EUROCHIP-II

FINAL SCIENTIFIC REPORT

ANNEX 08

REPORT OF

EUROCHIP-2 ACTION IN

ESTONIA

Impact of implementing a nationwide cervical cancer screening programme on population coverage by Pap-tests and on proportion of primarily detected cervical cancer in early stages

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Estonian National Institute for Health Development
on behalf of the partners who contributed to the project

Piret Veerus
Estonian National Institute for Health Development
Hiiu Str 42, 11619
Tallinn, Estonia
Tel: 0037 26593946
Fax: 0037 26593901
email: piret.veerus@tai.ee

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Executive summary

Background

The incidence of cervical cancer and mortality from cervical cancer are about four-fold higher in Estonia than in other Nordic countries. Both can be mainly explained by lack of nationwide organised cervical cancer screening programme.

A pilot study for organized cervical cancer screening programme was carried out in Estonia from 2003 to 2005. Organised cervical cancer screening was started throughout the country in 2006.

The objective of Eurochip-2 task force in Estonia was to provide knowledge for improving the population coverage by Pap-tests and for increasing the proportion of primarily diagnosed cervical cancer cases in early stages

Methods

Population data was retrieved from Statistics Estonia, data about performed Pap-smear tests within the screening programme from the Estonian Cancer Society responsible for carrying out the screening programme, data about Pap-smear tests outside the screening programme from the Estonian Health Insurance Fund, and data about cancer incidence and mortality from the Estonian Cancer Registry database.

Results

As organised screening was started only in 2006, the timeframe of the project does not permit to draw any determined conclusions about the impact of organised invitational cervical cancer screening on female population coverage with Pap-smear tests. The increasing number of cytological smears taken outside the screening programme suggests that the decision not to include women with a Pap-smear taken in last 12 months was not fully justified. The incidence of cervical cancer and the number of primarily diagnosed cervical cancer cases in early stages increased after implementation of the screening programme.

Conclusions

The factors influencing attendance in the cervical cancer screening programme in different age groups need to be studied further. A central cancer screening registry would improve data collection within the screening programme and enable to evaluate the effectiveness of the programme on a regular basis.

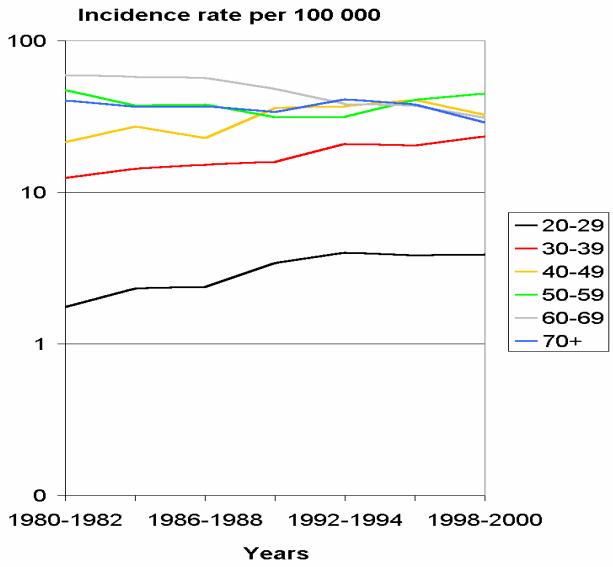
1. Introduction

1.1. Background

Estonia has a population of about 1.3 million (Statistics Estonia, 2007). Reliable cancer incidence data is available for Estonia since 1968 when the cancer registration became centralised. Reporting on cancer cases to the Estonian Cancer Registry (ECR) is mandatory for physicians and pathologists according to the Decree, issued by the Ministry of Social Affairs (the last version issued in 2001). All malignant neoplasms and *in situ* cancers are reportable to the ECR (Aareleid, Mägi 2003).

