

Population Screening Program for Cancer of the Cervix Using a Mobile Office-Experience of 2 Million Cases

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Abstract

Background: To evaluate the effectiveness of population screening program for cancer of the cervix using a mobile office.

Methods: The screening using a bus with an examination office has been conducted since 1968 in Kanagawa Prefecture, Japan. The bus visits local communities, where people enjoy convenient opportunity to receive the detection program. The screening method was cervical cytology. Women who were recommended to have the detailed examination were controlled strictly under the Quality Assurance Committee.

Results: A total of 2,070,282 women, including 30.2% of women with their first visit, were screened between 1968 and 2009. Among them 13,687 (0.66%) were recommended for the detailed examination and 95.1% of them received it. Two thousands, one hundred and seventy-two of cervical cancer and 2,476 of dysplasia were detected with the detection rates of 0.10% and 0.12%, respectively. The detection rates of cancer have been decreased year by year until 0.05% in 1993, and have been stationary since then. The decreasing tendency was obvious in the repeaters and higher age group. The detection rates of carcinoma *in situ* have been increasing up to 69.2%, whereas those of invasive cancer have been decreased. Those of dysplasia have been increased up to 0.34% in 2009 and the increasing tendency was obvious in women with first visit and age 30s followed by age 40s. However, the incidences even in the repeaters were above 0.1% in recent years.

Conclusion: The mobile screening program has been successful for detecting carcinoma *in situ* and dysplasia and will be useful for the women who live in a long distance before arriving at a permanent medical office.

Keywords: Cancer of the uterine cervix; Screening; Cervical cytology; A mobile office

Introduction

Carcinoma of the uterine cervix is one of a few carcinomas that have been confirmed to decrease the women's death due to the carcinomas concerned, if they are screened using cervical cytology. The cohort studies [1-3] and case-control studies [4-14] have revealed the effectiveness of the screening for cervical cancer with the end point of either mortality decrease or invasive cancer protection.

How do we perform the population-based screening program for detecting cancer of the cervix? Kanagawa Prefecture and Yokohama City, Japan have a long history of the screening using a bus, in which an examination office is facilitated since 1968 (Figure 1-3). The bus with a mobile office visits local community where people enjoy convenient opportunity to receive the detection program without visiting a permanent medical facility. Gynecologists from 5 University Hospitals and one Cancer Institute, which are located in Kanagawa, have been cooperating to proceed with the program, and these institutes have also accepted the screened women for the detailed examination. The Quality Assurance Committee that consists of the representative Gynecologic oncologists from these institutions has played a role of quality control of the screening.

The mobile screening program in Kanagawa has recorded more than a total of 2 million women screened in 2002, which we believe highest in number in Japan and the world. We report our screening results in this paper.

Subjects and Methods

Subjects

Women, age 30 and older who live in Kanagawa Prefecture reserve to have the screening at their regional place, where the screening bus visits. The municipal governments supported the majority of screening

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costs at first and since 1982 Health Service Law for the aged in Japan has supported the screening for four cancers, including cervical cancer. The screening subjects have been extended to women aged 20 and older since 2004.

Methods

Cellular sampling and screening: Obstetrics and Gynecology residents, from Kitasato University, St Marianna University, Tokai University, Nippon Medical School Musashikosugi Hospital and Yokohama City University, perform the screening at the examination office facilitated in a bus. The cytology specimens were obtained with a small cotton stick (Osaki applicator, Osaki Medical Co. Ltd., Nagoya, Japan), which had been rinsed with physiological saline, scrubbing both the vaginal portio and cervical canal. After placing the cells on the glass slides rotating the cotton tip, the slide specimens were fixed with MP fixing fluid (Wako Pure Chemical Industries, Ltd, Tokyo). Subsequently, the cellular samples were sent to the Cytology Center, the Kanagawa Health Service Association, and processed for routine Papanicolaou staining and diagnostic procedures.

The cytological diagnosis had been based on the modified criteria of Japan Society of Obstetricians and Gynecologists [15], which was similar to Papanicolaou classification in addition to reporting the suggestive pathological lesions, and was transferred to the Bethesda System (TBS) in 2009 [16,17]. Our old class IIb, however, is equivalent to ASC in TBS. Therefore, we translated all cytology results into TBS, and women with ASC-US \leq were introduced to the detailed examination.



Figure 1: A screening bus with a mobile office.



Figure 2: Waiting room in the bus. Recipients will be lead to a dress room behind followed by the screening office.



Figure 3: An examination table in the mobile office.

