

A Survey of Liver Cancer Specialists' Views on the National Liver Cancer Screening Program in Korea

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Background/Aims: To reduce the cancer burden, the Korean government initiated the National Cancer Control Plan including the National Liver Cancer Screening Program (NLCSP). Ultrasonography examinations and α -fetoprotein tests at six-month intervals are currently offered for high-risk individuals. High-risk individuals are identified by reviewing the National Health Insurance Service claims data for medical use for the past two years using International Classification of Diseases Codes for specific liver disease. We surveyed the attitudes and opinions towards the NLCSP to understand the issues surrounding the NLCSP in Korea.

Methods: Altogether, 90 Korean Liver Cancer Association members participated in online and offline surveys between November and December 2019.

Results: Approximately one-quarter (27%) of the survey participants rated the NLCSP as very contributing and about two-thirds (68%) as contributing to some extent toward reducing hepatocellular carcinoma (HCC)-related deaths in Korea. Most (87.8%) responded that the current process of identifying high-risk individuals needs improvement. Many (78.9%) were concerned that the current process identifies individuals who use medical services and paradoxically misses those who do not. When asked for the foremost priority for improvement, solving 'duplication issues between the NLCSP and private clinic HCC screening practices' was the most commonly selected choice (23.3%).

Conclusions: The survey participants positively rated the role of the NLCSP in reducing liver cancer deaths. However, many participants rated the NLCSP as needing improvement in all areas. This survey can be a relevant resource for future health policy decisions regarding the NLCSP in Korea. (*J Liver Cancer* 2020;20:53-59)

Keywords: Hepatocellular carcinoma; National Cancer Screening Program; Survey

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INTRODUCTION

Liver cancer is the sixth most common cancer (fourth in men and sixth in women) and the second-largest cause of cancer mortality in South Korea.¹ A total of 15,771 cases

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(11,774 men and 3,997 women) were identified, with an age-standardized incidence rate of 18.0 persons per 100,000 (29.2 in men and 7.9 in women) in 2016.² The mortality from liver cancer was 10,721 (7,982 in men and 2,739 in women) in 2017.² To reduce the cancer burden, the Korean government initiated a comprehensive National Cancer Control Plan in 1996.³ As part of this plan, the National Cancer Screening Program was launched in 1999.^{4,5} In terms of liver cancer screening, the National Liver Cancer Screening Program (NLCSP) began in 2003 by offering an ultrasonography (US) examination and an α -fetoprotein (AFP) test for people aged 40 years and over who were hepatitis B surface antigen (HBsAg) or anti-hepatitis C virus (HCV)-positive or had liver cirrhosis. The tests were offered at six-month intervals from 2003 to 2011, at one-year intervals from 2012 to 2015, and at six-month intervals since 2016 (<https://www.g-health.kr/portal/index.do>, accessed at December 21, 2019).

The stage at diagnosis is an important prognostic factor for cancer patient survival.⁶ The five-year relative survival rate is high for localized Surveillance, Epidemiology, and End Results (SEER) stage liver cancer (42.8%) and dismal (2.5%) for distant SEER stage liver cancer.⁷ Compared to the US SEER data, Korean patients had better stage distribution and stage-specific survival rates, which the authors suggested might be the result of contributions by the National Cancer Screening Program.⁷ However, data on the efficacy of the NLCSP is very limited.

The Korean Liver Cancer Association (KLCA) is a leading, multidisciplinary society promoting research in liver cancer-related disciplines, thereby providing a platform for the exchange of knowledge and information and suggesting scientific evidence and guidelines needed to overcome liver cancer with the aim of contributing toward public health. This study conducted a survey of KLCA members to assess their insights and opinions on the NLCSP, understand issues regarding the NLCSP, and provide relevant information for health policy decision-making in Korea.

METHODS

1. Study population and design

This survey study was conducted by a project committee of the KLCA. The first e-mail requesting participation in the online survey was sent to 735 KLCA members on November 25, 2019. Fifty-three members responded and completed the online survey. The second e-mail requesting participation in the online survey was sent on December 03, 2019, to which 18 members responded and completed the online survey. Lastly, a printed survey was prepared and participation was requested from 70 KLCA members who attended the KLCA single-topic conference held on December 13, 2019. Nineteen members completed the printed survey form. Finally, 90 KLCA members participated in this survey study. The baseline characteristics of the survey participants are summarized in Table 1. This study corresponds to an institutional review board approval waiver as only de-identified survey results were used.

