Can Screening Invitations from Primary Care Physicians Increase Participation in Cancer Screenings on Remote Islands?

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Background: Gastric and colorectal cancers are the leading cause of cancer-related deaths in Japan. In an attempt to control such cancer-related deaths, gastric and colorectal cancer screenings (GCSs) are readily available in Japan. Despite this, the rate of participation has been lower than expected. Previous studies have reported that some intervention tools can improve participation in cancer screenings and others cannot. Such studies conducted in rural areas are quite rare.

Methods: The subjects were residents of Kozu Island. All subjects were aged 40 and over. In the clinical setting, primary care physicians (PCPs) handed their patients a screening invitation, in an attempt to improve participation in GCSs. We examined participation trends before and after this intervention. In addition, we administered questionnaires to examine subjects’ reasons for attendance and relevant characteristics of the subjects.

Results: Following the intervention, participation in GCSs did not significantly improve in the short term. In 2011, the number of participants in gastric cancer screening was 173 (22.1%) and was not significantly different from the 2010 results (P = 0.80). Furthermore, the number of participants from year to year (2005–2011) was not significantly different (P = 0.07). In addition, the number of participants in colorectal cancer screening was 145 (16.5%) and was not significantly different from the 2010 results (P = 0.65). Moreover, the number of participants from year to year (2005–2011) was not significantly different (P = 0.17). 172 out of 211 (82%) participants submitted the questionnaire. Results taken from the questionnaires showed that our screening invitation influenced non-elderly people (49.5 ± 3.9 vs. 56.4 ± 6.5, P = 0.04) and first-attendance people showed a significant tendency for more gastrointestinal symptoms (4 vs. 2, P = 0.03).

Conclusion: On the whole, the screening of invitations from PCPs did not improve participation rates in GCSs in the short term. However, we believe that screening invitations can influence non-elderly people, and this intervention can be effective in increasing the numbers of gastrointestinal-symptomatic people attending for the first time (first-attendance people).

Key words: cancer screening, screening invitations, gastric and colorectal cancer, remote islands

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INTRODUCTION

Cancer is the leading cause of death in Japan, of which gastric and colorectal cancers are the most common types. Interestingly, gastric and colorectal cancers can be detected in their early stages. Early diagnosis and treatment are known to reduce cancer-related mortality. To detect gastric and colorectal cancers in the early stages and control mortality rates, cancer screenings have been conducted in Japan since the 1960s.

There is no doubt that the greater the participation in gastric and colorectal cancer screenings (GCSs), the more cancers will be detected in their early stages, and this will result in a decrease in mortality rates. Despite this, the number of people undergoing cancer screenings has been lower than expected, according to a National Survey. The participation rates in nationwide gastric and colorectal cancer screenings in 2009 were only 10.1% and 16.5%, respectively. Rates were similarly low in rural areas.

Many factors influence participation rates, including age, gender, annual income, education, past medical history, family history of cancer, and anxiety of one’s health. Recent studies have shown that direct recommendation tools, such as a letter and/or a leaflet, distributed to patients attending general practice appointments significantly increases participation in colorectal cancer screenings. Although many strategies have been reported to increase cancer screening participation in urban areas, very few such studies have been conducted in rural areas.

In rural areas, there are fewer medical institutions where patients can be screened for cancer compared with urban areas. Thus, primary care physicians (PCPs) need to make more of an effort to promote the annual nationwide screening program, which may be the only chance residents have to undergo a cancer screening each year. Specific research on how to best promote participation in nationwide cancer screenings in rural areas is desperately needed.

So, what tools can improve cancer-screening participation and who will be most influenced by such tools in rural areas? We devised a screening invitation as a direct recommendation tool. The aim of our study was to assess the impact of screening invitations delivered by PCPs on participation in GCSs and the characteristics of participants on a remote island.

MATERIALS AND METHODS

Subjects

Subjects were residents of Kozu Island, located in the southeastern region of Japan. In 2011, the population of Kozu Island was 1968 people, and 1261 of the residents were aged 40 and over. The Kozu National Health Insurance Clinic is the only medical institution on the island, employing two doctors.