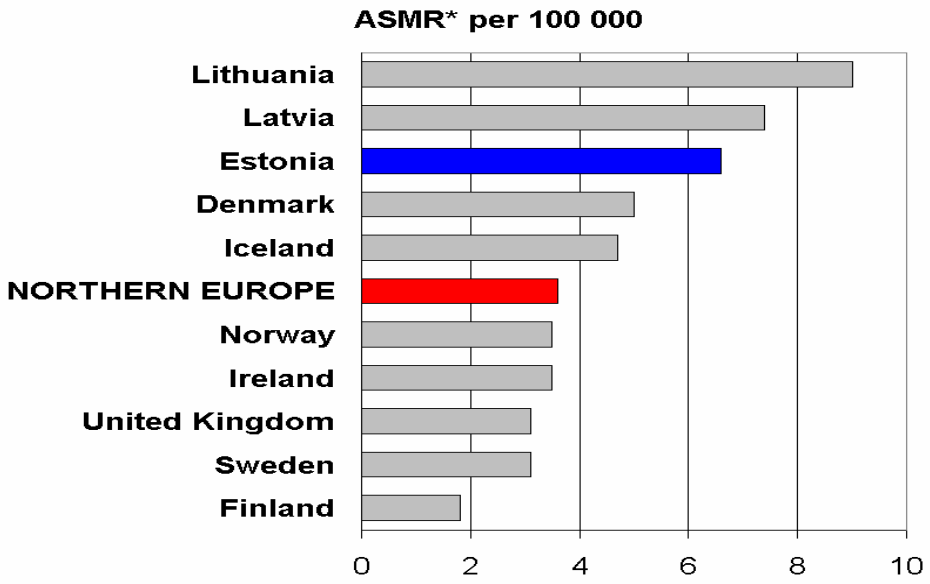
In the year 2000, the age standardised (world) incidence rate of cervical cancer was 15.5 per 100000 women-years in Estonia (Ferlay et al, 2004) with 162 new cervical cancer cases being detected. In 2004, the world age standardised incidence rate for cervical cancer was 17.5 per 100,000 women with 181 primarily detected cases. This is the second highest rate in the Northern Europe after Lithuania. The incidence and mortality rates are about four-fold higher in Estonia than those in the neighbouring Finland (Aareleid et al, 1993). A decreasing trend in the incidence of cervical cancer has been observed in Estonia between 1968 and the mid-1980s (Aareleid et al, 1993). Since that time, the total cervical cancer incidence became stable, while in ages 20-49 the rates almost doubled from 1980-1982 to 1998-2000 (Figure 1). On the other hand, a decline has continued among women over 60 (ECR unpublished data 2005).

Figure 1. Age-specific incidence of cervical cancer in Estonia, 1980-2000



The high incidence of invasive cervical cancer and high mortality from cervical cancer in Estonia can be mainly explained by lack of a nationwide organised cytological screening programme. It is especially obvious when comparing the time trends in Estonia with those in Finland (Aareleid et al, 1993), but also in other countries which have implemented effective screening (Nygard et al, 2002).

Figure 2. Mortality from cervical cancer in Northern Europe in 2000



1.2. Intervention

The pilot study of the cervical cancer screening was started in 2003. After five months of preliminary work, the Estonian Health Insurance Fund mailed 12 960 invitations to randomly selected women in the age group of 30 to 40 years with health insurance. Only 2808 of the invited women (21.7%) had a Pap-smear taken, and in 6.7% the results were abnormal. Five clinics and one lab participated in the project. Midwives participating in the screening programme were specially trained to take and fix the test, and to inform women about the test result by phone (Raud et al, 2006).

In 2004, all Estonian regions were included in the screening programme. Due to the lack of resources, no personal invitations were used. Women in the age group from 35 to 40 years were invited to cervical screening tests via media (advertisements in newspapers, flyers delivered by family practitioners, posters at working places, etc). Altogether 5264 women attended the programme, and for 5.6% the result of the Pap-test was abnormal. 19 clinics and seven labs participated in the programme. The decision to use seven labs instead of one central lab was based on the grounds of savings from transportation costs (Raud et al, 2006).

In 2005, a similar policy was continued. In addition, personal invitations to birth cohorts of 35- and 40-years-old women were mailed in six Estonian districts. The invitation included information how the test is taken and about the importance of screening in avoiding cervical cancer. Altogether, 6552 women participated in the programme, from among them 1239 were those who had had received the invitation to participate in the programme. For 6.7% of the tests the result was abnormal (Raud et al, 2006).