Table 1. Baseline characteristics of the survey participants

Variable	Value (n=90)
Sub-specialty	
Hepatology	72 (80.0)
Surgery	11 (12.2)
Radiology	3 (3.3)
Radiation oncology	2 (2.2)
General internist	2 (2.2)
Year of board-certificate acquisition (median, range)	2006 (1983-2019)
Years of sub-specialty experience	
Less than 10 years	20 (22.2)
10 to 19 years	36 (40.0)
More than 20 years	34 (37.8)
Workplace	
University hospital	79 (87.8)
General hospital	8 (8.9)
Private clinic	2 (2.2)
Government-affiliated agency	1 (1.1)

Values are presented as number (%) unless otherwise indicated.

2. Survey variables

The survey comprised three parts. The first part consisted of three questions on sub-specialty, acquisition year of the medical sub-specialty, and place of work. The second part consisted of seven questions asking the KLCA member's assessment of the status of the NLCSP in Korea. The third part consisted of six questions asking for the KLCA member's opinion on how the NLCSP could be improved. A complete survey (in the Korean language) can be found in Supplementary materials.

3. Statistical analyses

The results are summarized as median (quartile) or number (%), as appropriate. We also tested whether opinions differed by sub-specialty or year of experience. *t*-, chi-square, or Fisher's exact tests were used for comparisons, as appropriate. *P*<0.05 was considered significant.

RESULTS

1. Assessment of status by KLCA members

Ninety-nine percent of the participating KLCA members

agreed that hepatocellular carcinoma (HCC) surveillance in high-risk patients lowers the risk of HCC-related death (Fig. 1). Regarding the NLCSP in Korea, 99% reported that they knew the current NLCSP. When asked about the NLCSP's role in Korea, 95% responded that the NLCSP contributes to lowering the risk of HCC-related deaths in Korea (Fig. 1). When asked, "How many points do you give the NLCSP?" (lowest 0 points-highest 10 points), the median point was 7 (range, 2-10). The mean points were lower in members with more than 10 years of experience than that in those with less than 10 years of experience (6.96 ± 1.51 vs. 7.76 ± 1.10 , *P*=0.009). When the analysis was limited to 72 hepatologists, 30 had less than 10 years of experience, while 42 had more than 10 years of experience. Hepatologists with more experience rated the NLCSP more negatively (Supplementary Table 1). However, there were no significant differences in opinions on the target group, target group identification process, or priority for improvement except for agreement rates on the starting age for surveillance and the reasons why the selection process needs improvement (Supplementary Table 1).

2. Assessment of target groups

Currently, the NLCSP offers liver US and serum AFP mea-

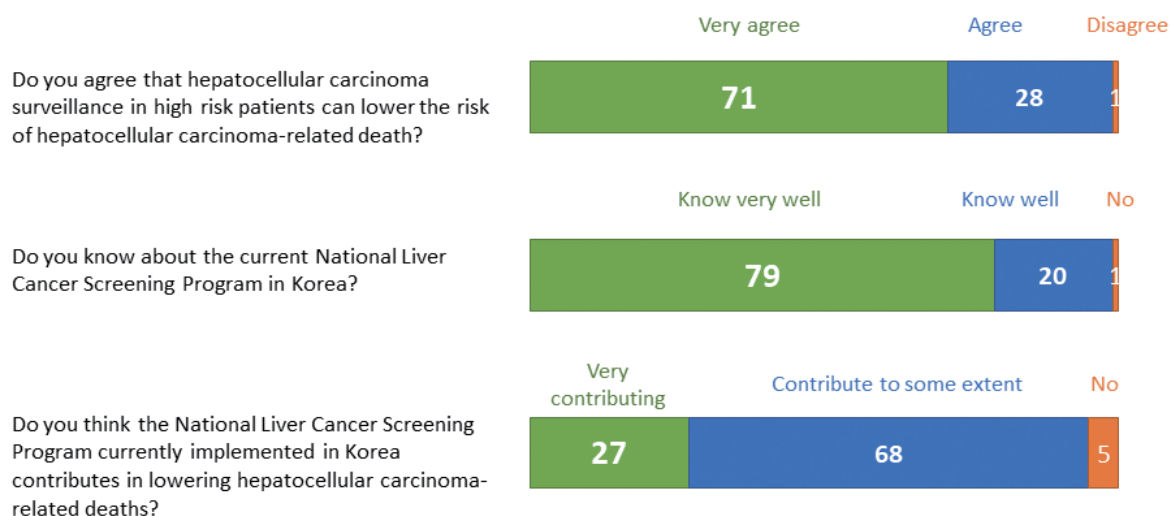


Figure 1. Survey participant assessment of the status of the National Liver Cancer Screening Program. Values are presented as %.

