

Preferences for the “screen and treat” Strategy of *Helicobacter pylori* to Prevent Gastric Cancer in Healthy Korean Populations

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Keywords

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Abstract

Background: *Helicobacter pylori* (HP) eradication may reduce the risk of gastric cancer, and professional guidelines recommend eradication based on patients' preference. However, little data exist regarding individual's preference for HP eradication to prevent gastric cancer. We explored healthy Korean populations' preference for HP “screen and treat” strategy and its associated factors.

Methods: We conducted a cross-sectional survey with 604 healthy adults expected to undergo screening esophagogastroduodenoscopy during routine health checkups. Survey packages—including a decision aid about “screen and treat” strategy for the HP eradication—were sent to the eligible people 1–3 weeks before the health checkup. Within the survey package, we first assessed people's knowledge and experience with HP test and treatment, provided the decision aid, and evaluated participants' preference for screening and treatment for HP to prevent gastric cancer.

Results: With the provision of the decision aid, most participants (73.7%) opted for the “screen and treat” strategy. Having family member(s) with gastric cancer (adjusted odds ratio (aOR) = 2.28; 95% confidence interval (CI), 1.16–4.47), previous treatment history of HP (aOR = 2.70; 95% CI, 1.38–5.29), and higher baseline knowledge (aOR = 1.16; 95% CI, 1.07–1.26) were significantly associated with accepting the strategy. Most participants (71.4%)—and even individuals who did not choose “screen and treat” strategy—agreed with the provision with the decision aid.

Conclusions: Individuals preferred to take the “screen and treat” strategy for the prevention of gastric cancer. Further intervention study is warranted to see if implementation of decisional support would improve decision quality and patient outcomes.

Gastric cancer is one of the most common cancers worldwide and leads to a substantial burden of morbidity, mortality, and healthcare costs—especially in Central Europe, South America, and East Asia [1]. In Korea, the incidence of gastric cancer is among the highest of the world; the age-standardized incidence rate is 65.7/100,000 for male and 26.0/100,000 for female [2]. Screening for gastric cancer is recommended to all Korean people aged 40 or older and is provided with minimal charge by National Cancer Screening Program [3].

Evidence strongly suggests that *Helicobacter pylori* (HP) causes gastric cancer [4, 5], and 63.4% of all gastric cancers were attributable to HP in 2002 [6]. A randomized controlled trial proved that eradication of HP was effective to prevent gastric cancer in high-risk groups [7], and its potential effectiveness with the general public was also reported in other randomized controlled trials [8] and meta-analyses [9]. Furthermore, the cost-effectiveness of HP eradication was confirmed in many studies [10–12]. Based on such evidence, “screen and treat” strategy has been suggested for

primary prevention of gastric cancer [13]. Current guidelines for helicobacter treatment suggest that HP better be tested and treated in high-risk individuals, such as those with a family history of gastric cancer [14–17], chronic atrophic gastritis [14–17], or high-incidence populations [14, 15].

On the other hand, other healthcare professionals claim that screening and eradication of HP should be strictly limited to those with established indications, discouraging widespread screening and eradication programs. They said that most individuals with bacteria can remain asymptomatic and do not develop any disease [18]. There are other concerns related to HP eradication—drug side effects [19], antibiotic resistance [17], reinfection [16], public health costs [20], cultural and practical considerations [19]. Some researchers even suggest possible beneficial interactions between HP and humans [21], although such links are disputable.

Therefore, treating individuals who are infected but asymptomatic—having no clear indication for HP eradication—is a very controversial clinical question [20]. Individualized approach which considers patient's preferences to the HP eradication was suggested [15–17], given the lack of definitive evidence of benefit in population level. For example, the Korean Helicobacter Treatment Guidelines recommend that physicians make treatment decisions depending on the individual's preference with adequately provided information on the cost and success rate of the treatment, reinfection rates, and the possibility of developing antibiotic resistance [16].

