Risk assessment	Early risk assessment	Appropriate assessment and risk stratification in primary care facilitating appropriate management, surveillance or referral to liver cancer specialists
Funding for screening	Funding/reimbursement of screening/detection	Adequate funding and infrastructure to promote and implement appropriate population screening and surveillance for prevention and early diagnosis
Political awareness	Political awareness and action	Heightened awareness, advocacy and political leadership to promote the necessary prevention, early detection, treatment and care for liver cancer
HCV strategy	Comprehensive HCV strategy	Appropriate strategies for prevention, screening, treatment and surveillance of patients either with or at risk of contracting hepatitis C
Public awareness	Public awareness and advocacy	Adequate funding, infrastructure, staffing and leadership to promote necessary public awareness and advocacy programs for liver cancer
Clinical education	Broad clinical education and awareness	Education for general practitioners and hepatologists on the importance of screening and early diagnosis and of the benefits of treating liver cancer
Funding for treatment	Funding/reimbursement of treatment	Appropriate payment for recommended treatments without barriers to access such as unaffordable copayments or delays in funding approval
Life style risk factors	Assessment and management of lifestyle risk factors	Effective programs for at-risk populations to prevent or manage lifestyle risk factors (including alcohol, obesity, diabetes, IV drug use and tobacco)
HBV strategy	A comprehensive HBV strategy	Appropriate strategies for vaccination, prevention, screening, treatment and surveillance for patients either with or at risk of contracting hepatitis B
National statistics	National statistics on liver disease and liver cancer	National programs to collect and maintain data on the incidence, prevalence and outcomes of patients with or at risk of liver cancer, including registries

Table 2. Respondent Characteristics

Characteristic	China	Korea	Japan	Taiwan	USA	Australia	Total	p-value
Main area of involvement								
Hepatitis %	8.3	16.7	8.3	25.0	25.0	50.0	22.2	0.099
HCC %	75.0	83.3	75.0	66.7	66.7	33.3	66.7	
Metastatic liver cancer %	16.7	0.0	0.0	0.0	8.3	0.0	4.2	
Transplantation %	0.0	0.0	16.7	8.3	0.0	16.7	6.9	
Involvement in liver cancer control								
Local/municipality %	8.3	0.0	16.7	25.0	8.3	25.0	13.9	<0.001
Regional/provincial %	0.0	66.7	0.0	8.3	0.0	50.0	20.8	
National %	66.7	25.0	66.7	41.7	41.7	25.0	44.4	
International %	25.0	8.3	16.7	25.0	50.0	0.0	20.8	
Major area of focus								
Hepatologist %	16.7	33.3	50.0	25.0	33.3	75.0	38.9	0.033
Oncologist %	66.7	16.7	8.3	25.0	8.3	0.0	20.8	
Radiologist %	0.0	16.7	16.7	16.7	33.3	16.7	16.7	
Surgeon %	8.3	25.0	25.0	25.0	16.7	0.0	16.7	
Other %	8.3	8.3	0.0	8.3	8.3	8.3	6.9	

Table 3. Deviations from Benchmark by Site and Dimension

Dimension	Normalized deviations from expected mean (z-scores)						Concordance
	Australia	China	Japan	Korea	Taiwan	USA	(p-values)
Risk assessment	-0.94	-0.24	3.45**	1.25	1.47	-6.45***	<0.001
Funding for screening	1.47	-0.48	0.59	0.50	-1.08	0.24	0.468
Political awareness	-12.1***	-0.18	-6.38***	-0.25	-0.94	-10.2***	0.002
HCV strategy	2.10*	-0.82	3.49***	-3.27***	1.67	-1.55	<0.001
Public awareness	-8.63***	-1.87	-5.41***	0.71	0.05	-7.35***	<0.001
Clinical education	-0.08	1.47	1.43	1.12	0.31	-0.30	0.483
Funding for treatment	1.37	-0.72	-0.13	2.40*	0.03	3.84***	0.001
Life style risk factors	-2.69**	-1.90	-4.46***	-3.40***	-0.45	-1.93	0.536
HBV strategy	-0.40	6.24***	2.29*	7.27***	8.53***	0.19	<0.001
National statistics	2.72**	-1.05	7.57***	-0.03	3.53***	3.49***	<0.001
N	12	12	12	12	12	12	

*(p<0.05); **(p<0.01); ***(p<0.001).

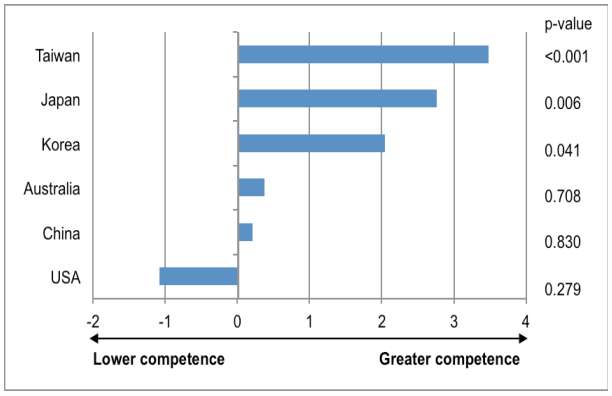

Figure 3. Aggregate Needs for Six Sites

awareness, public awareness, and lifestyle risk factors (all p<0.001). Aggregate competence was significantly above the benchmark for HBV strategy (p<0.001), national statistics (p<0.001) and funding for treatment (p=0.006).