surement every six months for high-risk individuals (adults older than 40 years with cirrhosis, chronic hepatitis B virus [HBV], or HCV infection, according to <https://www.g-health.kr/portal/index.do> [accessed December 21, 2019]). When asked, 5.6%, 57.8%, 25.6%, and 1.1% of survey participants responded that the current target populations were very appropriate, appropriate, inappropriate, and very inappropriate target populations for the NLCSP, respectively. Specifically, 22.2% responded that cirrhosis over 40 years of age was an inappropriate target, 20% responded that chronic HBV infection over 40 years of age was inappropriate, and 30% responded that chronic HCV infection over 40 years of age was an inappropriate target. Six opinions on ‘HCC surveillance target’ were selected by the project committee members and asked for agreement. The agreement rates ranged from 8.9% to 82.2% for each question (Table 2).

3. Assessment of the target group identification process

In the NLCSP, the target population (high-risk individuals) is identified by reviewing National Health Insurance Service (NHIS) claims data. The NHIS in Korea is a single-payer universal health system that maintains claims data on all reimbursed inpatient and outpatient visits, procedures, and prescriptions. These claims data are coded using the International Classification of Diseases, Tenth Revision (ICD-10) and the Korean Drug and Anatomical Therapeutic Chemical Codes. The NLCSP identifies high-risk individuals, defined as having NHIS claims for the past two years with the disease classification codes shown in Table 3.

Fifty percent of survey participants responded that they were aware of the target population selection process of the NLCSP. When asked whether this selection process needed

Table 2. Agreements in opinions regarding hepatocellular carcinoma surveillance targets

Question	Agreement (%)
Surveillance target	
Patients with liver cirrhosis should be included as surveillance targets regardless of age	82.2
The starting age for surveillance should differ between men and women	13.3
Chronic hepatitis patients (e.g., fatty liver, alcoholic liver disease) with advanced fibrosis should be surveillance targets regardless of age	72.2
Anti-hepatitis C virus-positive patients without advanced fibrosis should not be included as -surveillance targets regardless of age	17.8
Chronic hepatitis C patients who achieved sustained virological response and without advanced fibrosis should not be included as surveillance targets regardless of age	30.0
Chronic hepatitis B patients without advanced fibrosis should not be included as surveillance targets regardless of age	8.9
Opinions on the target population selection process	
Disease classification codes used to select the target population should be simplified	40.0
Register target population as cancer or rare/incurable disease	42.2
Minimize national program and increase private sector program using more incentives	50.0

Table 3. Disease classification codes defining target populations in the National Liver Cancer Screening Program

Disease entity	Classification code
Liver cirrhosis (* indicate 0, 1, 2, 9)	K702, K703 (K7030, K7031), K74, K740 (K740*), K741 (K741*), K742 (K742*), K743 (K743*), K744 (K744*), K745 (K745*), K746 (K746*), K765, K766
Positive for hepatitis B surface antigen or hepatitis C virus antibody	B18, B180, B181 (B1810, B1818), B182, B188, B189, Z225
Chronic liver disease due to hepatitis B virus or hepatitis C virus	B19, B190, B199

improvement, 20%, 67.8%, and 10% responded that improvement was very necessary, necessary, and not necessary, respectively, while two participants (2.2%) did not respond. When asked ‘Why does the selection process need improvement?’, 58.9% agreed that the screening targets identified by disease classification codes may not match true surveillance targets, 17.8% agreed that there was a privacy violation problem and 78.9% agreed that the current process identifies individuals who use medical services, paradoxically missing individuals who do not. Three opinions on ‘How the target population selection process can be improved’ were selected by the project committee members and asked for agreement. The agreement rates ranged from 40.0% to 50.0% for each question (Table 2).

