

Nationwide screening program for breast and cervical cancers in Hungary: special challenges, outcomes, and the role of the primary care provider

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Summary

Introduction: Breast and cervical cancers are both common malignancies in Hungarian women. The aim of this study was to evaluate the impact of nationwide screening programs on the incidence and mortality of breast and cervical cancers and to assess the role of primary care providers in this context. **Materials and Methods:** Published records from 2000-2011 on breast and cervical cancer screening activities in Hungary were reviewed. Previously unpublished data from the Hungarian National Cancer Registry were also included in this review. Hungarian outcomes were compared to international results. **Results:** A nationwide screening program for breast cancer was established in Hungary in 2001. A similar program for cervical cancer was subsequently initiated in 2003. As of 2009, 50% of the population at risk took advantage of breast cancer screening, while the exact participation rate for cervical cancer screening could not be established due to deficiencies of reporting by private gynecologists. The Health Visitors Cervical Screening Program, a new initiative within the context of the nationwide cervical screening program, based on involvement of local primary care providers, had encouraging results which substantially raised participation rates. However, deficiencies were identified regarding flow of information between service providers, patients, and family physicians. There was a slight reduction in the incidence of breast cancer and a more pronounced reduction in the incidence of cervical cancer, as well as a reduction in mortality for both breast and cervical cancers associated with these screening initiatives. **Conclusion:** The inclusion of primary care providers may benefit nationwide screening programs by raising participation rates in the target population.

Key words: Breast cancer; Cervical cancer; Hungary; Screening program; Public health; Primary care.

Introduction

The effectiveness of cancer treatment and the availability and outcome of therapeutic options are strongly dependent upon early diagnosis. At the population level, early detection influences national morbidity and mortality figures; at the individual level, this is ultimately a question of life and death. From a financial point of view, healthcare systems could also curb their expenses with early diagnosis provided the disease is detected early enough to widen the range of effective therapeutic options [1].

Since early diagnosis provides means to reduce mortality, it is desirable to increase the chance for early diagnosis by optimizing participation rates in organized screening programs. It is essential to first properly identify the population at risk and then to ensure that screening initiatives maximize accessibility for the entire population at risk in order that avoidable mortality is reduced [2].

Cancer screening options are generally determined by tumor location and histopathology, as well as available medical technology and financial resources. In the case of both cervical and breast cancers, detection is facilitated by easily accessible anatomy.

The most widely used screening test for breast cancer is mammography. Developments in imaging technology

in recent years have increased the reliability of this method. The US Preventive Services Task Force (USPSTF) guidelines recommend biannual screening mammography for all women aged 50-74 years. In contrast, the guidelines do not recommend breast self-examination as a screening test. The guidelines also state that there is insufficient evidence for the preference of either digital mammography or magnetic resonance imaging (MRI) over standard mammography [3].

Although mammography remains the standard and most widespread method of screening, some authors warn that due to a sizeable number of false positives, over-diagnosis is a common problem with this method [4].

Historically, the introduction of population-wide breast screening programs involving mammography has been associated with a decline in mortality. The actual percentage of mortality reduction varies from country to country. However, reports from several countries including Sweden, Australia, Canada, Denmark, Finland, Iceland, Italy, the Netherlands, Spain, and the United Kingdom confirm that a reduction in mortality uniformly occurred [5-9].

As in breast cancer, anatomy of cervical cancer makes this tumor particularly adept to screening. The most widely used screening method for cervical cancer is cytological examination (Pap smear) [10]. There are two different techniques for Pap smear: the traditional Pap

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smear technique, which is cheaper but yields a lower rate of satisfactory samples; and the more expensive liquid-based test [11]. As with breast cancer, the introduction of screening programs for cervical cancer was also associated with a decline in mortality. The reduction in mortality persisted decades after the introduction of screening. This phenomenon was observed in five Northern European countries including Denmark, Finland, Iceland, Norway, and Sweden where national screening programs have been present for decades [12].

The Hungarian College of Obstetrics and Gynecology guidelines recommend that cervical screening should always include a colposcopic examination simultaneously with the performance of a Pap smear. A Hungarian study from the 1990's revealed that false negative results on Pap smears could be significantly reduced with a combined Pap smear and colposcopic exam [13].

