The organisation and results of first screening round of the Hungarian nationwide organised breast cancer screening programme

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Background: The aim of this paper is to give an overview of organisational issues of the Hungarian nationwide organised breast cancer screening programme and to provide the results of the first screening round of the programme for the years 2002–2003.

Patients and methods: Data were derived from the financial database of the National Health Insurance Fund Administration covering the period 2000–2003. Women who underwent mammography screening were included into the study.

Results: Uptake of the organised screening programme in 2002–2003 was 45.09%, while the recall rate was 7.23%. Malignant cases represented 65.38% of total surgeries and 0.36% of total number of screened women yielding a cancer detection rate 3.6 per 1000 screened women. Malignant cases of 10.78% were identified as ductal carcinoma in situ, while 89.22% was invasive cancer. Benign to malignant ratio was 0.54 : 1.

Conclusion: There is therefore an urgent need to closely monitor performance and to review programme policies and procedures with the aim of increasing both the participation rate and the proportion of women eligible to attend screening.

Key words: breast cancer, breast neoplasms, Hungary, mammography, mass screening, screening

introduction

The first scientific evidences from large randomised controlled trials reported a significant decrease of breast cancer mortality of women with mammography screening. The Swedish two counties (Kopparberg and Östergötland) trial was published in 1985 [1] and reported that mortality from breast cancer fell by 31% after 7-years follow-up of women who had been aged 40–74 at the beginning of the trial. These results confirmed the findings of Shapiro’s earlier trial [2]. Other studies also underlined the role of mammography screening in the reduction of breast cancer mortality [3–5]. Many countries initiated national or regional screening programmes for breast cancer on the basis of the results of these trials (e.g. Sweden, Finland, UK, Netherlands and Norway). Although breast cancer mortality is declining in young women in the 10 new European Union Member States [6], it still represents a large epidemiological and social burden [7, 8]. The above average breast cancer mortality in Hungary is compared with other European countries, some of which have only recently initiated breast cancer screening programmes; and the above average breast cancer mortality in Hungary among older women underlines the role that mammography screening could play in reducing breast cancer mortality in Hungary.

In 1995 a new pilot programme was introduced in five Hungarian counties for cancer screening programmes. The overall purpose of this programme was to promote the establishment of effective and efficient screening programmes by means of adapting the internationally agreed principles of organised screening to the needs and opportunities in Hungary. After evaluating the experiences of the pilot projects, organised, nationwide screening for breast cancer with mammography was introduced in Hungary in January 2002 [9, 10].

patients and methods

organisation and structure of the Hungarian National Breast Cancer Screening Programme

The Hungarian Breast Cancer Screening Programme covers women aged 45–65 years. The screening interval is 2 years, and two-view mammograms
and double readings are standard. The personal data of women eligible for screening are provided by the central database of the Hungarian National Health Insurance Fund Administration (OEP). Women are eligible for screening if they are aged between 45–65 years, did not have mammography examination in the previous 2 years and did not undergo surgical treatment (mastectomy) because of breast cancer. The OEP is the only health insurance agency in Hungary and responsible for financing of health care services throughout the country. In the central database of the OEP, each inhabitant has a unique personal Social Security Identification Number (TAI) comprising nine digits. The OEP sends the data (name, address, TAI) of the women to the Screening Coordinating Centre of the National Public Health and Medical Officers Service (ÁNTSZ).

Before the start of the screening programme, the ÁNTSZ announced a call for application for mammography centres (screening unit) to take part in the breast screening programme. Most of the applicants were from traditional radiology departments and only a few new providers. Finally at the beginning of the programme in 2002, 37 mammography centres (34 public and three private providers) got qualification for participation in the nationwide programme. The screening has been carried out in stationary screening units of the mammography centres and there was only one mobile unit (screening bus) in 2005. The screening units belong to hospitals or outpatient health care centres owned by the local authorities. The main responsibility of screening units includes invitation of women for screening, carrying out of mammography screening, management of further diagnostic assessment and surgical procedure if necessary.

The screening units involve only one site at which mammography is carried out. The screening unit includes two radiologists, two radiographers (assistants) and two administrators and it is expected to examine on average 100–120 women daily. The minimum annual requirement towards screening units is 10 000 examinations per year. The readers must have a qualification in radiology with further special practical experience with mammography reading.

The mammography screening includes both a mediolateral oblique and a craniocaudal X-ray (two views) despite the early British and Swedish practice [11]. All mammograms are independently reviewed by two radiologists and only in case of their consensus can a woman be referred for further diagnostic assessment, which takes place also in the screening units. The radiologists of the screening unit are responsible for the assessment, including ultrasound examination, needle biopsy, cytology–histology, etc. If radiologists feel necessary, they can organise a multidisciplinary conference attended by breast surgeon, pathologist and oncoterapeutist. Thus, the women will have a diagnosis before surgery. The further treatment (operation and/or adjuvant therapy), if necessary, is provided by the regional oncology centres. According to the current practice, a postoperative multidisciplinary conference is arranged rarely.