4. Assessment of priorities for improvement

When asked for the foremost priority for improvement, solving duplication issues between the NLCSP and private clinic HCC screening practices were the most commonly selected choices (23.3%), followed by improving surveillance methods (e.g., allowing the use of computed tomography or magnetic resonance imaging, allowing the use of other tumor markers, and allowing intensive surveillance at short-term intervals) (21.1%), improving low screening rates (16.7%), improving the target identification process (14.4%), improving the definition of the target population (13.3%), and improving the quality of the NLCSP (8.9%) (Fig. 2). For each

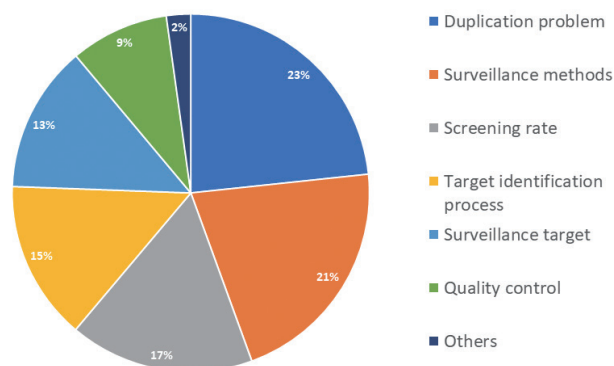


Figure 2. Assessment of the priority for improvement of the National Liver Cancer Screening Program according to survey participants.

specific area, 50.0% to 65.6% of the survey participants responded that improvement was needed (Fig. 3). There were no differences in the foremost priorities according to the respondents’ years of experience, sub-specialties, or workplace (data not shown).

DISCUSSION

In this survey, 99% of survey participants agreed that HCC surveillance in high-risk patients could lower the risk of HCC-related death (71% strongly agreed; 28% agreed). Ninety-five percent also agreed that the NLCSP helps to reduce the HCC mortality rate in Korea. Yet, only about one-quarter (27%) answered that the NLCSP is very contributing, while two-thirds of the survey participants (68%) rated the NLCSP as contributing to the reduction only to some extent. There was a large gap between belief (71% strongly agreed that HCC surveillance can lower the risk of HCC-related death) and the actual role of the NLCSP (27% rated that the NLCSP highly contributed to reducing HCC mortality in Korea). The median score of the current NLCSP was 7 points (max 10 points). It suggests that the survey participants think HCC surveillance can reduce the risk of HCC-related death, but that the NLCSP is not playing a sufficient role.

Several issues have been raised regarding the NLCSP in Korea. A lowered mortality risk (hazard ratio, 0.78; 95% confidence interval, 0.76 to 0.80) was recently reported

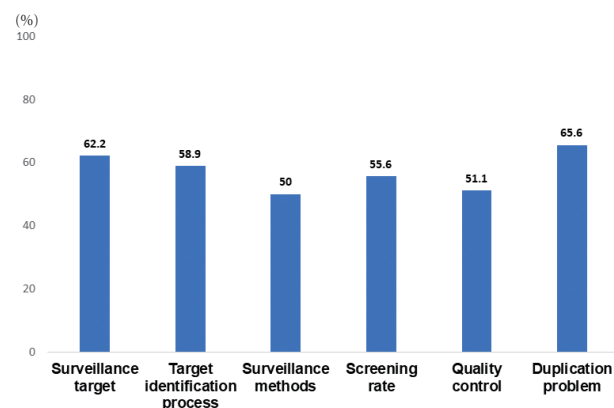


Figure 3. Assessment of the needs for improvement in certain areas of the National Liver Cancer Screening Program according to survey participants.