Decisions related to a preventive intervention such as HP eradication can be largely dependent on each individual's preferences and therefore necessitate certain form of informed and shared decision making [20,22,23]. Yet, little data exist about individuals' preferences regarding HP eradication for gastric cancer prevention. We undertook this study to explore the preference for HP "screen and treat" strategy for the prevention of gastric cancer in healthy Korean adults when the best available scientific information on risk, treatment efficacy, and cost was provided. We also investigated the factors associated with their preference—knowledge of HP, previous tests or treatment history of HP, perceived risk of developing gastric cancer, and family history of gastric cancer.

Methods

Study setting and subjects

A cross-sectional survey was performed with people who received routine health checkups in the Health

Promotion Center, Seoul National University Hospital, from April to September 2011. People who were at least 20 years old, were able to read and understand information presented in Korean language, and planned to undergo screening esophagogastroduodenoscopy (EGD) procedure during routine their health checkup were included in the study.

Study procedure

Survey packages were sent to all eligible participants 1–3 weeks before health checkup appointments. The package included a cover letter explaining the purpose of survey, a consent form, a survey instruction, and the survey. The survey consisted of three parts and guided participants to follow the order. First, it assessed each participant's knowledge and experience with HP screening tests and treatment. Second, it provided a decision aid about "screen and treat" strategy for HP eradication; last, it evaluated the participant's preference for screening and treatment for HP in relation to the prevention of gastric cancer. In addition, questions were asked regarding sociodemographics, self and family history of gastric cancer, perceived risk of gastric cancer. Participants returned the survey on the day of screening, and rapid urease test (campylobacter-like organism test) was added for those who provided written consent for the study and opted for the "screen and treat" strategy after seeing the decision aid. This study was approved by the institutional review board of Seoul National University Hospital; all participants provided written consents.

Questionnaires for knowledge and experience with HP screening test and treatment

Before seeing the decision aid, participants were asked about their knowledge of HP, their source of information about HP, and their previous experience of testing and treatment of HP. For knowledge, nine questions were developed based on clinical experience of specialists in preventive care and gastroenterology and the literature review. Knowledge score was calculated as total number of correct answers. The internal consistency was satisfactory in our sample (Cronbach's alpha = 0.83).

Decision aids

Decision aids for the "screen and treat" strategy for HP were developed based on the Korean HP Guidelines [16] and other literature, and on discussion with experts in gastroenterology, health screening, and

health education. Among various screening methods for detecting HP, we included information about the urease test which can be performed by sampling a small piece of stomach during the planned EGD that is relevant to our clinical setting. For treatment, we recommended 7–14 days of triple therapy consisting of one PPI and two antibiotics, clarithromycin and amoxicillin following the Korean guideline [16]. We performed pilot tests with 5 healthy adults and found that the information in the decision aid was well balanced and easy to understand.

Questionnaires for people's preference for HP screening and treatment

After seeing the decision aid, participants were asked whether they would take the “screen and treat” strategy for HP eradication. We also asked participants to evaluate the decision aid in terms of quality of information, amount of information, balance of information, and helpfulness. Finally, participants were asked about their opinion on provision of information for asymptomatic individuals without family history of gastric cancer.

Statistical analyses

Assuming that the prevalence of choosing the “screen and treat” strategy would be 70%, at least 323 participants are needed to estimate the prevalence with the precision of 0.05, and level of confidence of 95% [24]. As we were also interested in estimating prevalence in certain subgroups, such as those without experience of HP test and treatment or personal experience of gastric cancer, we aimed to recruit 500 participants assuming up to one-third of participants can have such experience [25, 26]. Because we have sent the questionnaire before the health checkup date, the final number of participants exceeded the target number. The precision finally obtained was 0.037 for total sample ($N = 604$), 0.048 for those without experience of HP test and treatment ($N = 348$), and 0.046 for those without experience of gastric cancer ($N = 383$).

