The Current Status of Gastric Cancer Screening in Korea: Report on the National Cancer Screening Programme, 2009

Yoon Young Lee¹, Dong Kwan Oh¹, Kui Son Choi¹, Kyu-Won Jung¹, Hoo-Yeon Lee², Jae Kwan Jun*¹

Abstract

Objective: The objective of this study was to evaluate the results of the National Cancer Screening Programme (NCSP) for gastric cancer in 2009 and provide the rates of participation in organized gastric cancer screening in Korea. Methods: The data were obtained from the National Cancer Screening Information System, and the participation rates in gastric cancer screening were calculated. Recall rates, defined as the proportion of abnormal cases among participants, were estimated with 95% confidence intervals (CIs). Results: The target population of the 2009 NCSP included 6,842,209 Korean men and women aged 40 and older. Of those adults, 2,328,715 were screened with upper endoscopy or upper gastrointestinal (UGI) series (34.0%). For the first time, the number of adults (56.3%) screened with upper endoscopy exceeded the number screened with UGI series. Participation rates varied by gender and health insurance type. Overall, the recall rates of upper endoscopy and UGI series were 0.3% (95% CI, 0.34 to 0.36) and 1.6% (95% CI, 1.62 to 1.67), respectively. Conclusions: According to our research, efforts to facilitate participation and to reduce disparities in gastric cancer screening among Korean men and women are needed.

Key words: Korea - mass screening - stomach neoplasms

Introduction

Gastric cancer mortality has been consistently decreasing in Korea. However, gastric cancer is still a clinically important disease due to its high incidence and mortality (Jung et al., 2011). In 2008, an estimated 28,078 new cases were diagnosed, accounting for 15.7% of new cancer cases. The incidence of disease was 43.8 per 100,000 in 2008, which was down from a high incidence of 46.1 in 2005. Survival rates have also improved.

To reduce gastric cancer mortality, a population-based screening programme for gastric cancer was initiated in 1999. Currently, the recommendation is that men and women 40 years or older undergo upper endoscopy or upper gastrointestinal (UGI) series every other year (Pack, 2002; Yoo, 2008). Participants can select a screening modality by themselves. When a UGI series is chosen as a screening method, additional upper endoscopy can also be conducted if gastric cancer is suspected. If necessary, a biopsy is able to be conducted during upper endoscopy. Currently, two population-based gastric cancer screening programmes exist in Korea: the National Cancer Screening Programme (NCSP) and the NHI Cancer Screening Programme (NHICSP). The target population of the NCSP includes Medical Aid Programme (MAP) recipients and the lower 50th percentile of National Health Insurance (NHI) beneficiaries based on income. The NHICSP targets the upper 50th percentile of NHI beneficiaries and is provided by the NHI Corporation (Kim et al., 2011). The aim of this study was to use the 2009 NCSP gastric cancer data to calculate the participation rates and screening results by screening modality and sociodemographic characteristics.

Materials and Methods

The participants of the 2009 NCSP included NHI beneficiaries within the lower 50th percentile of income and MAP recipients who were born in 1969 or earlier. The insurance premium was US $74 (1 US$=1,000 won) or less per month for the self-employed and US $60 or less for employees (based on November, 2008).

Participation in the NCSP was confirmed with insurance claims, and the results of gastric cancer screening were submitted to the NHI Corporation before December 31, 2010. Screening was performed between January 1, 2009 and December 31, 2009. Some subjects underwent the same screening procedure multiple times; for these individuals, only the first screening was...
counted (n=6,365). Although the NCSP-participants should undergo additional upper endoscopy at the same screening unit, in which UGI series was conducted, some subjects underwent UGI series followed by additional upper endoscopy at other screening units because gastric cancer was suspected (n=10,203). These patients were only counted once. However they were included in the number of additional upper endoscopy. The participation rate was calculated by dividing the total number of gastric cancer screening participants by the target population of the NCSP for gastric cancer and converting the result into a percentage (Perry et al., 2006).

The results of the screening programme were classified into five categories: normal, benign, suspicion of gastric cancer, gastric cancer, and other. Gastric cancer was defined as cancer confirmed by biopsy during upper endoscopy. Other was used to describe the cases of oesophageal or duodenal diseases that were diagnosed during screening. In the study, the participants falling within the categories suspicion of gastric cancer and gastric cancer were considered recall cases. The subjects who underwent UGI series followed by upper endoscopy were defined as recall cases regardless of the final diagnosis. Recall rates for gastric cancer screening were defined as the proportion of recall cases among all adults that underwent screening. The 95% confidence intervals were calculated for all outcome variables.