In 2011, the estimated number of subjects who were eligible to participate in nationwide gastric and colorectal cancer screenings on Kozu Island was 783 and 880 people, respectively. This estimate included people aged 40 and over, and excluded residents who underwent gastric or colorectal cancer screening in their corporate programs and people who could not attend because they were bedridden or hospitalized. The age limit assigned for undergoing the nationwide cancer-screening program was determined by the Ministry of Health, Labour and Welfare in Japan.

In 2011, the numbers of participants in gastric and colorectal cancer screenings were 173 and 145, respectively. The total number of participants was 211.

Methods of GCSs

GCSs are available to all Japanese residents aged 40 and over. The standard methods used in gastric and colorectal cancer screenings are upper gastrointestinal series (UGI) using barium and fecal occult blood test (FOBT), respectively. On Kozu Island, the method used for colorectal cancer screening is also FOBT; however, the method of gastric cancer screening is gastrointestinal endoscopy (GIE) instead of UGI. This is because there is no institution where UGI can be performed on the island.

Screening invitation strategy

Previously, GCSs were advertised on the Kozu Island local television station. In 2011, we introduced the screening invitation strategy. This strategy involved PCPs handing screening invitations to patients aged 40 and over. The invitation advised...
patients of the date of GCSs, types of examinations, and out-of-pocket charges for the examination. The types of examinations were GIE and FOBT, and the out-of-pocket charges for gastric and colorectal cancer screenings were 5,000 yen (50-60 U.S. dollars) and 1,000 yen (10-12 U.S. dollars), respectively. The screening invitation did not convey any information regarding the importance of cancer screenings or other details of the screening examinations.

We counted the number of participants in GCSs performed from 2005 to 2011 and assessed whether the number of participants had increased in 2011 following the implementation of the screening invitation strategy. The rate of participation was calculated using the same method as the National Survey.5

Questionnaires
To assess whether the screening invitation strategy influenced subjects to attend GCSs and to investigate the individual characteristics of subjects, we administered the questionnaire to all participants. The questions are shown as below.
1. How old are you?
2. Are you male or female?
3. Is this the first time you are participating in GCSs?
4. Why do you decide to participate?
   A: Received screening invitation from physicians.
   B: Watched local television program.
   C: Participate every year.
   D: Recommended by friends or family members.
   E: A friend or family member has gotten cancer.
5. Do you have anxiety about your health over the past year?
6. Have you suffered from any diseases in the past year?
7. Do you have gastrointestinal symptoms?

Statistical analyses
We used a chi-square test to estimate the differences between the number of participants from 2005 to 2010 and in 2011.

We divided the subjects in two ways. First, we divided subjects on the basis of the reason why they decided to attend GCSs: patients who attended because of the screening invitation and those who attended for other reasons. Second, we divided all subjects on the basis of the number of times they had attended GCSs. One group comprised subjects who were attending GCSs for the first time, and the other group comprised subjects who had previously attended GCSs at least once.

To determine whether age was a factor, we divided subjects into two groups: non-elderly (40-64 years) and elderly (65 and over). This distinction was made on the basis of the WHO definition of elderly people, as 65 years and over.6

We examined several factors: age, gender, reasons for attending the cancer screening, subject anxiety regarding health in the past year, the presence of disease in the past year, and the presence of gastrointestinal symptoms. Anxiety about health and diseases was not limited to just gastrointestinal disorders. We used a student’s t-test to estimate any difference in age distribution between the two groups. To estimate the differences in other factors, we used the chi-square or Fisher’s exact test.

All statistical analyses were performed using Excel software (http://office.microsoft.com/ja-jp/excel/). All the statistical tests reported were two-sided: a P value of <0.05 was considered statistically significant.

The present study was approved by the Institutional Review Board of Jichi Medical University (no. 11-9).

RESULTS
Of the participants who underwent GCSs, 172 out of 211 (82%) submitted the questionnaire.

Trends in participants in GCSs
Figure 1 shows that from 2005 to 2010, the number of participants in gastric cancer screening increased from 121 (13.7%) to 170 (21.7%) participants. In 2011, the number of participants was 173 (22.1%) and was not significantly different from the 2010 results (P = 0.80). Furthermore, the number of participants from year to year (2005–2011) was not significantly different (P = 0.07). Figure 2 shows that from 2005 to 2010, the number of participants in the colorectal cancer screening increased from 127 (13.1%) to 152 (17.3%)
participants. In 2011, the number of participants was 145 (16.5%) and was not significantly different from the 2010 results (P = 0.65). Moreover, the number of participants from year to year (2005-2011) was not significantly different (P = 0.17).