In 2005, National Cancer Strategy was prepared by a group of experts and presented to the Estonian Government early in 2006. It included the needs, structure, methodology, and budget for the nationwide cervical cancer screening programme as well as the need for establishing a centralized screening registry. According to the National Cancer Strategy, personal invitations to cervical cancer screening have to be mailed to all insured women in the age group of 30 to 59 years with a 5-year interval after a negative test. Women diagnosed with cervical cancer, without health insurance and having had a Pap-smear in past 12 months are excluded from the list of invitees. Cervical cancer screening is funded by the Estonian Health Insurance Fund, and the technical work (mailing of personal invitations and reminders, statistics on attendance rates at different clinics, test results, possible additional investigations) is carried out in cooperation with the Estonian Cancer Society.

In 2006, 30 123 invitations were mailed to insured women from birth cohorts 1956, 1958, 1961, 1966, and 1971 (the cohorts together being as big as 49 385). Women with a Pap-test within previous 12 months were excluded as well as women previously diagnosed with cervical cancer. Altogether, 6249 women had the Pap-smears taken at 19 clinics by specially educated midwives. Cytological investigations were performed in seven labs.

1.3. Objective of the Eurochip-2 task force in Estonia

The aim of the Eurochip-2 action in Estonia was to compare the coverage of the female population by Pap-tests and proportion of primarily detected cervical cancer cases in early stages before and after introducing a nationwide cancer screening programme.

The objective of this intervention is producing knowledge for improving the attendance rates to cervical screening and in a long run reduce cervical cancer incidence and mortality not only in Estonia but also in other Eastern European countries

The primary outcome measure was the proportion of the female population covered by Pap-tests. The secondary outcome measure was the proportion of primarily detected cervical cancer cases in different cancer stages. Both indicators were compared before and after the implementation of the nationwide cervical cancer screening programme.

2. Methods

2.1. Data collection and analysis

2.1.1. Population data

Numbers of women in different age groups and birth cohorts per region per year were obtained from Statistics Estonia.

2.1.2. Data about performed Pap-tests

2.1.2.1. Pap-tests within the cervical cancer screening programme

Individual data about numbers of Pap-smear tests taken in each birth cohort and region in 2006 within cervical cancer screening programme were obtained from the clinics participating in the screening programme and the results of the tests from the labs involved. The aggregated data resulting from the work of opportunistic screening in the years 2003 to 2005 was obtained from the Estonian Cancer Society.

2.1.2.2. Pap-tests outside cervical cancer screening programme

Estonian Health Insurance Fund database was used to obtain numbers of women in different birth cohorts and regions who had had a Pap-test in the period from 2004 to 2006, and numbers of women in different age groups in each region who had undergone a Pap-smear test in the year 2004, 2005, or 2006.

2.1.3. Cervical cancer cases

Average annual incidence per 100,000 women and numbers of primarily detected cervical cancer cases by stage in each age group was obtained from the Estonian Cancer Registry database. Estonian Cancer Registry database includes data about the incidence of cervical cancer for the period from 1968 to 2004, and data for the extent of cervical cancer at diagnosis for the period from 1995 to 2004.

2.2. Statistical analysis

Instead of advanced statistical modelling simple mathematical calculations were used to analyse the population coverage with Pap-smears tests and to compare the numbers of cervical cancer cases diagnosed at an early stage before and after implementation of the screening programme.

3. Results

3.1. Population coverage with Pap-smears

During the period from 2003 to 2005 the population coverage with Pap-smear tests within the target groups was from 3.0% to 14.4%. These data are not completely comparable as the invitational mode as well as target groups were different. The total number of women screened within the screening programme rose from 2808 to 6552 (Table 1).

The year 2006 was the first when invitations to attend cervical cancer screening were mailed to predefined birth cohorts all over Estonia. The number of screened women within the cervical cancer screening programme according to the report from the clinics was 9116, but the results of tests are known only for 6249 of them. Based on the data from clinics, the female population coverage with Pap-smear tests within the cervical cancer screening programme in 2006 was 18.5%. According to the calculations based on the data from labs, the coverage of the screened age cohorts in 2006 was 12.7%.