We calculated summary statistics to describe the sample characteristics, knowledge of HP, previous experience of testing and treatment of HP, preferences for the “screen and treat” strategy, evaluation of the decision aid, etc. We established a multiple logistic regression model to identify the factors associated with taking the “screen and treat” strategy, including age, sex, education, personal experience of gastric cancer, risk perception of gastric cancer, experience of test and treatment, and knowledge of HP. For each variable, the

odds ratio (OR) and 95% confidence interval (95% CI) were calculated. All statistical tests were two-sided, and $p < .05$ was considered statistically significant. All analyses were performed using STATA software (version 10.1; STATA Corp. Houston, TX, USA).

Results

Characteristics of the study participants

Among 1,888 people who were eligible and received study invitation during the study period, 617 patients (32.7%) agreed to participate in the study and finished the survey. The 13 subjects who reported a history of gastric cancer were excluded; the final analysis was conducted with 604 subjects.

Mean age of the participants was 52.1; 60.3% was male. Over 60% of the participants had more than 12 years education (more than high school graduate). Regarding personal experience with gastric cancer, 16.1% of the participants had family members with gastric cancer and another 26.3% of participants had friends or relatives with gastric cancer. Around 20% of participants perceived their gastric cancer risk as higher than other people with same age and sex; about 40% of the participants considered themselves having lower risk compared with others. For experience with HP screening test and treatment, 36.6% of the participants had been tested for HP and 23.2% had been treated for HP. Only 14.4% of the participants reported they had been provided sufficient and adequate information for the HP test and treatment decision; over 50% of the participants had not received any information about the test or treatment (Table 1).

Knowledge about *Helicobacter pylori*

Participants had generally poor knowledge of HP (mean score = 3.9; score range: 0–9). The percentage of “don’t know” answer was relatively high, ranging from 32% to 49.5% for each item; the percentage of correct answers was as low as 28.6%. Participants had the lowest knowledge regarding the mode of transmission or natural course; they knew relatively more about the diseases that can be caused by HP (Table 2).

Preference for *Helicobacter pylori* “screen and treat” strategy

After seeing the decision aid, most participants (73.7%) reported that they were willing to take the “screen and treat” strategy for gastric cancer prevention. There were 3.5% of the participants who said they would not take

Table 1 Study participants' characteristics and experience regarding helicobacter and gastric cancer ($N = 604$)

Characteristics	N (%)
Age, mean (SD)	52.1 (11.8)
Sex	
Male	364 (60.3)
Female	240 (39.7)
Education	
≤ 6 year	24 (4.0)
7–12 years	172 (28.5)
>12 years	391 (64.7)
Missing	17 (2.8)
Personal experience of gastric cancer	
No personal experience of gastric cancer	348 (57.6)
Having friends or relatives with gastric cancer	159 (26.3)
Having family members with gastric cancer	97 (16.1)
Risk perception of gastric cancer (compared to other people with same age and gender)	
Much higher	8 (1.3)
Higher	115 (19.0)
Same	195 (32.3)
Lower	154 (25.5)
Much lower	90 (14.9)
Missing	42 (7.0)
Test and treatment	
Having not been tested	383 (63.4)
Having been tested, but not treated for <i>Helicobacter pylori</i> (HP)	81 (13.4)
Having been ever treated for HP	140 (23.2)
Information from physician regarding Helicobacter test and treatment decision	
Having been provided sufficient and adequate information for the decision	87 (14.4)
Having been briefly informed, but it was not sufficient	115 (19.0)
Having not been informed	308 (51.0)
Don't know	65 (10.8)
Missing	29 (4.8)

the strategy; 18.2% of the participants did not make the decision (Table 3). The characteristics of the participants which were found to influence the decision for the HP "test and treat" strategy in multivariate analysis included the following: having family member(s) with gastric cancer (aOR = 2.28; 95% CI, 1.16–4.47), previous treatment history of HP (aOR = 2.70; 95% CI, 1.38–5.29), and higher baseline knowledge (aOR = 1.16; 95% CI, 1.07–1.26). Risk perception lost significance after adjustment; age, sex, education did not significantly affect the decision (Table 4).