**Questionnaires**

Table 1 shows the results of the questionnaires. Regarding the reasons participants gave us as to why they decided to participate in GCSs, 10 (6%) participants answered that they decided to participate in GCSs because of the screening invitation received from their PCP, and 162 (94%) cited other reasons for their participation.

Table 2 shows that all subjects who had responded to the screening invitation were significantly more likely to have reported suffering from a disease in the past year (P = 0.02), and that non-elderly subjects who had responded to the screening invitation were significantly younger (P = 0.04). No significant difference was found for the other factors.

Table 3 shows that all subjects attending for the first time were significantly more likely to have reported gastrointestinal symptoms (P = 0.03), to be female (P = 0.02), and were significantly younger (P = 0.001). There were no significant differences in any other factors. Gastrointestinal symptoms included epigastralgia, nausea, abdominal distention, and so on.

**DISCUSSION**

There were three major findings in our study. First, the screening invitation strategy did not increase the number of participants in GCSs on Kozu Island in the short term. Second, intervention can be effective for gastrointestinal-symptomatic people and can increase the number of first-attendance people. Third, the screening invitation can influence non-elderly resi-

### Table 1. Questionnaires results

<table>
<thead>
<tr>
<th></th>
<th>All results of questionnaires</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N</strong></td>
<td>172</td>
</tr>
<tr>
<td><strong>Age (years, SD)</strong></td>
<td>66.1 ± 11.3</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>(male : female)</td>
<td>91 : 81</td>
</tr>
<tr>
<td><strong>Number of times attended (n, %)</strong></td>
<td></td>
</tr>
<tr>
<td>once</td>
<td>4 (2%)</td>
</tr>
<tr>
<td>more than once</td>
<td>168 (98%)</td>
</tr>
<tr>
<td><strong>Reasons for attending (n, %)</strong></td>
<td></td>
</tr>
<tr>
<td>screening invitation from PCP</td>
<td>10 (6%)</td>
</tr>
<tr>
<td>local television program</td>
<td>3 (2%)</td>
</tr>
<tr>
<td>participate every year</td>
<td>142 (83%)</td>
</tr>
<tr>
<td>recommended by friends or family</td>
<td>4 (2%)</td>
</tr>
<tr>
<td>a friend or family has cancer</td>
<td>3 (2%)</td>
</tr>
<tr>
<td>others</td>
<td>10 (6%)</td>
</tr>
<tr>
<td><strong>Anxiety (n, %)</strong></td>
<td>59 (34%)</td>
</tr>
<tr>
<td><strong>Presence of disease (n, %)</strong></td>
<td>13 (8%)</td>
</tr>
<tr>
<td><strong>Presence of symptom (n, %)</strong></td>
<td>10 (6%)</td>
</tr>
</tbody>
</table>
Many recent studies have described various tools that physicians can use to encourage more participation in cancer screenings. Hart et al. showed that their educational leaflet about screenings significantly increased attendance at colorectal cancer screenings. On the other hand, some studies found that patient-targeted behavioral intervention tools delivered by physicians failed. For example, Ruffinet al. found that providing patients with a personalized, wallet-sized cancer screening guide was ineffective.

Our study showed that participation in GCSs could not be increased with our screening invitation strategy, at least not in the short term. We believe there are three reasons that account for this result. First, the contents of the screening invitation were minimal, giving only basic information about when GCSs were occurring and the out-of-pocket charges for the examination. The significance of the screening and details of the examination were not included in the letter. Hewitson et al. reported an additive effect when patients received both the general practitioner’s letter and a leaflet with details of the examination. If we had also provided subjects with a leaflet about the significance of screening and/or the details of the examination, the impact of intervention might have been greater.

Second, people may consider the examination invasive, especially in gastric cancer screening, because we perform GIE instead of UGI. This consideration may make the effect of the screening invitation weak.

Third, we could not significantly improve participation rates among first-attendance people. To increase the total number of participants, we need to make an effort to influence people who have attended screenings previously to attend again the following year, and also try to increase the number of first-attendance

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Table 2. Questionnaire results for all and non-elderly respondents, divided on the basis of the reasons why they participated in gastric and colorectal cancer screenings.