Materials and Methods

Institution of nationwide screening programs in Hungary

The Hungarian Ministry of Welfare initiated nationwide screening programs for prevention and early detection of different chronic diseases in 1997. These screening programs assumed active participation by primary care providers. Included in these nationwide screening programs were cancer-screening initiatives for both breast and cervical cancers [14].

Both the original guidelines by the Ministry of Welfare and their subsequent modifications detailed the expectations regarding the particulars of implementation for the screening programs. These included the identification of acceptable screening methods and appropriate target populations. A modest financial compensation was also offered to participating family physicians. At the same time only very limited information was provided on the practical means to ensure adequate participation by the target population.

The nationwide public health program was subsequently launched in 2001 by the Ministry of Health. This initiative was also supported by the Hungarian government. Its official designation was "Public Health Program for a Healthy Nation, 2001-2010". The main objectives set for this ambitious initiative included a decrease in mortality for almost all non-communicable chronic diseases. The target for mortality reduction in breast cancer was set at 20%; for cervical cancer it was 50% [15].

Breast cancer screening

A network of mammography stations, which also included mobile screening units, was established. This was accomplished by the National Public Health and Medical Officer Service (NPHMOS) which also received some aid from contracted private investors. The nationwide breast cancer screening program was primarily financed by the Health Insurance Fund organized by the Hungarian government.

The screening program was launched in 2002. All Hungarian women aged 45-65 years were eligible to participate in the screening program, which consisted of biannual mammography. The coordination division of the NPHMOS department of screening activities sent letters to all eligible women to invite them to participate in the screening program, each prospective participant in designated locations within her respective geographical area. In these letters, lists of participating mammography stations as well as participating family physicians were pro-

vided. The designated family physicians reported all participating subjects annually.

Cervical cancer screening

Cervical cancer screening at university clinics has been done since the 1950's. It was an *ad hoc* screening activity performed locally, targeting small groups of women, primarily those employed in nearby factories or offices. During the early 1970's, the Hungarian National Institute of Oncology organized mass cervical screenings for women involving both colposcopy and Pap smear. This so called "Cervixprogram" was started in 1981.

Subsequently in the 1990's, cervical cancer screening as well as various other health initiatives benefitted from financial support by the World Bank. Beginning in 2003, these World Bank-supported initiatives became part of the official public health program in Hungary.

With the initiation of the nationwide cervical screening program in 2003, all women aged 25-65 years became eligible for participation. The frequency of screening depended on the test result. If the initial result was negative, subsequent screening was performed every three years. In all cases, the screening method involved both Pap smear and colposcopic examination [14]. This combined screening method is unique to Hungary and differs from standard international guidelines in that colposcopic examination is not routinely included in the latter. It follows that the role of the gynecologist is markedly different in Hungary vs. most other countries; in Hungary the gynecologist is involved throughout the whole screening process, whereas his/her role is limited to the second phase of screening internationally and is mainly confined to the follow-up and treatment of positive cases [15].

Since the initial reports suggested an unacceptably low participation rate in the nationwide cervical cancer screening program, the Ministry of Health decided to launch a new model screening initiative in cooperation with NPHMOS. This new initiative under the designation "Health Visitors Cervical Screening Program" began in 2009 in the form of a pilot study [16, 17].

This latter initiative took advantage of the active participation of an existing community health nurse network in Hungary and required cooperation by community health nurses in reaching local residents in their designated areas.

Results

Breast cancer screening

Before the initiation of the nationwide screening program, only 27.4% of Hungarian women aged 45-64 years had received screening mammography. During the first phase of implementation (2002-2003), total percentage of women receiving mammograms increased to 61%. However, this percentage included all mammograms irrespective of whether they were actually performed as part of the nationwide program. It has been observed that the total number of mammograms performed outside the framework of the screening program rose substantially at this time period. At the same time, large local differences in mammography rates persisted among different Hungarian counties [18].

Compared to the first phase of screening (2002-2003), participation rates declined during the second phase (2004-2005). Total number of women screened as well as percentage participation during the second phase are presented

Table 1. — Outcomes of the second phase of the nationwide breast cancer screening program (2004-2005) [19].