**Results**

In the target population of 6,842,209 adults, there were 3,251,981 men and 3,590,228 women. Based on health insurance data, 926,598 adults in the target population (13.5%) were covered by MAP, and 5,915,611 (86.5%) were covered by NHI. There were 335,568 adults over the age of 70 covered by MAP, accounting for 36.2% of all MAP recipients. This percentage was much higher than the 11.8% of NHI beneficiaries who were in the same age group.

Of the total target population, 2,328,715 (34.0%) adults underwent gastric cancer screening. Of the participants, 968,699 (41.6%) were men and 37.9% among women.

The overall participation rate in the 2009 NCSP was 34.0%; the rate was 29.8% among men and 37.9% among women.

Among all of the adults undergoing screening, 1,009,221 (43.3%) selected UGI series for primary screening and 1,319,494 (56.7%) participants selected upper endoscopy. Of participants in their 40s, 245,660 (34.3%) underwent UGI series, and 470,669 (65.7%) underwent upper endoscopy. Thus, as age increased, the percentage of adults undergoing upper endoscopy
<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of UGI</td>
<td>216,334</td>
<td>588,149</td>
<td>6,842,209</td>
</tr>
<tr>
<td>No. of upper</td>
<td>122,840</td>
<td>6,722</td>
<td>1,009,221</td>
</tr>
<tr>
<td>No. of repeat</td>
<td>1,674</td>
<td>9,875</td>
<td>8,599</td>
</tr>
<tr>
<td>No. of recall</td>
<td>1,194</td>
<td>2,620</td>
<td>4,424</td>
</tr>
</tbody>
</table>

Table 1. UGI Series and Additional Upper Endoscopy Outcomes by Gender, Health Insurance Type, Age and Area of Residence from the National Cancer Screening Program in Korea, 2009.
Table 2. Upper Endoscopy and Biopsy Outcomes by Gender, Health Insurance Type, Age and Area of Residence from the National Cancer Screening Programme for Gastric Cancer, 2009

<table>
<thead>
<tr>
<th>Residence area</th>
<th>(n) (%)</th>
<th>(%)</th>
<th>or proliferative adenoma/</th>
<th>adenoma/</th>
<th>of gastric cancer</th>
<th>No. of Biopsy</th>
<th>Normal</th>
<th>Gastritis</th>
<th>Inflammatory</th>
<th>Tubualr</th>
<th>Suspicious</th>
<th>Gastric</th>
<th>Others†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia</td>
<td>70+</td>
<td>1,031,327</td>
<td>302,495</td>
<td>99,806</td>
<td>1,060</td>
<td>1.1</td>
<td>(1.00-1.13)</td>
<td>27,941</td>
<td>(28.0)</td>
<td>132</td>
<td>(0.5)</td>
<td>16,581</td>
<td>(59.3)</td>
</tr>
<tr>
<td>Japan</td>
<td>60-69</td>
<td>1,217,579</td>
<td>553,768</td>
<td>286,815</td>
<td>1,590</td>
<td>0.6</td>
<td>(0.53-0.58)</td>
<td>77,117</td>
<td>(26.9)</td>
<td>358</td>
<td>(0.5)</td>
<td>49,340</td>
<td>(64.0)</td>
</tr>
<tr>
<td>Korea</td>
<td>50-59</td>
<td>2,049,147</td>
<td>756,123</td>
<td>462,204</td>
<td>1,266</td>
<td>0.3</td>
<td>(0.26-0.29)</td>
<td>110,151</td>
<td>(23.8)</td>
<td>444</td>
<td>(0.4)</td>
<td>73,501</td>
<td>(66.7)</td>
</tr>
<tr>
<td>Canada</td>
<td>40-49</td>
<td>2,817,283</td>
<td>1,089,634</td>
<td>643,115</td>
<td>1,490</td>
<td>0.5</td>
<td>(0.42-0.51)</td>
<td>38,672</td>
<td>(29.9)</td>
<td>148</td>
<td>(0.4)</td>
<td>27,440</td>
<td>(65.1)</td>
</tr>
<tr>
<td>Australia</td>
<td>30-39</td>
<td>2,541,620</td>
<td>1,021,114</td>
<td>603,544</td>
<td>1,375</td>
<td>0.6</td>
<td>(0.53-0.58)</td>
<td>43,675</td>
<td>(23.2)</td>
<td>220</td>
<td>(0.5)</td>
<td>30,940</td>
<td>(67.7)</td>
</tr>
<tr>
<td>United States</td>
<td>20-29</td>
<td>2,276,707</td>
<td>890,883</td>
<td>527,504</td>
<td>1,092</td>
<td>0.5</td>
<td>(0.42-0.51)</td>
<td>35,631</td>
<td>(24.0)</td>
<td>211</td>
<td>(0.5)</td>
<td>27,440</td>
<td>(65.1)</td>
</tr>
<tr>
<td>European Union</td>
<td>10-19</td>
<td>2,011,964</td>
<td>750,231</td>
<td>468,024</td>
<td>1,271</td>
<td>0.3</td>
<td>(0.26-0.29)</td>
<td>99,151</td>
<td>(26.1)</td>
<td>394</td>
<td>(0.5)</td>
<td>72,601</td>
<td>(62.7)</td>
</tr>
<tr>
<td>Latin America</td>
<td>0-9</td>
<td>1,757,473</td>
<td>654,963</td>
<td>423,464</td>
<td>1,199</td>
<td>0.6</td>
<td>(0.53-0.58)</td>
<td>41,675</td>
<td>(24.0)</td>
<td>220</td>
<td>(0.5)</td>
<td>30,940</td>
<td>(67.7)</td>
</tr>
</tbody>
</table>