Detailed examination: The subjects screened and recommended for the detailed examination were introduced to have it at one of the five university hospitals mentioned above and Kanagawa Cancer Institute.

The detailed examination including Colposcopy was performed under the cover of medical insurance system in Japan.

Quality Assurance Committee: The quality Assurance Committee (Director; Toshiko Jobo, MD, PhD), of which members are the Gynecologic Oncologists from 6 institutions has controlled the quality of the cytological sampling and diagnosis, and the final diagnostic results were gathered from their own institutions and compared with cytological data, and discussed for the screening program of following year.

Handling the program and reporting the screening results: The Kanagawa Health Service Association has been performing the actual screening program with the request of municipal governments, and reporting the results to recipients as well as statistical analysis.

Basically the municipal governments in Kanagawa Prefecture pay the screening cost, and women who have the screening share to pay 10 to 30% of the screening fee depending on the policy of each municipal government, which is at present ¥400 to ¥1,100 (\$4 to \$11 with the exchange rate of \$1 for ¥100).

The present bus facilitated with a mobile screening office is a donation of Japan Lottery Association.

Results

Between 1968 and 2009, the women who received the screening for the cervical cancer recorded a total of 2,070,282, including 625,093 (30.2%) of the first visitors and 1,399,093 (67.6%) of the repeaters. The annual recipients were increased exceeding 80,000 in 1981 and declined gradually until recently after stationary number for several years (Figure 4). Number of the first visitors was high in the early years and declined gradually. However, the incidences have been increasing in recent years. Among women screened 13,687 women with ASC \leq , 0.66% in incidence, were introduced to the detailed examination, and 13,051 received it, of which incidence was 95.1%.

With the detailed exam, 2,172 women, 16.64% of women who had the detailed exam, were diagnosed as carcinoma of the cervix, including 1,028 of stage 0 and 507 with stage Ia. The incidences in the total recipients were 0.10%, 0.05% and 0.02%, respectively. Those of the first visitors were 0.23%, 0.10% and 0.06%, whereas those of the repeaters were 0.05%, 0.03% and 0.01%, respectively. The chronological incidences have declined down to 0.05% in 2008-2009, including 0.11% in the first visitors and 0.03% in the repeaters (Figure 5). The chronological detection rates of cervical cancer by age group revealed high in 30s and 40s, and showed increasing tendency in recent years after decreasing in the early periods except a decline in 30s recently (Figure 6), whereas in the older ages they were low and stationary in recent years.

The chronological detection rates by stage showed that the incidences of carcinoma *in situ* have been increased from 37.2% up to 69.2% in 2008-2009, whereas those of stage Ia and Ib have declined down to 7.7%, respectively (Figure 7).

A total of 2,476, 18.97% of women who had the detailed exam, including 1,116 in the first visitors and 1,360 in the repeaters, were diagnosed as having dysplasia, and the incidences were 0.12% of the screened, including 0.18% in the first visitors and 0.10% in the

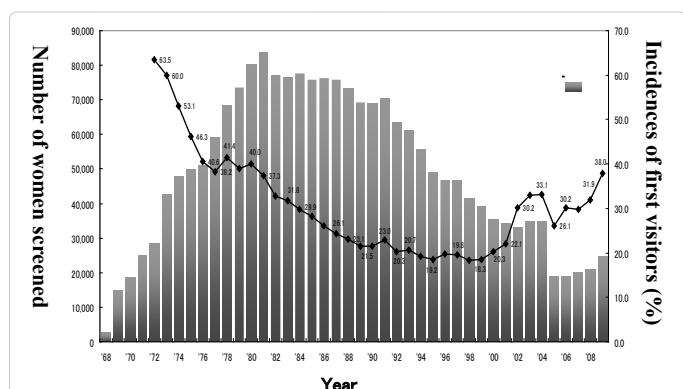


Figure 4: Chronological number of women screened and incidences of the first visitors. Number of women who had the screening (column) was increased until 1981 and decreased since then. Incidences of the first visitors (—◆—) had been decreased sharply at first and then have been increasing since 2000.