Aggregate results by site are shown in Figure 3 and results by site and dimension are shown in Table 2. Taiwan had the highest aggregate score (p<0.001), the highest score on HBV strategy and the second highest for national statistics (both p<0.001). The second highest aggregate score was for Japan (p=0.006), which had the highest score for HCV strategy and national statistics (both p<0.001), positive scores also for risk assessment (p<0.001) and HBV strategy (p=0.022) but the lowest score for lifestyle risk factors (p<0.001) and scores significantly below the benchmark for political and public awareness (both p<0.001). Korea's aggregate score was also above the benchmark (p=0.041) with positive results for HBV strategy (p<0.001) and funding for treatment (p=0.016) but the lowest score for HCV strategy (p=0.001) and the second lowest score for lifestyle risk factors (p<0.001).

The other three sites had aggregate scores that did not differ from the benchmark average. Australia had positive scores for national statistics (p=0.006) and HCV strategy (p=0.036), but the lowest score of all sites for political and public awareness (both p<0.001) and negative results also for lifestyle risk factors (p=0.007). China scored above the benchmark for HBV strategy (p<0.001) and did not deviate from the benchmark for other dimensions. USA had the lowest aggregate score, although it did not deviate significantly from the benchmark (p=0.279), and the lowest score for risk assessment (p<0.001). It also had negative results for public and political awareness (both p<0.001) but had a positive score for national statistics (p<0.001) and the highest score for funding for treatment (p<0.001).

The last column in Table 2 shows the results of F-tests for concordance, with p-values below 0.05 indicating significant discordance. Overall there was significant discordance across sites (p=0.003), with Japan (p=0.006), Korea (p=0.041), and Taiwan (p<0.001) scoring significantly above the benchmark and the other sites having no significant deviation from the mean.

Concordance across sites was observed only for funding for screening (p=0.468), clinical education (p=0.483) and lifestyle risk factors (0.536). No site had results significantly above or below the benchmark for clinical education or funding for screening, but for lifestyle risk factors, Australia (p=0.007), Japan (p<0.001) and Korea (p<0.001) all had significant negative scores.

Discordance across sites in risk assessment (p<0.001) reflects extremes from significantly above the benchmark in Japan to significantly below in USA (both p<0.001) while other sites did not deviate from the benchmark. The discordance for HCV strategy also reflected a range from significant positive scores in Japan (p<0.001) and Australia (p=0.036) to a significant negative score in Korea (p=0.001). For political awareness and public awareness, the discordances (p=0.002 and p<0.001, respectively) resulted from Australia, Japan, and USA (all p<0.001) having large negative scores while the other sites did not deviate from the benchmark. Discordance on funding for treatment (p=0.001) reflected significant positive scores from Korea (p=0.016) and USA (p<0.001). For HBV strategy there was discordance (p<0.001) due to four sites, China (p<0.001), Japan (p=0.022), Korea (p<0.001), and Taiwan (p<0.001) having significant positive scores. The same pattern was observed for discordance on national statistics (p<0.001), but the sites with significant positive scores for this indicator were Australia (p=0.006), Japan (p<0.001), Taiwan (p<0.001), and USA (p<0.001).

Discussion

Based on ratings and rankings by clinical experts from each of six sites, this study found competence was poorer than expected, and therefore needs existed for improvements in lifestyle risk factor management and political and public awareness. In contrast, competence was better than expected on funding for treatment, HBV strategy, and national statistics, suggesting less need for improvement on these dimensions. The study also found significant discordance of needs across sites for most dimensions of HCC control. Respondents from Taiwan, Korea, and Japan gave the best aggregate scores, while scores for Australia, China, and USA were no different to the expected benchmark score.

For three dimensions (funding for screening, clinical education, and lifestyle risk factors) this study found concordance across sites. This suggests a similar level of need for improvement across sites in these areas, and that cross-national efforts may be beneficial. Cross-national efforts may be particularly welcome for managing lifestyle risk factors, because this was the only dimension for which the aggregate result was significantly below the benchmark and concordant across sites. Where results are discordant across sites, there may be less justification for cross-national efforts, but the results do suggest where decision makers may look for examples of best practice, such as to Japan for risk assessment of HCC.

The finding of positive or near-zero scores for some dimensions cannot be interpreted as meaning no improvement is necessary. Non-significant scores near zero simply mean no effect was observed, that is, respondents may be indifferent, may not know or may consider competence to be average or as expected. There may also be room for improvement when scores are significant and positive. It is possible (although very unlikely given the inclusion of ranking in the scores) for one dimension within any given site to have a perfect score of 50. The highest observed score was 40.6 (z-score of 8.53), for HBV strategy in Taiwan, suggesting there may be room for improvement even there. Similarly, despite a positive aggregate score, only 29 of the 60 site-by-dimension means were positive, suggesting room for improvement across the board.