among patients who participated in the NLCSP once within two years prior to the diagnosis of liver cancer compared to those who did not participate in the NLCSP,⁸ indicating the potential role of the NLCSP in reducing HCC-related mortality. However, other studies reported poor efficacy of the NLCSP. A study that assessed the 2010 National Cancer Screening Program reported very poor performance of the NLCSP. The positive predictive value was only 5.7% and the sensitivity was 41.3%,⁹ meaning that the NLCSP program is not very effective despite the tremendous amount of government funding. A study from a single healthcare center reported that many (46% of NLCSP participants) individuals were inaccurately identified as the NLCSP target population.¹⁰ Another cohort study of 541 chronic hepatitis B patients who participated in the NLCSP reported that tumors were detected in only nine of 16 patients (56.3%) under the NLCSP, whereas tumors were detected in seven of 16 patients (43.7%) by computed tomography or magnetic resonance imaging evaluation outside of the NLCSP.¹¹ The participant rates for the NLCSP increased steadily from 13.2% in 2003 to 39.5% in 2012⁴ but were lowest (33.6%) compared to other cancers (stomach, colorectal, breast and cervical cancer; 73.6%, 55.6%, 59.7% and 67.0%, respectively) in 2013.¹² The quality of US screening was demonstrated to be sub-optimal in 143/685 hospitals (20.8%) and 645/1,985 (32.5%) private clinics that failed to pass quality assurance evaluation for liver cancer screening by US.¹³ In this survey study, most of the survey participants (87.8%) responded that the current target group identification process requires improvement. Most (78.9%) were also concerned about missing surveillance targets by using disease classification codes of NHIS claims data for identification. In this survey, more than 50% of respondents agreed that areas of the NLCSP need improvement (Fig. 3). It is clear that the NLCSP warrants further improvement.

Regarding suggestions to improve the NLCSP, a high rate of agreement was observed on two surveillance targets. The majority of respondents (82.2%) agreed that patients with liver cirrhosis should be included regardless of age. In fact, the Korean guideline for HCC surveillance recommends surveillance for those with HBV or HCV infection or cirrhosis

from 40 years of age or at the time of cirrhosis diagnosis.¹⁴

The reason why the NLCSP is provided for those only aged over 40 years remains unclear and cirrhosis patients should be included in the NLCSP regardless of age. Most (72.2%) participants also agreed that the NLCSP should include chronic hepatitis patients with advanced fibrosis as these patients are at high risk for HCC.^{15,16} Inclusion of these patients should be considered for the first candidate group when expanding the NLCSP. In terms of the target group identification process, none of the three suggestions for improving the surveillance target selection process achieved high agreement rates (Table 2). Thus, further studies are needed to determine how to improve the surveillance target selection process. Opinions were diverse regarding the foremost priority for improvement (Fig. 2), with solving duplication issues between the NLCSP and private clinic HCC screening practices receiving the most choices (23.3%). Efforts to improve the NLCSP are urgently needed.

This study had some limitations. The fairness of survey items and evaluation methods has not been validated by professional survey researchers and not guided by a theoretical framework. The survey form was sent to 735 KLCA members; however, the overall response rate was low (12.2%) and may not represent the opinions of all KLCA members. Specifically, the respondents included 72 of 368 hepatologists (19.6%); 11 of 127 surgeons (8.7%); 3 of 143 radiologists (2.1%); and 4 of 97 radiation oncologists, pathologists, and other specialties (4.1%). Most of the survey participants (87.8%) worked in university hospitals and hepatologists comprised 80.0% of participants. The NLCSP is widely practiced by physicians in many specialties and is not only performed in university hospitals. Opinions from other practice areas are needed. The survey was conducted in Korean; hence, its generalizability to other countries with different cultural and medical backgrounds is limited. The survey asked for expert opinions without providing detailed data on the NLCSP in Korea (program cost, HCC diagnosis rate, true positive rate, false-positive rate, false-negative rate, participation rate, etc.). Thus, the survey participants may have under- or over-estimated the actual contributions of the NLCSP in reducing liver cancer mortality in Korea. The strength of

this survey is that it is the first structured and organized report on the views of liver cancer specialists of the NLCSP in Korea.

In summary, this survey found generally positive attitudes among liver cancer specialists regarding the role of the NLCSP. However, most of the survey participants rated the NCLSP as needing improvement. The findings from this survey can provide relevant information and may help future health policy decisions.

SUPPLEMENTARY MATERIAL

Supplementary datas can be found with this article online <http://www.e-jlc.org/html/https://doi.org/10.17998/jlc.20.1.53>.

Conflicts of Interest

The authors declare no conflicts of interest relevant to this article.

