

## RESEARCH COMMUNICATION

# Effectiveness of Interventions to Increase the Participation Rate of Gastric Cancer Screening in the Republic of Korea: a Pilot study

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### Abstract

This study assessed the effectiveness of three intervention strategies to improve the participation rate of gastric cancer screening among people who had never undergone such screening, and those who had been screened for the disease, but not recently. It was conducted in the Ilsandong-gu District of Goyang City, Korea. The population for the current study was restricted to male residents, aged 40-65 years, who received an invitation letter to undergo gastric cancer screening from the National Health Insurance (NHI) Corporation at the beginning of 2010. The subjects were divided into two categories according to their screening history: never-screened, and ever-screened. A total of 2,065 men were eligible: 803 never-screened and 1,262 ever-screened. In each screening category they were randomly assigned to one of three intervention groups: 1) tailored telephone counseling; 2) tailored postcard reminder after tailored telephone counseling; and 3) tailored telephone counseling after tailored postcard reminder. At 3 months post-intervention, never-screened men with any intervention were more likely to undergo gastric cancer screening (OR=2.75, 95% CI: 1.22-6.18) compared to those in the reference group (no intervention). However, there was no statistically significant intervention effect in ever-screened men (OR=1.21, 95% CI: 0.65-2.27). Examination of the intervention effects by intervention group among never-screened men showed that those in the postcard reminder after telephone counseling group to be statistically significantly more likely to undergo gastric cancer screening (OR=4.49, 95% CI: 1.79-11.29) than the reference group (no intervention). Our results highlight that use of tailored postcard reminders after tailored telephone counseling is an effective method to increase participation in gastric cancer screening among men who had never been screened.

**Key words:** Gastric cancer screening - participation rate - intervention - Ilsan, Korea

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### Introduction

Gastric cancer is the fourth most common type of cancer (988,602 new cases, 7.8% of all new cancer cases in 2008) and the second most common cause of cancer death (737,419 deaths in 2008) worldwide (Ferlay J, 2008). Some Asian countries, such as China, Japan, and the Republic of Korea have the highest incidence of gastric cancer in the world (Parkin et al., 2005). Although the incidence of gastric cancer in Korea has declined in recent decades, it remains the most common cancer in the country (Shin et al., 2005).

Because the prognosis of early gastric cancer is highly favorable, countries with a high prevalence of the disease have focused on early diagnosis through screening. In

these countries gastric cancer screening is offered to the average-risk population to reduce the disease burden and related mortality. In Korea, nationwide gastric cancer screening was started in 1999 as a part of the National Cancer Screening Program (NCSP) for low-income groups (Kim et al., 2011). Currently, Medical Aid recipients and National Health Insurance (NHI) beneficiaries in the lower 50% income bracket can undergo gastric cancer screening with no out-of-pocket expense. The NCSP provides biennial gastric cancer screening for men and women aged 40 years and older, by either upper gastrointestinal series or endoscopy. Within the framework of the NCSP, eligible men and women receive an invitation letter for gastric cancer screening every 2 years from the NHI Corporation. Those invited

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can undergo gastric cancer screening at a clinic, hospital, or general hospital that has been designated as a gastric cancer screening unit by the NHI Corporation.

Although the NCSP provides gastric cancer screening free-of-charge to low-income groups, the participation rate is not satisfactory (Choi et al., 2009). According to the Annual Report of the NCSP, the participation rate of gastric cancer screening was only 29.1% in 2008 (Lee et al., 2011). Furthermore, among those who did undergo gastric cancer screening, only 59.4% participated in on-time subsequent screening (Hahm et al., 2011). Relatively little is known about the factors associated with participation in gastric cancer screening, and very few published studies have examined how to improve the participation rate of the NCSP for gastric cancer. Nevertheless, to maximize the participation rate, an effective strategy must be developed, taking into consideration an individual's characteristics and cancer screening history.

Many studies on strategies to improve screening participation rates have been undertaken for other cancers, such as breast cancer, colorectal cancer, and cervical cancer. Sending letters, making phone calls, mailing educational materials and organizing training activities have all been reported to be more effective than no intervention (Baron et al., 2008; Bonfill et al., 2001; Bowie et al., 2005; Legler et al., 2002; Stone et al., 2002), and letters and telephone calls were effective in most studies (King et al., 1994; Snell and Buck, 1996; Wagner, 1998). However, most previous studies on this topic focused on never-screened individuals.

Recently it has come to light that an important issue related to early cancer detection is the extent to which individuals continue to use screening services after receiving an initial examination. The reasons for not attending gastric cancer screening differ between never-screened and ever-screened individuals, but not recently-screened individuals. Therefore, it is just as important to identify the most effective methods to increase the participation rate of cancer screening for ever-screened, as for never-screened individuals.