Evaluation and opinion regarding the decision aid

Most participants reported that they considered the contents of information to be fair to very good (>80%),

and the amount of information as adequate (62.7%). Although 57.8% of participants said that the decision aid was well balanced, about one-third of participants felt that the information was biased to persuading uptake of the "test and treat" strategy. Most participants found the decision aid to be very or somewhat helpful (>80%) and answered that health professionals should provide such information proactively (71.4%) (Table 5).

Discussion

Individuals often have to choose a test or treatment for which the benefits do not clearly outweigh the risks and costs [27]. Ideally, decisions should be based on the provision of well-balanced information and be consistent with each individual's preferences. In the area of cancer prevention, variability in individuals' preferences is well noted and implies that the uniform application of a preventive strategy may be difficult without sufficient insight into the patient's perspective [22]. Yet, relatively few studies have addressed the preference and decision making regarding cancer prevention with limited cancers—colorectal [27], breast [22], esophageal [28]—in certain populations. To our knowledge, this is the first study to explore patients' preference for the prevention of gastric cancer.

In our study, the majority of participants had inadequate knowledge regarding HP and its test and treatment even though their educational level was relatively high. This is consistent with nationwide reports of the general public's perception regarding gastric cancer risk factors [29]. The role of HP in the development of gastric cancer was underestimated by the general public, and people thought that distress was a stronger risk factor than HP for gastric cancer [29].

In terms of past experience with HP eradication, less than 15% of our study participants reported that they had received adequate and sufficient information from physicians; it was the same with individuals who reported to have taken tests or treatment for HP. A possible explanation would be that physicians prescribed the tests or the treatments without discussing the potential benefits or harm of HP eradication.

After we provided the decision aid, most of our study participants chose to take the "screen and treatment" strategy. This is consistent with the general tendency for individuals to overestimate the actual risk [22] and take risk-averse behaviors [27]. For example, 93% of Barrett's esophagus patients showed a willingness to use celecoxib or aspirin for esophageal cancer prevention, despite uncertain benefits [28]. Higher acceptance in our study might be due to the one-time,

Table 2 Knowledge of *Helicobacter pylori* before seeing the decision aid

Items (Cronbach's alpha = 0.83)	Yes N (%)	No N (%)	Don't know N (%)	Missing N (%)	Correct answer N (%)
More than 50% of Korean adults have HP in their stomach (Yes)	273 (45.2)	25 (4.1)	277 (45.9)	29 (4.8)	273 (45.2)
Transmission of the bacteria usually occurs through mouth among family members (Yes)	188 (31.1)	76 (12.6)	299 (49.5)	41 (6.8)	188 (31.1)
HP infection often disappears spontaneously (No)	115 (19.0)	173 (28.6)	272 (45.0)	44 (7.3)	173 (28.6)
HP is known to cause gastric cancer (Yes)	352 (58.3)	29 (4.8)	199 (32.9)	24 (4.0)	352 (58.3)
HP can cause gastric or duodenal ulcer (Yes)	367 (60.8)	13 (2.2)	193 (32.0)	31 (5.1)	367 (60.8)
HP does not cause gnawing pain or dyspepsia (No)	92 (15.2)	225 (37.2)	247 (40.9)	40 (6.6)	225 (37.2)
HP can be identified by taking small pieces of tissue from the stomach during endoscopy (Yes)	307 (50.8)	51 (8.4)	212 (35.1)	34 (5.6)	307 (50.8)
HP can be treated by drinking yogurt (No)	103 (17.1)	207 (34.3)	258 (42.7)	36 (6.0)	207 (34.3)
There is effective treatment for HP (Yes)	275 (45.5)	34 (5.6)	258 (42.7)	37 (6.1)	275 (45.5)
Mean knowledge score, Mean (SD)					3.9 (2.7)

HP, *Helicobacter pylori*; SD, Standard deviation.

