RESEARCH COMMUNICATION

Cervical Cancer Screening in Korea: Report on the National Cancer Screening Programme in 2008

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Abstract

   The National Cancer Screening Programme (NCSP) began in 1999. The purpose of this report is to evaluate the results of the NCSP for cervical cancer in 2008 and to present essential evidence associated with the cervical cancer screening programme in Korea. Screening results were obtained from the National Cancer Screening Information System. Participation rates and recall rates were calculated with 95% confidence intervals (CIs). The target population of the cervical cancer screening programme in 2008 was 4,701,167 Korean women aged 30 and over, 1,208,581 of whom underwent Papanicolaou (Pap) smear tests (25.7% participation rate). The recall rate was 0.41% (95% CI, 0.40 to 0.42). Although efforts to facilitate participation and to reduce disparities in cervical cancer screening among Korean women are needed, the results do provide support evidence-based strategies for control of cervical cancer in Korea.

Keywords: Korea - populationp-based screening - uterine cervical neoplasms

Introduction

   Despite a trend of decreasing incidence and mortality, cervical cancer is a major health problem for Korean women. It is estimated that, in 2008, there were 3,888 new cases, accounting for 4.5% of all new female cancer cases. The incidence rate per 100,000 women was 11.2 in 2008, decreased from a high of 16.3 in 1999. Survival rates have also improved (Jung et al., 2011). Both phenomena may be due in large part to the introduction of the cervical cancer screening programme in Korea in the late 1980s (Shin et al., 2008).

   In 1988, Korea introduced population-based cervical cancer screening, initially providing this service to employees and dependents insured by the Korea National Health Insurance Programme. As part of a comprehensive 10-year plan for cancer control, the National Cancer Screening Programme (NCSP) for Medical Aid Programme (MAP) recipients was initiated in 1999 (Kim et al., 2011). Currently, there are two organised, population-based cancer screening programmes in Korea. One is the NCSP, whose target population includes MAP recipients and National Health Insurance (NHI) beneficiaries in the lower 50% of the income bracket, and the other is the NHI Cancer Screening Programme (NHICSP), whose target population is NHI beneficiaries in the upper 50% of the income bracket. These two programmes provide biennial screening tests free of charge to all Korean women aged 30 and over.

   In the present study, we aimed to provide preliminary information on cervical cancer screening programmes based on data collected by the NCSP in 2008. This report describes participation rates and the percentage of abnormalities by age and insurance type. The results for the NHICSP will be reported by the NHI Corporation.

Materials and Methods

   The target population for cervical cancer screening in the 2008 NCSP was women born in 1978 or earlier who were MAP recipients or NHI beneficiaries in the lower 50% of the income bracket. For those NHI beneficiaries who were included in the NCSP, the insurance premium was USD 56.50 or less per month for employees and USD 67.00 or less per month for the self-employed (based on figures from November 2007).

   Using an online database system, we confirmed participation in the NCSP by examining the insurance claims and results of cervical cancer screening submitted to the NHI Corporation before 31 December 2009. Screening was performed between 1 January 2008 and 31 December 2008. Some subjects underwent the screening procedure multiple times; for those individuals, only the first screening was counted (n = 577). These participants

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Table 1. Screening Outcomes by Age, Health Insurance Type, and Area of Residence from the National Cancer Screening Programme for Cervical Cancer, 2008

		Target (n)	Participants (n)	Rate (%)	Abnormal cases* (n)	Recall rate (%)	(95% C.I.)
Total		4,701,167	1,208,581	25.7	4,996	0.41	(0.40-0.42)
Health insurance type							
National Health Insurance		4,053,537	1,118,688	27.6	4,330	0.39	(0.38-0.40)
Medical Aid Programme		647,630	89,893	13.9	696	0.77	(0.72-0.83)
Age group (yr)	30-39	862,107	124,754	14.5	671	0.54	(0.50-0.58)
	40-49	1,428,591	409,532	28.7	1,782	0.44	(0.41-0.46)
	50-59	1,082,933	381,203	35.2	1,284	0.34	(0.32-0.36)
	60-69	644,373	213,414	33.1	799	0.37	(0.35-0.40)
	70+	683,163	79,678	11.7	460	0.58	(0.52-0.63)
Residence area	Seoul	872,230	222,504	25.5	1,063	0.48	(0.45-0.51)
	Busan	370,775	112,726	30.4	506	0.45	(0.41-0.49)
	Daegu	240,481	72,755	30.3	215	0.30	(0.26-0.33)
	Daejeon	127,867	39,238	30.7	142	0.36	(0.30-0.42)
	Incheon	258,714	58,659	22.7	343	0.58	(0.52-0.65)
	Gwangju	128,180	35,025	27.3	124	0.35	(0.29-0.42)
	Ulsan	81,811	21,547	26.3	98	0.45	(0.36-0.54)
	Gyeonggi	962,831	240,975	25.0	1,053	0.44	(0.41-0.46)
	Gangwon	163,562	40,604	24.8	157	0.39	(0.33-0.45)
	Chungbuk	162,748	42,935	26.4	198	0.46	(0.40-0.53)
	Chungam	214,278	41,271	19.3	129	0.31	(0.26-0.37)
	Jeolbuk	213,645	51,929	24.3	237	0.46	(0.40-0.51)
	Jeolnam	229,559	54,506	23.7	167	0.31	(0.26-0.35)
	Gyeongbuk	293,295	73,832	25.2	226	0.31	(0.27-0.35)
	Gyeongnam	322,546	83,947	26.0	234	0.28	(0.24-0.31)
	Jeju	58,645	16,128	27.5	104	0.64	(0.52-0.77)