The mammography centres (screening units) have to submit two administrative reports. The first report of the centre, as a health care provider, goes to the central database of the OEP containing routinely collected financial data. The detailed description of the Hungarian health care system is described elsewhere [12]. The second report of the centre, as a mammography screening unit, goes to the central database of the Screening Coordinating Centre of the ÁNTSZ containing specific quality control data for breast screening. Currently (2006), the database of the ÁNTSZ is still under development, therefore only limited information is available from this database (Figure 1).

The cost of mammography examination (both the mediolateral oblique and a craniocaudal views) and travelling cost of women are fully reimbursed by the OEP. The current (September 2006) reimbursement rate of the mammography examination is ~3950 Hungarian Forint (~15.8 Euro or 18.8 USD).

**communication to and recruitment of women**

The Screening Coordinating Centre of the ÁNTSZ distributes the name and address of women to the mammography centres, which are responsible for a certain geographical area. In each of the 19 county offices of the ÁNTSZ, there is a screening coordinator responsible for the local (county level) management of the screening programme. His or her authority includes communication with screening units in their county, strengthening the cooperation between screening units and the regional oncology centres, help with finding lost women (e.g. invitation letter is returned because of the woman moved away), administration of quality control data reported by the screening units and monitoring the performance indicators at county level. The screening coordinators are responsible to the chief medical officer of their county.

After receiving the name and address of women, mammography centres will send the personal invitation letter to women living in their catchment area including an appointment for a set time and place. Invited women can change the appointment via phone call and can arrange a new appointment. Women failing to respond for the invitation are sent a reminder after 8–10 weeks.

The role of media campaign (television, radio, daily newspapers and weekly magazines) has been negligible, while the use of mailed educational materials was occasional at the discretion and possibilities of local (county level) coordination.

**data and methods**

The data on quality control (including uptake) of mammography screening (Tables 1 and 2) were derived from the Screening Coordinating Centre of the ÁNTSZ and on the basis of the quality reports of mammography centres. The detailed data for participation (including screening, diagnostic and total coverage) were derived from the financial database of the OEP covering the period of 2000–2003 (Figure 3). In order to improve the appropriateness of different attendance rate indicators, we calculated both the uptake and the coverage for determining the participation rate of women.

Figure 2 shows the definitions of the formulas used for calculation of different indicators. The uptake of the programme means the percentage of women who, having been sent an invitation for screening, attend a screening unit and undergo mammography in response to that invitation, i.e. number of women aged 45–65 having screening mammography after invitation divided by the number of women aged 45–65 eligible for mammography.
screening. A woman is eligible for mammography screening if she is between 45 and 65, did not have any mammography examination in the previous 2 years and did not have breast cancer or mastectomy earlier. Uptake is sometimes referred to as ‘acceptance’.

We defined coverage as the proportion of women residents who have had a mammogram at least once in the previous 2 years. We calculated screening, diagnostic and total coverage. The screening coverage is calculated by dividing the number of women aged 45–65 having screening mammography within the organised breast cancer screening programme by the total number of women aged 45–65 resident. Due to the fact that even after the introduction of the organised screening programme the number of diagnostic mammograms remained high (the main reasons are: patients’ complaints, GP referrals, or women just simply wanting a mammography examination without any complaints). Diagnostic mammography refers to mammography done outside of the organized screening programme, without invitation letter. Therefore it is important to calculate the diagnostic (opportunistic) coverage. The diagnostic (opportunistic) coverage is calculated by dividing the number of women aged 45–65 having diagnostic (opportunistic) mammography outside the organised breast cancer screening programme by the total number of women aged 45–65 resident. Finally, we combined the screening and diagnostic (opportunistic) coverage to get the total coverage of women with mammography. Thus, the total coverage is calculated by dividing the number of women aged 45–65 having either screening or diagnostic (opportunistic) mammography within or outside of the organised breast cancer screening programme by the total number of women aged 45–65 resident.

We carried out the detailed analysis for the years 2000–2001, without nationwide organised screening programme, as a reference value and for the years 2002–2003 after the implementation of nationwide organised breast cancer screening programme.

We aimed to provide data on the usual performance indicators [13, 14] of mammography screening.