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Supplementary Table 1. Survey results stratified according to year of experiences among hepatologists (n=72)

Question	Experience less than 10 years (n=30)	Experience more 10 years (n=42)	P-value
Do you agree that hepatocellular carcinoma surveillance in high risk patients can lower the risk of hepatocellular carcinoma-related death?			0.37
Very agree	80	67	
Agree	20	31	
Disagree	0	2	
Do you know about the current National Liver Cancer Screening Program in Korea?			0.78
Know very well	83	86	
Know well	17	14	
Do you think the National Liver Cancer Screening Program currently implemented in Korea contributes in lowering hepatocellular carcinoma-related deaths?			0.031
Very contributing	37	14	
Contribute to some extent	53	76	
Not contributing	0	10	
How many points can you give to the National Liver Cancer Screening Program? (median, quartile)	8 (7-8)	7 (6-8)	<0.001
Do you think current National Liver Cancer Screening Program target population is appropriate target?			0.16
Very appropriate	13	3	
Appropriate	60	64	
Inappropriate	23	33	
Very inappropriate	3	0	
Do you think 'cirrhosis over 40 years of age' is appropriate target? (yes)	70	76	0.55
Do you think 'chronic hepatitis B virus infection over 40 years of age' is appropriate target? (yes)	80	74	0.54
Do you think 'chronic hepatitis C virus infection over 40 years of age' is appropriate target? (yes)	67	67	1.00
Agreements on surveillance target			
Patients with liver cirrhosis should be surveillance targets regardless of age	97	86	0.12
Starting age for surveillance should be different for men and women	0	29	0.001
Chronic hepatitis patients (e.g., fatty liver, alcoholic liver disease) with advanced fibrosis should be surveillance targets regardless of age	73	76	0.78
Anti-HCV positive patients without advanced fibrosis should not be included as a surveillance target regardless of age	20	24	0.70
Chronic hepatitis C patients who achieved sustained virological response and without advanced fibrosis should not be included as surveillance targets regardless of age	37	29	0.46
Chronic hepatitis B patients without advanced fibrosis should not be included as surveillance targets regardless of age	10	7	0.66
Did you know the target population selection process of the National Liver Cancer Screening Program? (yes)	57	59	0.87

Supplementary Table 1. Continued

Question	Experience less than 10 years (n=30)	Experience more 10 years (n=42)	P-value
Do you think the target population selection process of the National Liver Cancer Screening Program should be improved?			0.54
Very necessary	17	29	
Necessary	73	62	
Not necessary	10	9	
Agreements on opinions about reasons why selection process need improvement			
The screening targets identified by disease classification codes may not match true surveillance targets	40	79	0.001
There can be a privacy violation problem	10	21	0.20
The current process identifies individuals who use medical services, and paradoxically, misses individuals who do not use medical services	77	83	0.48
Agreements on opinions about how selection process should be improved			
Disease classification codes used to select the target population should be simplified	37	41	0.74
Register target population as cancer or rare/incurable disease	43	41	0.80
Minimize national program and increase private sector program using more incentives	43	55	0.33
The foremost priority for improvement			0.35
Surveillance target	17	14	
Target identification process	13	17	
Surveillance methods	33	14	
Screening rate	7	19	
Quality control	7	10	
Duplication problem	23	21	
Others	0	5	
Agreements on area that need improvement			
Surveillance target	63	71	0.46
Target identification process	57	64	0.51
Surveillance methods	50	50	1.00
Screening rate	60	52	0.52
Quality control	47	60	0.28
Duplication problem	57	69	0.28

Values are presented as %.

Supplementary Fig 1. A complete survey (in Korean language).

전문가(대한간암학회 회원 대상) 의견 수집 을 위한 설문지

1. 선생님의 전문 진료과는 무엇입니까?

한 개의 타원형만 표시합니다.

- ☐ 내과-소화기
- ☐ 내과-소화기외 분과 혹은 일반의
- ☐ 외과
- ☐ 영상의학과
- ☐ 가정의학과
- ☐ 방사선종양학과
- ☐ 병리과
- ☐ 기타: _____

2. 전문의 취득년도는 언제입니까?

3. 현재 진료하시는 기관은 어디입니까?

한 개의 타원형만 표시합니다.

- ☐ 대학병원
- ☐ 종합병원
- ☐ 개인의원
- ☐ 건강검진센터
- ☐ 기타: _____

Supplementary Fig 1. Continued

4. 간암 고위험군을 대상으로 간암 선별검사(검진)을 시행하는 것이 간암 사망 위험을 낮춘다고 생각하십니까?

한 개의 타원형만 표시합니다.