<table>
<thead>
<tr>
<th>The reason</th>
<th>All respondents</th>
<th>Non-elderly respondents</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Screening invitation from PCP</td>
<td>others</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>10</td>
<td>162</td>
<td></td>
</tr>
<tr>
<td>Age (years, SD)</td>
<td>66.5 ± 15.2</td>
<td>66.1 ± 11.1</td>
<td>0.93</td>
</tr>
<tr>
<td>Gender (male : female)</td>
<td>5 : 5</td>
<td>86 : 76</td>
<td>1.00</td>
</tr>
<tr>
<td>Anxiety (n, %)</td>
<td>4 (40%)</td>
<td>55 (34%)</td>
<td>0.73</td>
</tr>
<tr>
<td>Presence of disease (n, %)</td>
<td>3 (30%)</td>
<td>10 (6%)</td>
<td>0.02*</td>
</tr>
<tr>
<td>Presence of symptom (n, %)</td>
<td>0 (0%)</td>
<td>10 (6%)</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Screening invitation from PCP</td>
<td>others</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>4</td>
<td>66</td>
<td></td>
</tr>
<tr>
<td>Age (years, SD)</td>
<td>49.5 ± 3.9</td>
<td>56.4 ± 6.5</td>
<td>0.04*</td>
</tr>
<tr>
<td>Gender (male : female)</td>
<td>2 : 2</td>
<td>42 : 24</td>
<td>0.62</td>
</tr>
<tr>
<td>Anxiety (n, %)</td>
<td>0 (0%)</td>
<td>19 (29%)</td>
<td>0.56</td>
</tr>
<tr>
<td>Presence of disease (n, %)</td>
<td>1 (25%)</td>
<td>2 (3%)</td>
<td>0.16</td>
</tr>
<tr>
<td>Presence of symptom (n, %)</td>
<td>0 (0%)</td>
<td>6 (9%)</td>
<td>1.00</td>
</tr>
</tbody>
</table>
The reality was that we could only get four first-attendance people. We asked participants why they participated in GCSs and the presence of gastrointestinal symptoms, and the answer I had some gastrointestinal symptoms was significantly more common among first-attendance people than others who had attended before; the reason “I had some gastrointestinal symptoms” was not significantly more common in one group compared with the other. Therefore, it can be concluded that the screening invitation from the PCP could not increase the number of first-attendance people; however, the presence of gastrointestinal symptoms can influence the behavior of first-attendance people.

Among non-elderly people, the results of our questionnaires showed that the participants who cited the screening invitation as the reason they attended GCSs were significantly younger than the group who cited other reasons. We believe that there are two reasons for this result. First, young people could be more interested in disease prevention and early detection of cancer than older people. In addition, the young people who received the screening invitation from their PCP were affected with some other disease and had already visited the hospital. They may have started to get concerned about their health because of their experience of other illnesses, and this concern may have influenced them to participate in GCSs.

Our study showed that the screening invitation from PCP has potential to improve participation among non-elderly people. Recognizing that the screening invitation may be an effective intervention
for younger residents, we could have handed the screening invitation to outpatients of our clinic. However, these individuals generally have less need to see a doctor than elderly people, therefore, we may not be able to hand out screening invitation to sufficient numbers of young patients to significantly improve their attendance at GCSs. Following from this, it is also possible that the total amount of participants, elderly and non-elderly, would not have increased significantly as a result of the screening invitation strategy.

Our study had three limitations. First, the study design was an intervention study and not a randomized controlled study. We hope to plan a randomized controlled study in the future. Second, we examined the results of the intervention after only one year. To assess the long-term impact of screening invitations on participation in cancer screenings, it would be useful to conduct research over several years. Third, the number of participants in this study was limited, because Kozu Island has a small population and the observation period was only one year.

In conclusion, the screening invitation strategy could not significantly improve participation in GCSs on a remote island in the short term; however, this study suggested that a screening invitation has the potential to influence non-elderly people, and that intervention aimed at reaching gastrointestinal-symptomatic people could be effective in increasing the number of first-attendance people.

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The author (YT) and Dr. Miyazaki implemented the screening invitation strategy and treated the patients. YT, Dr. Miyazaki, Dr. Tsuboi, and Dr. Uehara researched the significance of the experience. The authors thank the Clinical Research Support Team Jichi for their advice.

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