The objective of this study was to assess the

effectiveness of tailored telephone counseling and tailored postcard reminders among people who had never undergone gastric cancer screening, and those who had been screened for the disease, but not recently. Furthermore, this study examined the effect of adding tailored printed material to tailored telephone counseling by switching the order of these interventions (tailored postcard reminder after tailored telephone counseling versus tailored telephone counseling after tailored postcard reminder).

## Materials and Methods

This study was conducted in the Ilsandong-gu District of Goyang City, Korea. The population for the current study was obtained from the NCSP database, and restricted to men residing in the Ilsandong-gu District, aged 40-65 years, who received an invitation letter to undergo gastric cancer screening from the NHI Corporation at the beginning of 2010. Those invited to the NCSP for gastric cancer could undergo screening by either upper gastrointestinal series or endoscopy within the framework of the program until December 31, 2010. History of gastric cancer screening between January 1, 2002 and August 31, 2010 was identified through the NCSP database, and study subjects were then divided into two categories according to their screening history: never-screened (subjects who had never undergone gastric cancer screening through the NCSP before 31 August 2010), and ever-screened (subjects who had undergone gastric cancer screening at least once during their lifetime, but not within the previous 2 years).

We excluded all subjects previously diagnosed with cancer; those who moved out of the Ilsandong-gu District in 2010; and those who moved in after 2007. A total of 2,065 men were eligible for the study: 803 never-screened men and 1,262 ever-screened men. Subjects in each screening category were further randomly assigned to one of three intervention groups: 1) tailored telephone counseling, 2) tailored postcard reminder after tailored telephone counseling, and 3) tailored telephone counseling after tailored postcard reminder.

**Table 1. Characteristics of the Study Subjects in both Screening Categories by Intervention Group**

	Never-screened (N=194)				Ever-screened (N=166)											
	No intervention		Telephone counseling		Postcard reminder		Telephone counseling after postcard reminder									
	N	(%)	N	(%)	N	(%)	N	(%)								
N of subjects	97	(50.0)	28	(14.4)	42	(21.7)	27	(13.9)	83	(50.0)	11	(6.6)	46	(27.7)	26	(15.7)
Age (years)																
40-49	50	(51.5)	15	(53.6)	19	(45.2)	16	(59.3)	41	(49.4)	8	(72.7)	20	(43.5)	13	(50.0)
50-65	47	(48.5)	13	(46.4)	23	(54.8)	11	(40.7)	42	(50.6)	3	(27.3)	26	(56.5)	13	(50.0)
Health insurance type																
Medical Aid Program	65	(67.0)	26	(92.9)	20	(47.6)	19	(70.4)	14	(16.9)	6	(54.6)	4	(8.7)	4	(15.4)
National Health Insurance	32	(33.0)	2	(7.1)	22	(52.4)	8	(29.6)	69	(83.1)	5	(45.5)	42	(91.3)	22	(84.6)

The tailored postcard reminder was comprised of information regarding the participants' history of gastric cancer screening, the gastric cancer screening unit nearby them (e.g., name, location and telephone number), and explanation about how to arrange for gastric cancer screening. We sent these tailored postcard reminders and an information leaflet on cancer prevention and screening. Tailored telephone counseling was carried out by counselors working for the Ilsandong-gu Public Health Center. The counselors encouraged study subjects to participate in gastric cancer screening and either assisted them in scheduling appointments, or provided explanations on how to arrange for gastric cancer screening on their own. Subjects that counselors were unable to contact were excluded. Approximately 12% of men assigned to an intervention group were successfully contacted.

The reference group (i.e., no intervention) was randomly selected from a pool of men eligible for gastric cancer screening through the NCSP, matched by age, and health insurance type with each intervention case. The intervention was conducted between September 1, 2010 and September 30, 2010. The outcome measure was defined as participation in gastric cancer screening in the 3 months following the intervention. The final analytic sample contained 360 subjects, all of whom signed informed consent forms.

#### Statistical analysis

Descriptive analyses were carried out for age and health insurance type in each screening category by intervention group. Characteristics of the study subjects are displayed as a percentage. The chi-square test was conducted to evaluate the unadjusted effects of intervention. The effects of intervention were evaluated by comparing the participation rate of the reference group (no intervention) to that of the different intervention groups. Logistic regression was also performed to estimate the odds ratios (OR) for undergoing gastric cancer screening in different intervention groups compared to the reference group (no intervention), after adjustment for age and health insurance type. All statistical analyses were conducted using the SAS statistical software (version 9.2; SAS Institute, Inc., Cary,

North Carolina, USA) and  $p < 0.05$  was considered to be statistically significant.