Number of women	Total number (in 1,000 subjects)	Participation rate (%)
Contacted	1,255	
Participated	461	38.1
Contacted to follow-up	31.2	
Attended follow-up exam	26.8	86.0
Surgical procedures offered	2.22	
Surgeries performed	1.66	75.0

Table 2. — Participation rate in cervical screening before (2000-2002) and after (2003-2005) implementation of the nationwide cervical screening program, expressed as percentage of women receiving PAP smear testing using either the target population (age 45-64 years) or the entire Hungarian female population as reference [21].

Participation rate (%)	2000	2001	2002	2000-2002	2003	2004	2005	2003-2005
Hungarian female population	16.2	15.5	15.4	31.2	16.3	16.4	16.8	32.8
Target population	23.3	22.1	22.0	48.9	23.4	23.6	24.3	52.6

Table 3. — Outcomes of the “Health visitors” screening program for cervical cancer (2009-2011) [16, 17].

Year	Screening campaign season (months per year)	Health visitors (n)	Subjects contacted (n)	Subjects screened (n)	Participation rate (%)	Positive result on screening (n)
2009	4.5	110	30,717	4,764	15.8	23
2010	4	213	45,899	5,117	11.1	30
2011	1	181	25,258	3,771	14.9	15

in Table 1 [19]. As it is demonstrated in Table 1, participation rates of follow-up cases after positive or suspicious cytological findings were substantially higher. The ratio of women undergoing surgery may also have been higher than reported due to under-reporting from non-participating health facilities. The nadir in participation rates (36.7%) was reached in 2005. Subsequently, participation rates approached half the population (Figure 1) [20].

Cervical cancer screening

Several Hungarian studies analyzed the changes in outcomes before vs. after the implementation of the nationwide cervical cancer screening program [21-22]. These reports confirm that a total of 1,667,618 women were screened in the time period before implementation (2000-2002). This number increased to 1,749,498 after the implementation of nationwide screening (2003-2005). According to the Health Insurance Fund database, this amounts to 820,000-890,000 Pap smears performed annually, considering that some women required follow-up testing. These figures translate into a 48.9% participation rate within the target population before implementation of the program vs. 52.6% following implementation (an increase of 3.7%).²¹ Relative participation rates before and after implementation are shown in Table 2.

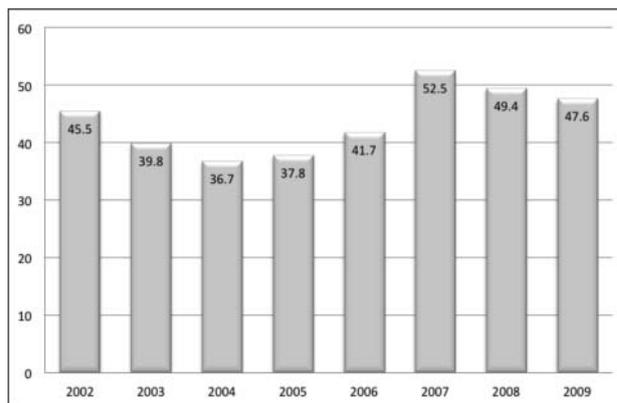


Figure 1. — Percent participation in the nationwide breast cancer screening program (2002-2009) [20].

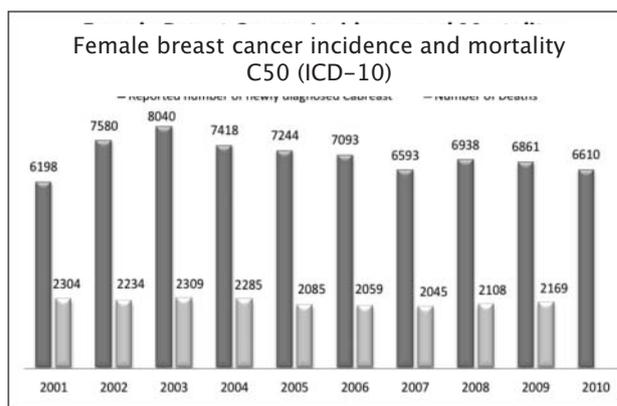


Figure 2. — Incidence and mortality rates of female breast cancer in Hungary, between (2001-2010) [24-26].