- ☐ 매우 동의한다
☐ 동의한다
☐ 동의하지 않는다
☐ 전혀 동의하지 않는다

5. 현재 우리나라에서 시행되고 있는 국가 간암 검진 사업에 대해 알고 계십니까?

한 개의 타원형만 표시합니다.

- ☐ 잘 알고 있다.
☐ 어느정도 알고있다.
☐ 잘 모른다
☐ 전혀 모른다

6. 현재 우리나라에서 시행되고 있는 국가 간암 검진 사업은 우리나라 간암 사망위험을 낮추는데 기여하고 있다고 생각하십니까?

한 개의 타원형만 표시합니다.

- ☐ 매우 기여하고 있다
☐ 어느정도 기여하고 있다
☐ 기여하지 못하고 있다
☐ 전혀 기여하지 못하고 있다

7. 현재 우리나라에서 시행되고 있는 국가 간암 검진 사업에 몇 점을 주시겠습니까? (최저 0점-최고 10점)

Supplementary Fig 1. Continued

8. 현재 국가 간암 검진 대상자는 만 40세 이상 남녀 중 간경변증, B형간염 바이러스, C형간염 바이러스 보유자들입니다. 이 대상군은 적절하다고 생각하십니까?

한 개의 타원형만 표시합니다.

- ☐ 매우 적절하다
☐ 적절하다
☐ 적절하지 않다
☐ 매우 적절하지 않다

9. 현재 대상자가 적절하지 않다고 생각하시면 적절하지 않다고 생각하시는 모든 경우를 선택하여 주십시오

해당 사항에 모두 표시하세요.

- ☐ 만 40세 이상 간경변증
☐ 만 40세 이상 B형간염 바이러스 보유자
☐ 만 40세 이상 C형간염 바이러스 보유자

10. 다음은 간암 검진 대상자에 대한 의견들입니다. 동의하시는 모든 경우를 선택하여 주십시오

해당 사항에 모두 표시하세요.

- ☐ 간경변증은 나이 제한이 없어야 한다
☐ 간암 검진 대상자의 시작 연령은 남/녀가 달라야 한다
☐ 진행성 섬유화가 동반된 만성간질환(지방간염, 알코올 간질환, 만성 바이러스 간염 등)은 나이 제한없이 포함되어야 한다
☐ 진행성 섬유화가 동반되지 않은 C형 간염바이러스 항체 양성 환자는 나이 제한없이 포함되지 않아야 한다
☐ 진행성 섬유화가 동반되지 않았으며, 치료로 완전 바이러스 반응이 획득된 만성 C형 간염 환자는 나이 제한없이 포함되지 않아야 한다
☐ 진행성 섬유화가 동반되지 않은 만성 B형 간염 환자는 나이 제한없이 포함되지 않아야 한다

기타: ☐ _____

Supplementary Fig 1. Continued

11. 현재 국가 간암 건진 대상자 선정은 해당연도 전 2년간 간암 발생 고위험군 해당자이며, 간암 발생 고위험군은 B형 간염바이러스 항원 양성, C형 간염바이러스 항체 양성, B형 또는 C형 간염바이러스에 의한 만성 간질환 환자로서 해당하는 질병분류코드로 의료이용을 한 경우로 규정하고 있습니다. 이러한 선정 방식을 알고 계셨습니까?

표 4 간암발생고위험군 질병코드

질 환 명	질병분류 코드(code)
간경변증 **는 0, 1, 2, 9를 의미	K702, K703(K7030, K7031), K74, K740(K740*), K741(K741*), K742(K742*), K743(K743*), K744(K744*), K745(K745*), K746(K746*), K765, K766
B형 간염바이러스 항원 양성, C형 간염바이러스 항체 양성	B18, B180, B181(B1810, B1818), B182, B188, B189, Z225
B형 또는 C형 간염바이러스에 의한 만성 간질환 환자	B19, B190, B199

한 개의 타원형만 표시합니다.

- ☐ 알고 있었다
☐ 모르고 있었다

12. 질병분류 코드를 이용한 대상자 선정 방식이 개선이 필요하다고 생각하십니까?

한 개의 타원형만 표시합니다.

- ☐ 매우 필요하다
☐ 필요하다
☐ 필요하지 않다
☐ 전혀 필요하지 않다

Supplementary Fig 1. Continued

13. 질병분류 코드를 이용한 대상자 선정 방식이 개선이 필요하다고 생각하신다면, 해당하는 이유를 모두 선택해 주십시오.