## Results

Table 1 presents the characteristics of the study subjects in both screening categories by intervention group. Of the 194 never-screened men, 28 (14.4%) were in the telephone counseling group; 42 (21.7%) were in the postcard reminder after telephone counseling group; and 27 (13.9%) were in the telephone counseling after postcard reminder group. Of the 166 ever-screened men, 11 (6.6%) were in the telephone counseling group; 46 (27.7%) were in the postcard reminder after telephone counseling group; and 26 (15.7%) were in the telephone counseling after postcard reminder group. Among never-screened men in the reference group, 51.5% were aged 40-49 and 67% were Medical Aid recipients. In contrast, among ever-screened men in the reference group, 50.6% were aged 50-65 and 83.1% were NHI beneficiaries (Table 1).

The proportion of subjects in both screening categories who underwent gastric cancer screening after intervention is shown in Table 2 by intervention group. The participation rate of gastric cancer screening in the 3 months after intervention was higher in ever-screened men than never-screened men. Among never-screened men, the participation rate of gastric cancer screening was significantly higher for any intervention (i.e., all intervention groups combined) (23.7%), and in the postcard reminder after telephone counseling group (35.7%), compared to the reference group (no intervention) (10.3%). Among the ever-screened group, the participation rate was higher for any intervention (62.7%) compared to the reference group (no intervention) (57.8%), but there was no statistical difference (Table 2).

Table 3 shows the ORs and 95% confidence intervals (CI) for the logistic regression models. After adjusting for age and health insurance type, significant intervention effects were revealed among never-screened men. Never-screened men with any intervention were more likely to undergo gastric cancer screening (OR=2.75, 95% CI: 1.22-6.18) compared to those in the reference group

**Table 2. Proportion of Subjects that Underwent Gastric Cancer Screening after Intervention in both Screening Categories, by Intervention Group**

	Never-screened			Ever-screened		
	N of subjects	N of subjects who under screening	PR (%)	N of subjects	N of subjects who under screening	PR (%)
No intervention	97	10	10.3	83	48	57.8
Any intervention‡	97	23	23.7†	83	52	62.7
Telephone counseling	28	4	14.3	11	6	54.6
Postcard reminder after telephone counseling	42	15	35.7†	46	28	60.9
Telephone counseling after postcard reminder	27	4	14.8	26	18	69.2

† $P < 0.05$ , compared to the reference group (no intervention); ‡Any intervention is defined as telephone counseling, or telephone counseling-postcard reminder, or postcard reminder-telephone counseling; PR, Participation Rate.

**Table 3. Logistic Regression Results for Undergoing Gastric Cancer Screening in both Screening Categories by Intervention Group**

	Multivariate-adjusted odds ratio (95% confidence interval) †	
	Never-screened	Ever-screened
No intervention	1.00	1.00
Any intervention‡	2.75 (1.22 - 6.18)	1.21 (0.65 - 2.27)
Telephone counseling	1.64 (0.46 - 5.87)	0.87 (0.23 - 3.24)
Postcard reminder after telephone counseling	4.49 (1.79 - 11.29)	1.14 (0.54 - 2.38)
Telephone counseling after postcard reminder	1.54 (0.44 - 5.39)	1.60 (0.62 - 4.12)

†Adjusted for age and health insurance type; ‡Any intervention is defined as telephone counseling, or telephone counseling-postcard reminder, or postcard reminder-telephone counseling.

(no intervention). However, there was no statistically significant intervention effect in ever-screened men (OR=1.21, 95% CI: 0.65-2.27). Examination of the intervention effects by intervention group among never-screened men showed that those in the postcard reminder after telephone counseling group were statistically significantly more likely to undergo gastric cancer screening (OR=4.49, 95% CI: 1.79-11.29) than the reference group (no intervention) (Table 3).

## Discussion

This study assessed the effectiveness of three intervention strategies (tailored telephone counseling, tailored postcard reminder after tailored telephone counseling, and tailored telephone counseling after tailored postcard reminder) to improve the participation rate of gastric cancer screening. At 3 months post-intervention, there was an increase in the participation rate of gastric cancer screening among both never-screened and ever-screened men. This study showed that ever-screened subjects had a higher participation rate in gastric cancer screening than never-screened subjects. This is in agreement with a previous study showing that, generally, individuals with a previous screening experience were more likely to be rescreened (Hahn et al., 2011).