The results are consistent with some evidence from policy implementation and epidemiological data. Korea's high score for HBV strategy is consistent with the fact that its HBV vaccination program has been credited with significantly reducing HBsAg seropositivity and HCC mortality rates (Yoo, 2010). A study of Korean cancer screening patients found that awareness of their infection status was only about 33% among HCV carriers and 75% among HBV carriers (Shin et al., 2009), which is also consistent with our finding that competence on HCV strategy was significantly below the benchmark. Similarly, our finding of competence above benchmark for HBV strategy in China is not surprising given its recent improvements in blood safety regulation and vaccination, including achievement of 90% coverage for neonatal vaccination (Zhou et al., 2009).

Taiwan had the highest score for HBV strategy, consistent with the fact that it has over 99% vaccine coverage among children in their first year of elementary school (Taiwan CDC, 2006) and it has observed significant reductions in HBsAg prevalence and HCC incidence in children since the vaccination program was introduced (Chang et al., 1997; Ni et al., 2001). As part of its J-HCC Guidelines, Japan uses a surveillance and diagnostic algorithm to track patients with HBV, HCV, and liver cirrhosis for testing every 3-6 months (Song et al., 2010). The successful implementation of this system is consistent with our finding that only Japan scored significantly above the benchmark on risk assessment.

The result that lifestyle risk factors are a significant need does not lead to an obvious conclusion because it may refer to several different concerns. The result may reflect expectations of the increasing importance of lifestyle risk factors in the etiology of HCC with increasing prevalence of obesity and decreasing HBV prevalence (Nordenstedt et al., 2010). Alternatively, it may reflect views that current efforts to reduce alcohol consumption, smoking, risky sexual behaviors, and/or drug injection practices are insufficient. Further research to separate these factors would be useful. In addition, the fact that no site had a positive score on this indicator suggests there may not be an example of best practice available such that research to investigate the effectiveness of policies to reduce lifestyle risk factors is a priority.

The use of the self-explicated method, a technique previously used mostly in marketing research (Green & Srinivasan, 1990), had several benefits for this study. The method is superior to Likert ratings alone because the addition of a ranking scale allows comparison across

different attributes or options. Similarly, the method is superior to a ranking scale alone because the resulting scores also can demonstrate magnitude. Conjoint analysis, another method of preference elicitation that produces results that are both cardinal and ordinal, is less appropriate for use in policy because a maximum of around seven attributes can be considered in one experiment. Many more attributes are often necessary for policy analysis, decision-making across jurisdictions, consultation, and planning for treatment services. Use of the self-explicated method in these contexts is a pragmatic way to add quantitative analysis to qualitative information from interviews, focus groups, surveys, and submissions.

One limitation of the study is the potential for bias from cross-cultural differences in reporting on Likert scales. Previous research has found differences among Chinese, Japanese, and Americans, and between Koreans and Americans in responses to Likert scales (Lee, Jones, Mineyama, & Zhang, 2002; Willis & Zahnd, 2007). Cross-cultural differences may have affected our results, but the addition of ranking scales reduced the impact of any bias in ratings.

Another potential limitation is the differences in HCC etiology and prevalence across the sites in the study. It is important to interpret results in the context of these international differences. For example, our finding of scores well below the benchmark for public and political awareness in Australia, Japan, and USA might be expected given that they have much lower HCC incidence than in China, Korea, and Taiwan (Ferlay et al., 2010). Similarly, sites with the highest scores for HBV strategy are also the sites where HBV contributes most to the epidemiology of HCC (Raza, Clifford, & Franceschi, 2007), suggesting either that the policy response is appropriate or that respondents considered competence on what is a major risk factor to be more important than competence on dimensions that may be perceived as less critical to HCC control.

A third limitation is the fact that the results may not generalize to other jurisdictions in the region. It may be appropriate to generalize for dimensions where results were concordant across sites, but there are likely to be differences in needs for dimensions that are discordant across our sample.

Clinicians who specialize in HCC and related areas were chosen as the respondents for this study because they are likely to be well-informed about the experience of HCC patients and about policy and technological developments in the field. However, the views of clinical experts alone should not be expected to provide sufficient evidence for decision-making. One model of needs assessment requires that information on needs be collected from epidemiological and demographic statistics, key informants and users or the public in order to inform goal-setting and program planning that is oriented to the needs of a particular community (Neuber, 1980). The reviews of epidemiology and intervention effectiveness conducted by the Asia-Pacific Working Party on Prevention of Hepatocellular Carcinoma (Farrell et al., 2010) provide the first part of this evidence set and our study contributes the second. A comprehensive assessment of needs therefore still requires consideration of the views of a broader population, including patients, members of the public, and other types of experts.

This study has found that significant needs exist for improvements in public and political awareness and lifestyle risk factors, but that other needs vary across six sites in the Asia-Pacific region. There is potential for the region to benefit from cross-national efforts to improve HCC control that focus on areas of concordant needs. Where competence differs across sites, there is also significant potential to learn from jurisdictions that have been relatively successful.

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