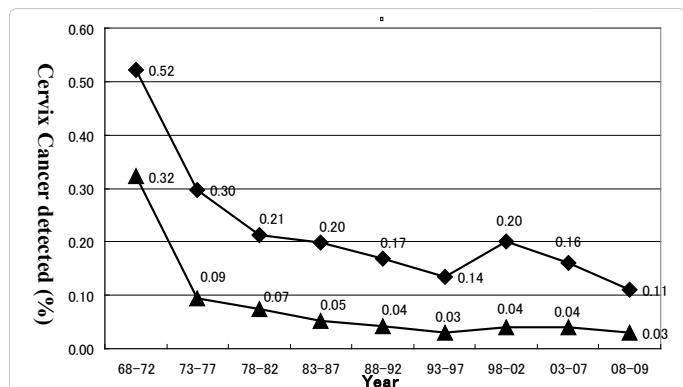


Figure 5: Chronological detection rates of cervical cancer in the first visitors and the repeaters. The detection rates of both first visitors (—◆—) and repeaters (—▲—) have been decreasing year by year. However, those of the first visitors are still above 0.1%, whereas those of the repeaters are less than 0.04%.

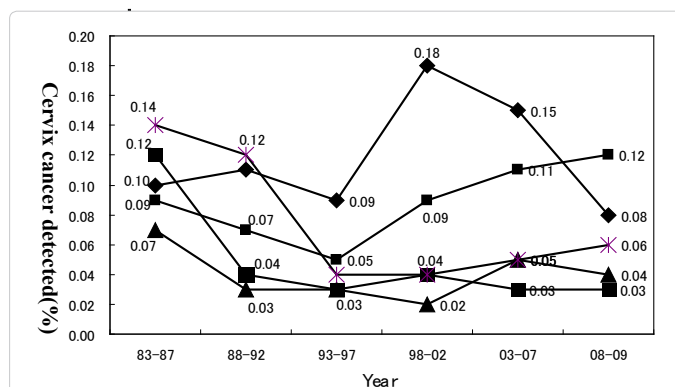


Figure 6: Chronological detection rates of cervix cancer by age group. The detection rates of cervical cancer in age 30s (—◆—) have been increasing year by year with exception of that in the recent years, followed by those of age 40s (—■—), whereas those of age 50s (—▲—), age 60s (—×—) and age 70 and older (—☆—) were high in initial years and then have been decreased.

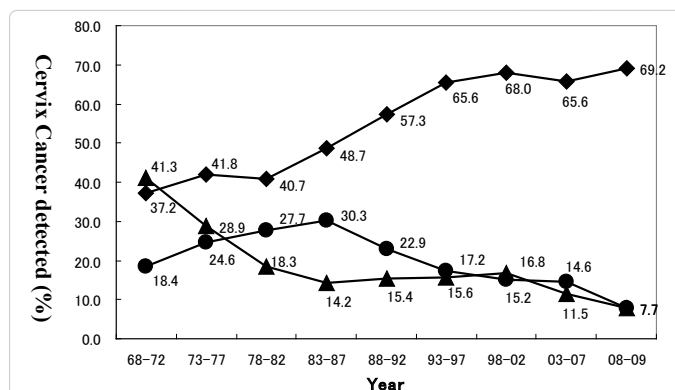


Figure 7: Chronological detection rates of cervical cancer by stage. The detection rates of stage 0 (—◆—) have been increasing up to 69.2% in 2008-2009, whereas those of stage Ia1 (—●—) and stage Ia2 (—▲—) have been decreasing.

repeaters. The incidences have been increasing year by year up to 0.34%. The chronological incidences in the first visitors have been increased exceeding 0.4% (Figure 8). However, incidences even in the repeaters were above 0.1% in recent years, although these were low in increasing tendency. The chronological detection rates of dysplasia by age group revealed highest in 30s followed by 40s with increasing tendency showing 0.61% and 0.45% in 2008-2009, respectively, whereas in the older ages they were low and stationary (Figure 9).

Discussion

The mobile screening program for cancer of the cervix played the role to initiate the population screening system in Japan, and started in Miyagi Prefecture in 1964, which was followed by us in 1968. Since 1990s, the program operated by the permanent offices of medical facilities has replaced gradually in city areas, whereas the mobile program has been working at the suburban or country areas. It gives still a convenient opportunity to receive the detection program for women without having a permanent medical facility at their nearby area. Women in 67.6% of 2,070,282 were repeaters, and may be customers to enjoy the mobile screening program. We should, however, persuade women who had never received the program to elevate the cancer detection rate, and actually the incidence of first visitors is increasing in recent years (Figure 4).