*Includes low-grade intraepithelial lesion (LSIL), high-grade intraepithelial lesion (HSIL), adenocarcinoma in situ (AIS), and squamous or adenomatous cell cancer

were only counted once in determining the participation rate. The participation rate of cervical cancer screening was calculated by dividing the number of participants by the target population of the NCSP for cervical cancer, and it is denoted as a percentage (Perry et al., 2006).

The standard modality for cervical cancer screening in the NCSP is the Papanicolaou (Pap) smear test, which is based on conventional cytology. The NCSP requires that units report Pap smear results using the Bethesda System categories (Bergeron, 2003). The categories included are normal, infection/reaction, atypical squamous cells of undetermined significance (ASCUS), low-grade squamous intraepithelial lesion (LSIL), high-grade squamous intraepithelial lesion (HSIL), squamous cell carcinoma, and other. The category "other" includes Pap smear results relating only to the glandular elements of the genital tract and to hormonal evaluation. Pap smear results were defined as abnormal if they were reported as LSIL, HSIL, adenocarcinoma in situ (AIS), or squamous or adenomatous cell carcinoma. Recall rates for cervical cancer screening were defined as the proportion of abnormal cases among the cancer-screened participants. The 95% confidence intervals (CIs) were calculated for all outcome variables.

Results

The target population of the 2008 NCSP for cervical cancer screening was 4,701,167 women. Based on health insurance, 647,630 (13.8%) were covered by the MAP and 4,053,537 (86.2%) were covered by the NHI. There were 262,292 over the age of 70 covered by MAP, accounting for 40.5% of total MAP recipients. This was much higher than the 10.4% of NHI beneficiaries falling in the same age group. In the target population, a total of 1,208,581 women underwent cervical cancer screening. The screening participants included 89,893 MAP recipients (7.4%) and 1,118,688 NHI beneficiaries (92.6%). Participants in their 40s comprised the largest group; there were 23,172 (25.8%) MAP recipients and 386,362 (34.5%) NHI beneficiaries in this age group. The number of participants from among the NHI beneficiaries decreased with age, whereas the numbers of participants from among the MAP recipients did not change with age (Figure 1).

The total participation rate in the 2008 NCSP for cervical cancer was 25.7%. The participation rate of the NHI beneficiaries (27.6%) was higher than the
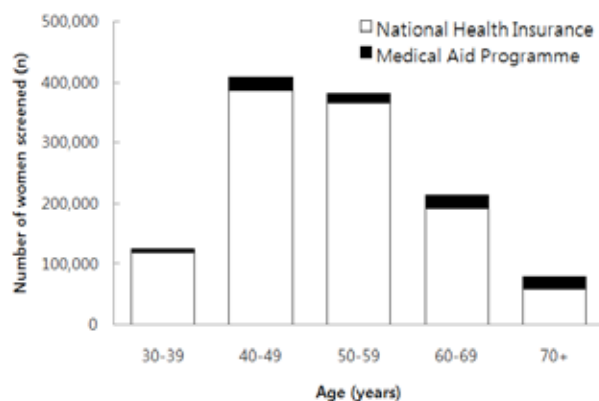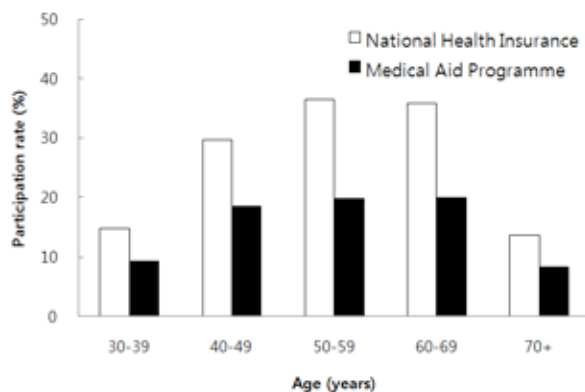