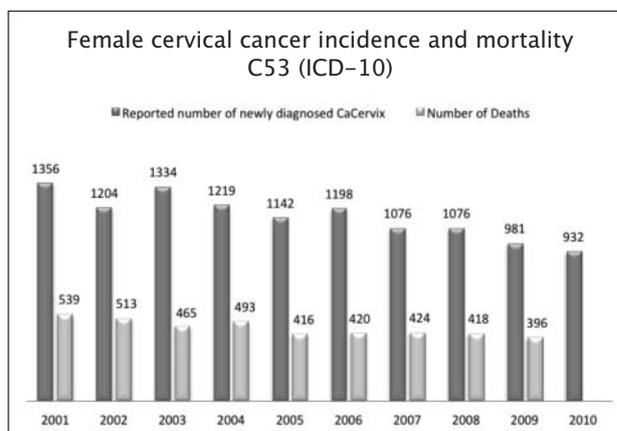


Figure 3. — Incidence and mortality rates of female cervical cancer in Hungary, between (2001-2010) [24-26].

Table 3 shows the results of the *Health Visitors Cervical Screening Program* initiated in 2009. The success of this initiative is reflected by the fact that a two to three times greater number of women could be screened, as compared

to the results of the organized nationwide screening program.

Although the nationwide cervical cancer screening initiative specifically aimed at a higher participation rate within the framework of the program, most Pap smears were actually performed outside this network: in 2006 the ratio of Pap smears performed by non-participating private healthcare providers vs those involved in the nationwide screening program amounted to 20:1 [22].

Incidence and mortality of breast and cervical cancers

The increment in cumulative probability for both breast and cervical cancer deaths for women in Hungary aged 15-79 years declined between 1980 and 2010 [23]. Although these results are encouraging, Hungarian women still have a relatively high mortality risk for breast and cervical cancer. Recent reports indicate that in the year 2009, total mortality figures for Hungarian women were 2,169 for breast cancer and 396 for cervical cancer [24].

The incidence of breast cancer measured through the use of diagnostic code C50 of the International Classification of Diseases (ICD-10) WHO coding system [24-26] in Hungary increased in the time period between 2001-2010 from a total of 6,198 to 6,610 cases (a 6.6% increase) [25]. The number of new diagnoses peaked in 2003, and subsequently showed a small but steady decline. Annual mortality rates declined for both cervical and breast cancers in this time period. Breast cancer mortality decreased from 2,304 in 2001 to 2,169 in 2009 (a decline of 5.86%). The respective figures for cervical cancer were 539 in 2001 vs 396 in 2009 (a decline of 26.53%). Taking the decade as a whole, the average annual mortality rate for cervical cancer (approximately 400 deaths per year) remains relatively high [24].

Incidence and mortality rates for breast and cervical cancers in Hungary in the time period between 2001 and 2010 are shown in Figures 2 and 3.

Discussion

What lies behind the low effectiveness of screening programs? The answer is complex and involves financial, administrative, social, educational, medical, and epidemiological factors. Economically, the problem could be described as a consequence of diminishing financial resources put aside for national public health programs, partly through increased bureaucracy and a related increase in administrative expenses. There are also substantial regional differences in how effective local administrative structures are in ensuring reliable flow of information and effective communication between screening coordinators and family physicians.

An additional bias is introduced by the tendency for wealthier and more health-conscious Hungarian women to attend private gynecology clinics not associated with the nationwide screening program. Considering the fact that deficiencies in reporting screening activities have been identified in private clinics, precision of data regarding the number of women actually screened is not always reliable. It is reason-

able to assume that the actual number of women screened for both breast and cervical cancers could be substantially higher than actually reported.

As far as outcomes of the screening tests, Pap smear results performed by private gynecologists are not always reported to the *Health Insurance Fund*. Although all gynecological examinations performed by State insurance funded gynecologists are reported to the Fund, it is not always clear whether the examination was associated with a referral from the nationwide screening program vs an acute compliant. Ambiguity is also introduced by the fact that follow-up is not restricted to a standard time frame. In addition, there were cases where follow-up involved more frequent testing than standard practice. [27].