Table 1 Population coverage by Pap-smear tests in Estonia from 2003 to 2006 within the screening programme

Year / target group	Population	Invited	Screened	Coverage
2003 30 to 40 yrs	92770	12960	2808	3.0%
2004 35 to 40 yrs	45213	NA	5264	11.6%
2005 35 to 40 yrs	45462	NA	6552	14.4%
2006 35, 40, 45, 48, 50 yrs	49385	30123	6249	12.7%

In the year 2006, the population coverage with Pap-smear tests within the cervical cancer screening programme was 8.4 % in the cohort of women 35 years of age, 10.7% for the cohort of women 40 years of age, 13.7% for 45 years old and 18.6% for 48 years old. For women in the birth cohort of 50 years of age, the coverage decreased a little (11.3%). The overall attendance to screening for all birth cohorts was 12.1%. So the female population coverage with Pap-smear tests within the screening programme tended to increase with age except for the oldest birth cohort included in the programme (Table 2).

Table 2 Population coverage by Pap-smear tests in Estonia in different age groups in 2006

Age	Size of cohort	Invited	Screened	Coverage
35 yrs	9633	4993	813	8.4%
40 yrs	8914	4678	955	10.7%
45 yrs	10462	5666	1438	13.7%
48 yrs	10137	4678	1887	18.6%
50 yrs	10239	5546	1156	11.3%

Contrary to the results from the organised screening programme, the analysis of population coverage with Pap-smear tests outside the programme showed the decreasing trend of population coverage with tests in the older birth cohorts. According to data from 2004 to 2006, the population coverage with Pap-smears taken in last three years decreased from 86% in the age group from 31 to 36 years to 50% in the age group from 56 to 60 years (Table 3). The overall number of Pap-smear tests taken outside the cervical cancer screening programme increased from 111 252 in 2004 to 127 097 in 2006 (total increase in the number of Pap-smears taken outside the programme 114.2%).

Table 3 Population coverage with Pap-smear tests from 2004 to 2006 outside the organised cervical cancer screening programme

Age group	Average size of cohort	No screened in last 3 yrs	Coverage in last 3 yrs
31 to 35 yrs	47 123	40 451	85.8%
36 to 40 yrs	45 324	36 189	79.9%
41 to 45 yrs	50 138	36 977	73.8%
46 to 50 yrs	51 106	38 973	76.3%
51 to 55 yrs	49 318	31 063	63.0%
56 to 60 yrs	42 587	21 385	50.2%

3.2. Incidence of cervical cancer and stage at diagnosis

The last follow-up date in the Estonian Cancer Registry database for the analysis was December 31, 2004. Taking into account the time lag in the natural process of events, the first impact of cervical cancer screening pilot programme started in 2003 may be seen in the incidence of cervical cancer in 2004. The number of primarily detected cervical cancer cases increased in almost all age groups in 2004 (Table 4).

Table 4 Numbers of primarily diagnosed cervical cancer cases in Estonia from 2000 to 2004

Year	All ages	30 to 34 yrs	35 to 39 yrs	40 to 44 yrs	45 to 49 yrs	50 to 54 yrs	55 to 59 yrs	Crude rate*	ASR§
2000	164	8	14	10	24	20	22	22.2	15.6
2001	151	7	9	20	21	15	15	20.5	14.3
2002	154	6	15	21	18	13	18	21.0	15.0
2003	143	13	8	20	21	14	11	19.6	14.1
2004	181	14	13	24	31	18	13	24.9	17.5

* average annual incidence of cervical cancer per 100,000
§ world age-standardized incidence rate per 100,000 (1966)

It is too early to conclude if the proportion of cervical cancer cases diagnosed at an early (localized) stage has increased after implementation of the cervical cancer screening programme (Table 5), but the proportion of *in situ* carcinomas diagnosed within the screening programme is clearly increasing (Table 6).