Figure 1. Number of Participants by Health Insurance Type and Age from the National Cancer Screening Programme for Cervical Cancer, 2008

Table 2. Distribution of Papanicolaou (Pap) Smear Test Results by Age Group in the National Cancer Screening Programme for Cervical Cancer, 2008

	All (n=1,208,581)		30–39 (n=124,754)		40–49 (n=409,532)		50–59 (n=381,203)		60–69 (n=213,414)		70+ (n=79,678)	
Normal	792,033	(65.3)	82,830	(66.4)	270,103	(66.0)	246,732	(64.7)	139,58	(65.4)	52,783	(66.2)
Epithelial cell abnormality	30,432	(2.5)	3,362	(3.0)	11,471	(2.8)	9,212	(2.4)	4,484	(2.1)	1,903	(2.4)
Squamous cell	24,336		2,816		9,157		7,251		3,528		1,584	
Glandular cell	133		5		21		24		37		46	
Unknown	5,963		541		2,293		1,937		919		273	
Negative for intraepithelial lesion or malignancy												
	380,403	(31.5)	38,027	(30.5)	125,980	(30.8)	123,435	(32.4)	68,386	(32.0)	24,575	(30.8)
Organisms	130,343		10,377		41,221		43,903		25,713		9,129	
Reactive changes	250,060		27,650		84,759		79,532		42,673		15,446	
Other	5,713	(0.5)	535	(0.4)	1,978	(0.5)	1,824	(0.5)	959	(0.4)	417	(0.5)
Total Abnormals*	4,996	(0.4)	671	(0.5)	1,782	(0.4)	1,284	(0.3)	799	(0.4)	460	(0.6)

Data are n (%); *Includes low-grade intraepithelial lesion (LSIL), high-grade intraepithelial lesion (HSIL), adenocarcinoma in situ (AIS), and squamous or adenomatous cell cancer

Figure 2. Participation Rates by Health Insurance Type and Age from the National Cancer Screening Programme for Cervical Cancer, 2008
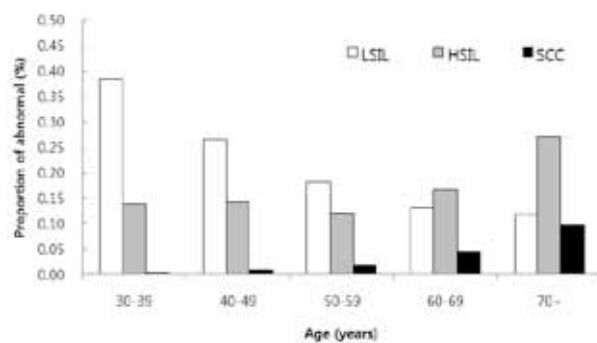
Figure 3. Proportion of Abnormal Results by Age from the National Cancer Screening Programme for Cervical Cancer, 2008

participation rate of MAP recipients (13.9%) (Table 1, Figure 2). Participation rates increased with age; 36.5% of NHI beneficiaries in their 50s and 19.9% of MAP recipients in their 60s participated.

Table 2 shows the results of the Pap smears. Of the 1,208,581 tests performed, 0.41% were abnormal (LSIL, HSIL, AIS, or squamous or adenomatous cell carcinoma). The U-shaped curve representing abnormal tests by age diverged from 0.54% for women in their 30s, reached a minimum (0.34%) for women in their 50s, and approached 0.58% for women aged 70 and over (Figure 3). With increasing age, the proportions of LSIL reported decreased, and the proportions of HSIL or squamous cell carcinoma increased.

Discussion

Organised screening programmes for cervical cancer using Pap smears have been shown to be effective in decreasing both the incidence and mortality of the disease (Anttila et al., 2004). The NCSP for cervical cancer is a nationwide cancer screening programme launched in 1999. Since organised cervical cancer screening programmes, including the NCSP, were introduced in Korea, both the incidence and mortality of cervical cancer have been declining steadily (Jun et al., 2009; Shin et al., 2008). The incidence of cervical cancer decreased by 4.6% annually from 1999 to 2008 (Jung et al., 2011).