Yes/No in the parentheses denotes the intended (correct) answer.

Knowledge score: total number of correct answers.

Table 3 Preference for “test and treatment” strategy after seeing the decision aid

Participants	Yes N (%)	No N (%)	Not sure N (%)	Missing N (%)	p-value
All	445 (73.7)	21 (3.5)	110 (18.2)	28 (4.6)	
By experience regarding test and treatment					
Having not been tested	259 (67.6)	15 (3.9)	92 (24.0)	17 (4.4)	<.001
Having been tested, but not treated for <i>Helicobacter pylori</i> (HP)	63 (77.8)	1 (1.2)	10 (12.3)	7 (8.6)	
Having been ever treated for HP	123 (87.9)	5 (3.6)	8 (5.7)	4 (2.9)	
By experience regarding gastric cancer					
No personal experience of gastric cancer	243 (69.8)	12 (3.4)	72 (20.7)	21 (6.0)	.047
Having friends or relatives with gastric cancer	119 (74.8)	8 (5.0)	28 (17.6)	4 (2.5)	
Having family members with gastric cancer	83 (85.6)	1 (1.0)	10 (10.3)	3 (3.1)	
By knowledge score regarding HP					
Below mean (0–3)	221 (66.4)	12 (3.6)	80 (24.0)	20 (6.0)	<.001
Above mean (4–9)	224 (82.7)	9 (3.3)	30 (11.1)	8 (3.0)	

Yes: Would get the test and receive treatment if HP are present; No: Would not get the test.

p-value: by Chi-squared test.

short duration of treatment with reasonable treatment costs with substantial benefits—the prevention of one of the most common cancers in Korea.

In contrast, about 25% of our study participants remained unwilling to take the “screen and treat” strategy. Although we were not able to find reasons for their unwillingness, several reasons for not adopting preventive strategies have been identified in other studies including self-determined low risk [30], claim of responsibility for their own health [30], preference for no action without definite needs [27], a suspicion that

taking medication always carries risk [27]. Therefore, uniform application of preventive care and services would not be appropriate.

According to the Health Belief theory, people feared the diseases and preventive actions of people were motivated by the perceived susceptibility, severity of the disease, the expected fear reduction in actions (perceived benefits), as long as that possible reduction outweighed practical and psychological barriers to taking action (perceived barriers) [31]. Consistent with this theory, risk perception was significantly associated with

Table 4 Factors associated with preference for “test and treat” strategy for *Helicobacter pylori* (HP)

Patient characteristics	Univariate OR (95% CI)	Multivariate OR (95% CI)
Age (year)	0.99 (0.98–1.00)	0.99 (0.97–1.01)
Female (Reference: male)	1.21 (0.83–1.75)	1.16 (0.75–1.78)
Education (Reference: ≤ 6 years)		
7–12 years	2.08 (0.86–5.01)	2.20 (0.83–5.77)
12+ years	2.08 (0.89–4.82)	1.71 (0.66–4.42)
Personal experience of gastric cancer (Reference: none)		
Having friends or relatives with gastric cancer	1.29 (0.84–1.97)	1.12 (0.70–1.80)
Having family member(s) with gastric cancer	2.56 (1.39–4.72)	2.28 (1.16–4.47)
Risk perception of gastric cancer (Reference: much lower–same)		
Much higher or higher than other people with same age and sex	1.89 (1.13–3.16)	1.31 (0.75–2.29)
Experience of test and treatment (Reference: having not been tested)		
Having been tested, but not treated for HP	1.68 (0.95–2.95)	1.38 (0.71–2.68)
Having been ever treated for HP	3.46 (2.00–6.01)	2.70 (1.38–5.29)
Knowledge score regarding HP (per point)	1.22 (1.13–1.31)	1.16 (1.07–1.26)

OR, odds ratio; CI, confidence interval.