해당 사항에 모두 표시하세요.

- ☐ 질병분류코드상 간암 검진 대상자는 간암 발생 고위험군과 일치하지 않을 수 있다
- ☐ 질병분류코드로 의료이용을 한 경우를 대상으로 선정하는 방식은 개인정보 위반 소지가 있다
- ☐ 질병분류코드로 의료이용을 한 경우를 대상으로 선정하면, 의료이용을 잘 하고 있는 환자는 대상으로 선정되고, 역설적으로 의료이용을 잘 하고 있지 않은 환자들은 대상자에서 누락이 된다

기타: ☐ _____

14. 다음은 대상자 선정 방식 개선에 대한 의견들입니다. 동의하시는 의견을 모두 선택하여 주십시오

해당 사항에 모두 표시하세요.

- ☐ 질병분류 코드 중 대상자인 질병분류 코드를 몇가지로 줄이고, 의료기관에서 간암 검진 대상자는 특정 질병코드를 등록하게 한다
- ☐ 암 및 희귀질환 산정특례 등록 방식처럼, 간암 검진 대상자임을 의료기관에서 5년마다 등록하게 하고, 등록된 사람들에게 간암 검진을 5년간 제공한다
- ☐ 간암 검진은 고위험군에 대한 검진이며, 고위험군 여부는 민감 개인정보이므로, 국가에서 대상자를 선정하는 현 방식은 철회하는 것이 맞고, 검진이 아닌 진료시에 간암 선별검사를 위한 초음파 등 검사는 추가적인 진료비 혜택을 주는 방식으로 전환해야 한다

기타: ☐ _____

Supplementary Fig 1. Continued

15. 회원님께서 국가 간암 검진 사업을 담당하신다면 가장 우선적으로 개선할 부분은 어떤 항목이라고 생각하시는지 가장 중요한 한가지만 선택하여 주십시오

한 개의 타원형만 표시합니다.

- ☐ 대상 환자군 개선 (검진 대상자의 확대 또는 축소)
- ☐ 대상자 선정방식 개선(질병분류코드로 의료이용을 한 경우에 따른 선정방식의 개선)
- ☐ 검진 방법의 개선 (고위험군의 경우 초음파 외 CT/MRI의 허용, AFP외 PIVKA-II등 다른 종양표지자 검사 활용, 초고위험군은 3개월 간격 검사 허용 등)
- ☐ 검진 수검률 증가(대국민 홍보 및 수검자 혜택 증가 등을 통한 수검률 증가)
- ☐ 검진 질관리 사업(검진 사업의 질 담보)
- ☐ 국가 간암 검진과 진료 영역의 중복 문제 해결(국가 검진을 받는 사람들과 의료기관에서 진료받는 환자들의 이중 간암 검진 문제 해결)
- ☐ 기타: _____

16. 회원님께서 국가 간암 검진 사업 중 개선이 필요한 항목이라고 생각하시는 항목이 있다면, 해당하는 항목을 모두 선택하여 주십시오

해당 사항에 모두 표시하세요.

- ☐ 대상 환자군 개선 (검진 대상자의 확대 또는 축소)
- ☐ 대상자 선정방식 개선(질병분류코드로 의료이용을 한 경우에 따른 선정방식의 개선)
- ☐ 검진 방법의 개선 (고위험군의 경우 초음파 외 CT/MRI의 허용, AFP외 PIVKA-II등 다른 종양표지자 검사 활용, 초고위험군은 3개월 간격 검사 허용 등)
- ☐ 검진 수검률 증가(대국민 홍보 및 수검자 혜택 증가 등을 통한 수검률 증가)
- ☐ 검진 질관리 사업(검진 사업의 질 담보)
- ☐ 국가 간암 검진과 진료 영역의 중복 문제 해결(국가 검진을 받는 사람들과 의료기관에서 진료받는 환자들의 이중 간암 검진 문제 해결)
- 기타: ☐ _____

17. 한 개의 타원형만 표시합니다.

- ☐ 옵션 1

Supplementary Fig 1. Continued

18. 국가 간암 검진과 관련하여 제안하시고 싶은 의견을 자유롭게 기술해 주십시오.

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