*Participants who received 'suspicious of cancer' or 'gastric cancer' were deemed to be recall.
Discussion

The total participation rate in the NCSP for gastric cancer was 34.0% in 2009. The annual rate has been increasing continuously from 12.7% in 2002 when the NCSP was first implemented (Kim et al., 2011). However, the screening rate is still below the overall screening rate for gastric cancer in Korea of 65.1%, which includes opportunistic screenings as well as the organised screening programme conducted by the NHI Corporation (Lee et al., 2011a).

Although there is insufficient evidence to recommend upper endoscopy as a population-based screening tool for gastric cancer (Hamashima et al., 2008; Choi et al., 2011), NCSP participants have been undergoing upper endoscopy at a steadily increasing rate, from 24.8% in 2002 to 56.3% in 2009. In the 2009 NCSP, the number of participants screened with upper endoscopy exceeded the number screened with UGI series for the first time. This may be the result of changes in preference for upper endoscopy as a gastric cancer screening method (Choi et al., 2009) and improved accessibility to screening units equipped with upper endoscopy (Lee et al., 2011b). As the proportion of participants undergoing upper endoscopy increases, the cost-effectiveness of the NCSP for gastric cancer may improve (Lee et al., 2010).

Until 2008, the indications for upper endoscopy after UGI series were ambiguous, and the rate had increased by 33.3% (Lee et al., 2011b). However, in 2009, the reporting of the results in the NCSP for gastric cancer changed from six categories (normal, benign, needing further evaluation, suspicion of cancer, gastric cancer, and confirmed gastric cancer) to five categories (normal, benign, suspicion of gastric cancer, gastric cancer, and other). The indication for additional upper endoscopy among those screened with UGI series was restricted to participants with results that were suspicious for gastric cancer. This change should reduce unnecessary additional upper endoscopies, and in fact, the recall rate among those screened with UGI series dropped to 1.6% in 2009.

Despite increases in NCSP participation, there are still screening disparities based on gender, age, socioeconomic status, and area of residence. In particular, the participation rate of MAP recipients increased from only 12.6% in 2002 to 23.3% in 2009, which was lower than the increase among NHI beneficiaries within the same time period (12.7% in 2002; 35.7% in 2009). Considering the effect of gender and socioeconomic status on the incidence and mortality of gastric cancer in Korea (Khang et al., 2004; Kim et al., 2008), efforts should be made to increase gastric cancer screening among Korean men and MAP recipients. In addition, we noted differences in the selection of gastric cancer screening modalities.

In conclusion, 34.0% of the target population participated in the 2009 NCSP for gastric cancer. Along with improving the participation rate for gastric cancer screening, continuing efforts are needed to minimise screening disparities based on region, age, and socioeconomic status. We expect that our results will be useful in creating policies and strategies to prevent gastric cancer in Korea.

References