A total incidence for the detailed exam was 0.66%, of which ASC and LSIL were used to be approximately 0.30% and 0.35% in incidences, respectively. The incidence of ASC-US, however, was increased up to 0.70% in 2009, which may be due to the official introduction of TBS for reporting the cervical cytology. The incidence of women who were recommended to have the detailed exam and actually received it was 95.1%. This high rate was realized by a systematic recommendation activity for receiving the detailed exam and by the well-established exam system at University Hospitals

The over all detection rate of cervical cancer was 0.10% i.e. 100/100,000 during the past 42 years. The rate was decreased year by year, and the decreasing tendency was obvious in the repeaters resulting in 0.03% in recent years (Figure 5). However in the first visitors, it was high exceeding 0.1%. The result notifies us that we need further effort to popularize the screening for cervical cancer. Among cancers, the detection rate of stage 0 has elevated up to 69.2%, whereas invasive cancers including stage Ia1 have declined (Figure 7).

Detection rate of dysplasia was 0.12% i.e. 120/100,000 on the whole. However, it has been increasing, and revealed a higher tendency in the first visitors showing up to 0.43%, whereas in the repeaters it was 0.19% in 2008-2009 (Figure 8). The results show that the detection rate of dysplasia is still high even in the repeaters, and dysplasia is a lesion that we can hardly prevent with screening program.

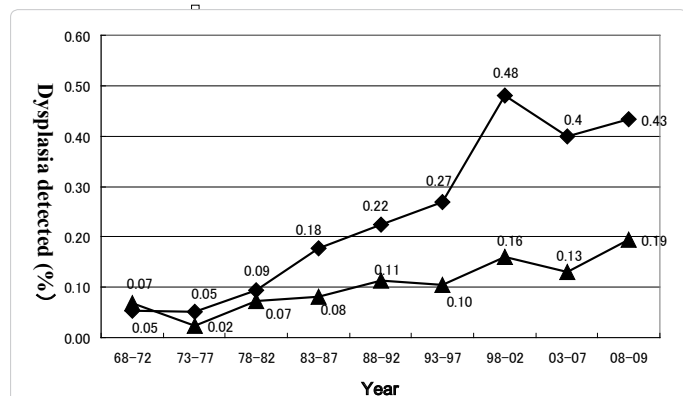


Figure 8: Chronological detection rates of dysplasia in the first visitors and the repeaters. Detection rates of the first visitors (—◆—) have been increasing sharply year by year; whereas the repeaters (—▲—) have been gradually. Note that the incidences are over 0.1% even in the repeaters.

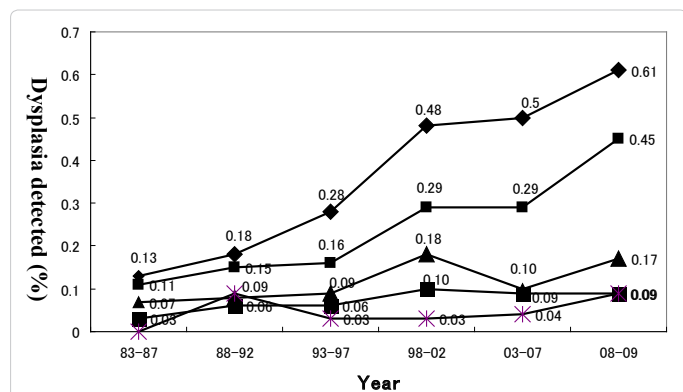


Figure 9: Chronological detection rates of dysplasia by age group. The detection rates of dysplasia in age 30s (—◆—) have been increasing year by year followed by those of age 40s (—■—), whereas those of age 50s (—▲—), age 60s (—■—) and age 70 and older (—×—) have been low and stationary.

Majority of dysplasia and cancer of the cervix were detected in age 30s and 40s. Therefore, we need more effort to advise younger women to have the screening program.

The mobile screening program using cervical cytology has been successful and early detection of preclinical lesions like dysplasia and carcinoma *in situ* can be realized if women receive the program constantly.

It is said that HPV testing is more sensitive to find cervical lesions than cervical cytology [18,19], and a combined cytology and HPV testing method [20] is expected to enhance the detectability of cervical lesions. In contrast, there is a trial that HPV testing alone is adopted for primary screening and cervical cytology is reserved as a way to determine whether PHV-positive women require additional follow-up or colposcopy [21]. HPV testing, however, may increase 6 times the incidence of women who have to receive the detailed exam [22]. Therefore, the usefulness of HPV testing for population screening program should remain for the future conclusion. The screening system using cervical cytology is classic but an effective method of screening for cancer of the cervix [1-14], and should be popularized more than that at present situation. For this purpose, it is plausible that the mobile screening shall be one of options of the screening system and gives a convenient chance to the women who live far away from permanent medical facilities.

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