The interesting finding in the current study was that tailored postcard reminder after tailored telephone counseling was shown to be effective in improving participation rates in never-screened men, but not ever-screened men. Previous studies have focused on encouraging screening in never-screened subjects, but they did not compare the effects of intervention among people with and without prior cancer screening experience. In the current study, the effects of intervention were quite different across these two screening categories. This result might be partly explained by the fact that when individuals with a history of screening

decide whether or not to participate in future screening, they might be more influenced by their past experience than by intervention from others. Therefore, different contents and methods of intervention must be developed in accordance with the actual screening history of the individual targeted populations.

In the last decade, several studies have been conducted in an attempt to increase participation in cancer screening (Richardson et al., 1996). Although many interventions have been applied to promote cancer screening, their effectiveness, applicability, cost, and cost effectiveness to increase participation rates are either not clearly established, or not completely understood. Patient-directed reminders have been shown to increase participation in cancer screening (Ellis et al., 2005; Ferlay J, 2008). Mailed reminders had the most noticeable and reliable effect in studies comparing individuals receiving reminders to those not receiving reminders in the United States (Wagner, 1998). On the other hand, Davis and colleagues (Davis, Lewis, et al., 1997) showed that, compared to controls, women who received telephone counseling were significantly more likely to get mammograms (30% versus 45%). In the current study, though it was not statistically significant, tailored telephone counseling increased the participation rate among never-screened men.

Many studies have claimed an additive effect of adding printed material to phone messaging (Champion et al., 2007; Rimer et al., 2001; Rimer et al., 2002). Lantz et al. reported that mailed reminder letters from a physician combined with telephone contact from a health educator significantly increased the odds of participants receiving breast and cervical cancer screening (Lantz et al., 1995). Further, Vogt et al. reported that mailed reminders followed by a live telephone call appeared to be a cost-effective approach to implementing cancer screening programs (Vogt et al., 2003). Our results are consistent with these studies, showing that a tailored postcard reminder after tailored telephone counseling was significantly more effective than no intervention. However, switching the order of intervention, i.e., tailored telephone counseling after tailored postcard reminder did not prove to have a significant effect.

To increase participation, interventions at the individual level are required in cancer screening implementation. There have been a number of recent studies on tailoring interventions to increase repeat screening rates (Champion et al., 2003) Tailored interventions were more effective in pre-contemplators than in contemplators who were already considering cancer screening. Several studies reported on the use of tailored print communications to change behavior, promote informed patient decision making, or both (Kreuter and Strecher, 1996; Rimer and Glassman, 1998; Skinner et al., 1999).

Tailored print communications are created especially for an individual based on information about that particular person. Research indicates that tailored

materials are rated more highly and are more likely to be read, compared to non-tailored materials (Rimer and Glassman, 1998; Skinner et al., 1994). Tailored telephone counseling has also been shown to increase mammography adherence (Davis, Nash, et al., 1997; Marcus et al., 1993). Indeed, with few exceptions (Drossaert et al., 1996; Kreuter and Strecher, 1996; Meldrum et al., 1994), tailored interventions have outperformed non-tailored interventions in promoting mammography use (Saywell et al., 1999; Skinner et al., 1999; Skinner et al., 1994; Wagner, 1998).

In Korea, where gastric cancer is highly prevalent, gastric cancer screening is provided by the NCSP to reduce the disease burden and related mortality. However, gastric cancer screening remains under-used in Korea (Choi et al., 2009). Although the debate over the value and risk of screening asymptomatic individuals is ongoing, interest has shifted to determining the preferred screening strategy, and discerning the most effective ways of implementing screening, in the general population (Pisani et al., 1994). In order to increase the effectiveness of cancer screening, it is critical that people in the target population be screened on a regular basis, instead of just a one-time participation.

There are no previous studies on the effectiveness of interventions to improve the participation rate of gastric cancer screening. A number of limitations should be considered when interpreting these results. First, this pilot study considered a small sample of male participants. Second, our study presented data from a short follow-up period, and so there was no information about the long-term effects of the implemented interventions. A longer follow-up would be beneficial. Third, it is known that early detection occurs less often in minorities, the elderly, the less educated, and the poor (Bowie et al., 2005), and we did not have information on socioeconomic status such as income level, education level, or job status, nor on risk factors.

Despite these limitations, these results provide important information on promoting gastric cancer screening. Collectively, our results highlight that tailored postcard reminder after tailored telephone counseling was an effective method to increase participation in gastric cancer screening among men who had never been screened. These results may have important practical implications. Nevertheless, there is a need for future studies that explore the effectiveness of periodically repeated interventions, and that consider the different types of interventions that may be effective for both men and women based on their screening history.

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