One of the key problems with nationwide screening programs is that participation rates remain unacceptably low. Persistently high mortality rates for breast and cervical cancers may partially reflect this issue. Some experts suggest that the participation of primary health care providers in organized screening activities may improve local accessibility to these programs, thus increasing participation rates [22].

The health visitor network has an important role in the Hungarian primary care. The health visitors are community health nurses in Hungary. These nurses work in cooperation with family pediatricians and family physicians. Their primary role is to provide care for women before, during, and after pregnancy, as well as the follow-up of children through adolescence. In rural areas, the health visitor network assumes an extended role involving midwife services under certain circumstances. The present results indicate that participation rates for cervical screening were two to three times higher when the network of health visitors actively participated. This suggests that participation rates could be further improved if cervical screening was included among the primary tasks of these primary care providers, especially if they also would receive financial incentives for this activity.

Several Hungarian authors propose that primary care providers should have an essential role in raising oncological awareness [28-29]. Advanced cases of cervical cancer due to late diagnosis is a particular problem among low-educated women in poor, rural areas. Many of these women never take part in any organized cervical screening [16].

The health visitor network may be particularly helpful in reaching this rural, high-risk population of women. It is therefore especially unfortunate that an increasing number of health visitors have been lost to the nationwide screening program due to increasing workload and related burnout. In 2011, fewer health visitors were trained than in previous years and seasonal campaigns dedicated to cervical screening were also shortened due to lack of resources [17].

It is the authors' impression that screening programs were not sufficiently covered in the media. Also, participation in organized screening events may not have been sufficiently promoted by family physicians, perhaps because of lack of financial incentives. Studies also suggest that patients may not have received adequate information and proper medical advice on screening activities. Lack of information may have adversely affected participation rates and may have

increased risk for adverse psychological events in those who participated [30]. While a national screening program would provide an optimal setting for the provision of medical advice, this mechanism is thwarted by the tendency for a majority of Hungarian women to ignore invitation to organized screening in favor of engaging the services of a private physician. Perhaps this tendency could be partially remedied through improved education regarding the nationwide program [31].

Hungarian guidelines regarding cervical cancer screening are uniquely different from those in similar programs in other countries. The primary difference lies in the Hungarian guidelines requiring a simultaneous colposcopic examination in addition to the standard Pap smear. Colposcopic exam without a Pap smear is not recommended for population screening, although having high sensitivity, its specificity is unacceptably low [32]. As already mentioned, Hungarian studies suggest a benefit from the combined use of the two diagnostic methods [13].

There are international differences in age recommendations for both breast and cervical cancer screening. For instance, the ability of mammography to save lives seems to depend on which age groups are included. Certain age groups may minimally benefit with only one to three weeks of average lifetime gain [33].

Given the relatively recent initiation of the nationwide programs, so far there is insufficient data for proper epidemiological analysis of screening-related outcomes. International data indicate that both incidence and mortality tend to decrease several years after the implementation of cancer screening programs. Clinical experience suggests that incidence for a disease may initially increase after initiation of a screening program due to improved detection of early-stage disease. Mortality however, provided that appropriate therapeutic options are employed, tends to gradually decline. In general, morbidity and mortality data may not run parallel because, unlike morbidity, mortality is reported later, usually not in the year the diagnosis was actually made.

Participation rates in the nationwide screening programs were low. In the first three years of implementation, only 52.6% of the population at risk was screened for cervical cancer and 53.4% for breast cancer [21]. These results are highly unsatisfactory, especially when compared to those of similar screening programs in Western and Northern European countries. For instance, 75% of women were screened for breast cancer, and 80% for cervical cancer in the United Kingdom around the same time period, while in Finland 87% were screened for breast cancer and 69% for cervical cancer in 2005 [34].

Conclusion

Nationwide cancer screening programs could benefit from a more pronounced involvement of primary care providers. Structural changes may be warranted within the Hungarian healthcare system to facilitate involvement of primary care providers in breast and cervical cancer screening. This may require more focused efforts by relevant policy makers.

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