All variables which were univariate models were included in multivariate model.

choosing the “screen and treat” strategy in the univariate model in our study. However, it became insignificant after adjusting personal experience of gastric cancer in their family, treatment experience, and knowledge of HP in the multivariate model reflecting that risk perception is influenced by various factors, including media exposure [32], clinical consultations [33], and family experiences [34].

Most of our study participants—even individuals who did not choose “screen and treat” strategy—agreed that this kind of information should be given to all. As an individual’s preference for preventive intervention vary and could not be accurately predicted by physicians [22], it is important to incorporate an informed choice process into routine preventive care to help patients make informed decisions. Given the lack of time for physicians to facilitate such informed decisions, a decision aid could be helpful adjunct to clinical consultation in encouraging individuals to express their concerns and preferences in terms of possible screening and treatment options [35].

Several limitations should be mentioned. First, our study results might not be generalizable to other populations or other clinical settings as it was performed in a relatively high-risk ethnic population and among

Table 5 Evaluation of the decision aid

Items	N (%)
Contents of information	
Role of <i>Helicobacter</i> in the pathogenesis of gastric cancer	
Very good	78 (12.9)
Good	217 (35.9)
Fair	197 (32.6)
Poor	45 (7.5)
Missing	67 (11.1)
Pros and cons of “test and treatment” strategy	
Very good	74 (12.3)
Good	237 (39.2)
Fair	207 (34.3)
Poor	17 (2.8)
Missing	69 (11.4)
Amount of information	
Too much	72 (11.9)
Adequate	379 (62.7)
Too little	122 (20.2)
Missing	31 (5.1)
Balance of information	
Biased to persuading uptake of “test and treatment” strategy	201 (33.3)
Biased to dissuading uptake of “test and treatment” strategy	8 (1.3)
Well balanced	349 (57.8)
Missing	46 (7.6)
Helpfulness of the information	
Very helpful	188 (31.1)
Somewhat helpful	338 (56.0)
Little helpful	46 (7.6)
Not helpful at all	6 (1.0)
Missing	26 (4.3)
Opinion about providing information from health professionals	
Should be provided proactively	431 (71.4)
Should be provided on request only	101 (16.7)
Need not be provided	42 (7.0)
Missing	30 (5.0)

individuals who were voluntarily going to take a health checkup including EGD. The low response rate might have also reduced external validity, as people who had more interest in gastric cancer prevention participated in the study. Second, despite of our efforts to ensure balance of information in the decision aid, some patients found that it was biased toward the “screen and treat” strategy. Experts, however, are not certain how to present numerical information to achieve clarity, objectivity, and balance of the decision aid [35], and the format and expression of the decision aid in our study might not be optimal for having strict balance. Third, we could only provide general information about HP eradication according to the risk of the general population; we could not tailor the risk information to each participant.

The goal of gastric cancer prevention should be the integration of the best scientific evidence with each individual's values and beliefs within the context of the individual's situation and experience [30, 36]. Given the uncertainty and controversies regarding the benefits of HP eradication, we could not confidently assume that implementation of decisional support in this area would improve disease outcomes. Our preliminary study do, however, suggests that such measures are feasible and have potential to improve decision quality and patient outcomes [37]. Further intervention trial is warranted.

In summary, we found the participants' preference to take the "screen and treat" strategy for the prevention of gastric cancer in our study setting, and such decision was affected by a number of factors, including having family member(s) with gastric cancer, treatment history of HP, and higher baseline knowledge regarding HP. Despite the limitations mentioned previously, our study provides some useful insights into patient preferences in the arena of gastric cancer prevention and its affecting factors, and can serve as a basis to guide future investigation.

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