Table 5 Primarily diagnosed cervical cancer cases by stage from 2000 to 2004*

Year	Loca-lised	Regional, nodes only	Neigh-bouring tissues	Meta-static	Dissemi-nated	Unstaged	Total
2000	93 57%	31 19%	7 4%	17 10%	11 7%	5 3%	164
2001	110 73%	16 11%	8 5%	12 8%	1 0.1%	4 3%	151
2002	106 69%	19 12%	8 5%	14 9%	5 3%	2 1%	154
2003	97 68%	20 14%	9 6%	13 9%	3 2%	1 1%	143
2004	126 70%	20 11%	10 6%	13 7%	4 2%	8 4%	181

* Due to rounding, all percentage totals may not sum up to one hundred

Table 6 Primarily detected cervical cancer cases within the screening programme from 2003 to 2006

Year	Invasive cervical cancer	*In situ* carcinomas	Total number of diagnosed cancers
2003	7 (100%)	-	7
2004	1 (25%)	3 (75%)	4
2005	3 (43%)	4 (57%)	7
2006	4 (27%)	11 (73%)	15

4. Discussion and conclusions

The primary objective of the Eurochip-2 task force in Estonia was to compare the coverage of the female population by Pap-tests before and after implementing the cervical cancer screening programme. During the period from 2003 to 2005, a pilot study of cervical cancer screening was started in Estonia. Organised screening was started only in 2006 after the National Cancer Strategy was launched by the Estonian Parliament. Organised screening seems to improve the population coverage with Pap-smear tests in older age groups. The timeframe does not allow doing definitive conclusions yet.

The secondary objective of the Eurochip-2 task force was to compare the proportion of cervical cancer cases detected at an early stage before and after the implementation of the screening programme. According to the data acquired within the screening programme, the proportion of *carcinoma in situ* diagnosed within the framework of screening activities is clearly increasing.

The incidence of cervical cancer increased in Estonia in 2004. No later data are available yet. Whether this is a chance finding or a result of the cervical cancer screening programme started in 2003 has to be clarified during further follow-up. We presume that the increasing incidence of cervical cancer may be due to the increased number of cases detected at an early stage due to screening activities.
More time is needed to analyse the impact of screening on cervical cancer mortality.

The impact of the invitational mode and other factors influencing population coverage with Pap-smear tests in different age groups need to be studied in the future. A survey among the target population is being planned to find out the reasons for non-attendance in the cervical cancer screening programme.

The increasing number of Pap-smear tests outside the programme is questioning the decision not to include women with a previous Pap-smear in past 12 months. There is no data about the test result and further follow-up of these women. A consensus conference with gynaecologists, oncologists, cytologists, researchers, and stakeholders is being planned. The decision not to include women without health insurance into the national cancer screening programme is debated.

There is an urgent need for establishing a central electronic screening registry to collect data on mailed invitations, reminders, test results, diagnostic and treatment procedures, etc. This would facilitate the data collection from different clinics and labs participating in the screening programme in the future.

5. References

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Appendix 1. Working group for the Eurochip-2 task force in Estonia

Name:	Position:	Organisation:	Contact information:
Piret Veerus	Epidemiologist, physician (Principal investigator)	National Institute for Health Development; Hiiu 44, 11619 Tallinn, Estonia	Tel: +3726593946; Fax: +3726593901; E-mail: piret.veerus@tai.ee
Tiiu Aareleid	Epidemiologist, physician	National Institute for Health Development; Hiiu 42, 11619 Tallinn, Estonia	E-mail: tiiu.aareleid@tai.ee
Auni Aasmaa	Coordinator of the cancer screening programme	Estonian Cancer Society	E-mail: auni.aasmaa@cancer.ee
Maie Thetloff	Data analyst	Estonian Health Insurance Fund	E-mail: maie.thetloff@haigekassa.ee
Terje Raud	Member of the cancer screening working group	Estonian Gynaecological Association	E-mail: terje.raud@kliinikum.ee
Mari Meren	Department of public health, specialist	Estonian Ministry of Social Affairs	E-mail: mari.meren@sm.ee
Margit Mägi	Physician, data manager	Estonian Cancer Registry; Hiiu 42, 11619 Tallinn, Estonia	E-mail: margit.magi@regionaalhaigla.ee

Appendix 2. Timetable of the activities within the Eurochip-2 task force in Estonia

Task	**Timetable**
Data collection	February 2006 - June 2007
Data analysis	July 2007 - October 2007
Report	October 2007 - November 2007