The NCSP participation rate for cervical cancer in 2008 was 25.7%. Although participation rates have been increasing, they are still lower than those for other cancer screening programmes in the NCSP (Lee et al., 2011; Oh et al., 2010; Lee et al., 2010). Both socioeconomic status and age affect participation rates. First, both the incidence and mortality of cervical cancer are known to be relatively high among women of lower socioeconomic status (Kim et al., 2008); therefore, the participation rate in cervical cancer screening needs to be improved in this cohort. However, the participation rate of MAP recipients decreased from 15.4% in 2002 to 13.9% in 2008 (Choi et al., 2010). Although the NCSP's cervical cancer screening is free of charge, the poor participation rate of women of lower socioeconomic status indicates that other factors inhibit participation in cervical cancer screening apart from the economic burden of screening costs. Identification of barriers to participation in cervical cancer screening and solutions to overcome them are required.

Second, the participation rate of women aged 30-39 was 14.5%. This rate was lower than all other age groups except for women aged 70 and over. Although there are various recommendations regarding when to start screening, it is important that women should be screened beginning in their 30s. The incidence of cervical cancer in Korea is very low in women under 30 years of age, but then begins to climb rapidly thereafter (Jung et al., 2011). Some countries, including Korea, have reported increasing rates in younger women (Herbert, 2004; Chan et al., 2003; Han et al., 2008). For these reasons, we should attempt to increase participation in the NCSP for cervical cancer

among women in their 30s.

Finally, many countries recommend discontinuing cervical cancer screening once women reach their 60s. Older women tend to be less compliant with screening protocols, and good-quality smears are difficult to obtain from women so far past menopause. However, in view of the high age-specific incidence of cervical cancer in older women, there is controversy in Korea regarding when older women should be advised to discontinue cervical cancer screening. Although age-standardised mortality rates for cervical cancer in Korean women have significantly decreased over time, they increased in women aged 70 and over by 3.62% annually (Shin et al., 2008). Older women in Korea, especially those who have never been screened or have not been screened for many years, should still be encouraged to get tested.

In 2008, 25.7% of the target population participated in the NCSP for cervical cancer. Differences in participation rates occurred between regions, age, and socioeconomic status. Thus, along with improving the participation rate in cervical cancer screening, continuing efforts are required to minimise these differences. Our results can be useful to government officials, clinical providers, and public health researchers for planning policies and new studies to improve efforts to prevent cervical cancer in Korea.

Acknowledgements

References

Anttila A, Ronco G, Clifford G, et al (2004). Cervical cancer screening pogrammes and policies in 18 European countries. *Br J Cancer*, **91**, 935-41.

Bergeron C (2003). The 2001 Bethesda system. *Salud Publica Mex*, **45**, S340-4.

Chan PG, Sung HY, Sawaya GF (2003). Changes in cervical cancer incidence after three year decades of screening US women less than 30 years old. *Obstet Gynecol*, **102**, 765-73.

Choi KS, Lee H-Y, Jun JK (2010). Cancer facts and figures 2010. In 'Cancer Screening Program', Eds Jung JS, Choi JM, Joung MJ. National Cancer Centre, Goyang pp47-56.

Han CH, Cho HJ, Lee SJ, et al (2008). The increasing frequency of cervical cancer in Korean women under 35. *Cancer Res Treat*, **40**, 1-5.

Herbert A (2004). The value of cervical screening to young women. *Br J Cancer*, **90**, 1108.

Jun JK, Choi KS, Jung K-W, et al (2009). Effectiveness of an organized cervical cancer screening program in Korea: Results from a cohort study. *Int J Cancer*, **124**, 188-93.

Jung K-W, Park S, Kong H-J, et al (2011). Cancer statistics in Korea: incidence, mortality, survival, and Prevalence in 2008. *Cancer Res Treat*, **43**, 1-11.

Kim Y, Jun JK, Choi KS, et al (2011). Overview of the National Cancer Screening Programme and the Cancer Screening Status in Korea. *Asian Pacific J Cancer Prev*, **12**, 725-30.

Lee KS, Oh DK, Han, et al (2011). Gastric cancer screening in Korea: report on the National Cancer Screening Program in 2008. Cancer Res Treat, in press.

Lee E-H, Han MA, Lee H-Y, et al (2010). Liver cancer screening in Korea: a report on the 2008 National Cancer Screening Programme. *Asian Pacific J Cancer Prev*, **11**, 1305-10.

Oh DK, Shim JI, Han MA, et al (2010). Breast cancer screening in Korea: report of the National Cancer Screening Program in 2008. *J Breast Cancer*, **13**, 299-304.

Perry N, Broeders M, de Wolf C, et al (2006). European guidelines for quality assurance in breast cancer screening and diagnosis. 4th ed. Brussels: European Communities. p.47-56.

Shin HR, Park S, Hwang SY, et al (2008). Trends in cervical cancer mortality in Korea 1993-2002: correct mortality using national death certification data and national cancer incidence data. *Int J Cancer,* **122**, 393-7.