**Table 1.** Detailed performance and quality indicators of the first (initial) screening round (2002–2003) of the Hungarian organised breast cancer screening programme

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Hungary 45–65 years 2002/2003</th>
<th>EU guideline (acceptable/desirable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of women aged 45–65</td>
<td>1 533 971</td>
<td></td>
</tr>
<tr>
<td>Target population (women aged 45–65 eligible for screening)</td>
<td>1 178 112</td>
<td></td>
</tr>
<tr>
<td>Women screened</td>
<td>531 244</td>
<td>45.1% &gt;70%/75%</td>
</tr>
<tr>
<td>% (uptake or participation rate, compared with target population)</td>
<td>38 396</td>
<td>7.2% &lt;7%/&lt;5%</td>
</tr>
<tr>
<td>Women screened after recall</td>
<td>32 739</td>
<td>85.3%</td>
</tr>
<tr>
<td>Women referred for surgery</td>
<td>3901</td>
<td>0.7%</td>
</tr>
<tr>
<td>Number of women having surgery</td>
<td>2938</td>
<td>75.3%</td>
</tr>
<tr>
<td>% (compared with women screened)</td>
<td>1034</td>
<td>0.2%</td>
</tr>
<tr>
<td>Benign cases</td>
<td>1921</td>
<td>4.0%</td>
</tr>
<tr>
<td>% of screened women</td>
<td>65.4%</td>
<td></td>
</tr>
<tr>
<td>% of total surgeries</td>
<td>35.2%</td>
<td></td>
</tr>
<tr>
<td>Malignant cases</td>
<td>207</td>
<td>10.8% 10%/&gt;15%</td>
</tr>
<tr>
<td>% of screened women (cancer detection rate)</td>
<td>1714 (89.2%) 90%/80%–90%</td>
<td></td>
</tr>
<tr>
<td>% of total surgeries</td>
<td>142</td>
<td></td>
</tr>
<tr>
<td>DCIS</td>
<td>869</td>
<td></td>
</tr>
<tr>
<td>% of malignant cases</td>
<td>50.7% 50%/&gt;50%</td>
<td></td>
</tr>
<tr>
<td>Invasive cancers</td>
<td>767</td>
<td></td>
</tr>
<tr>
<td>% of invasive cancers</td>
<td>44.7%</td>
<td></td>
</tr>
<tr>
<td>Unknown size</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>% of invasive cancers</td>
<td>4.6%</td>
<td></td>
</tr>
</tbody>
</table>

EU, European Union; DCIS, ductal carcinoma in situ.

**Table 2.** Distribution of invasive cases according to grade and size (2002–2003)

<table>
<thead>
<tr>
<th>Grade</th>
<th>1–9 mm</th>
<th>10–14 mm</th>
<th>15–19 mm</th>
<th>Over 20 mm</th>
<th>Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 1</td>
<td>157</td>
<td>240</td>
<td>198</td>
<td>170</td>
<td>–</td>
<td>765</td>
</tr>
<tr>
<td>Grade 2</td>
<td>68</td>
<td>106</td>
<td>102</td>
<td>140</td>
<td>–</td>
<td>416</td>
</tr>
<tr>
<td>Grade 3</td>
<td>15</td>
<td>21</td>
<td>40</td>
<td>66</td>
<td>–</td>
<td>142</td>
</tr>
<tr>
<td>Unknown</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>391</td>
<td>391</td>
<td>391</td>
</tr>
<tr>
<td>Total</td>
<td>240</td>
<td>367</td>
<td>340</td>
<td>376</td>
<td>391</td>
<td>1714</td>
</tr>
</tbody>
</table>

–, no data available.

**results**

Figure 3 presents the screening, diagnostic and total coverage (screening + diagnostic) of the Hungarian organised breast cancer screening programme. The total coverage more than doubled from 25.9% in 2000–2001 without a nationwide programme to 53.5% in 2002–2003 with an organised nationwide programme. Most of this increase can be attributed to the higher screening coverage which moved from 7.3% in 2000–2001 to 33.9% in 2002–2003 while the diagnostic (opportunistic) coverage did not show a significant increase (from 19.7% to 22.0%).

Table 1 shows the detailed performance and quality indicators of the first screening round (2002–2003) of the Hungarian organised breast cancer screening programme. Total number of women aged 45–65 was 1 533 971 in 2002–2003 and 1 178 112 of
them, as a target population eligible for screening, received a personal invitation for mammography screening. A total of 531,244 women responded to the invitation and underwent the screening resulting in a 45.1% uptake for the first 2-year circle 2002–2003.

We realised a 7.2% recall rate and 85.3% of recalled women visited the mammography centres. Altogether, 3901 women were referred for surgery but finally only 2938 women had surgery; among them 1034 benign and 1921 malignant cases were detected. The malignant cases represented 65.4% of total surgeries and 0.36% of total number of screened women yielding a cancer detection rate of 3.6 per 1000 screened women. From the 1921 malignant cancer cases, 10.8% (207 cases) were identified as ductal carcinoma in situ (DCIS) while 89.2% (1714 cases) were invasive cancer.

Tumour size of invasive cancers was reported over or below 15 mm. The proportion of invasive cases <15 mm was 50.7% (869 cases), while the proportion of invasive cases ≥15 mm was 44.75% (767 cases) and 4.55% (78 cases) was with unknown size. The benign cases represented 35.19% of total surgeries and 0.19% of total number of screened women. The benign to malignant biopsy ratio was 0.54 : 1.

Table 2 shows a further distribution of invasive cases according to grade and size on the one hand and according to axillary status on the other hand. In many cases, we do not have reliable data simultaneously on grade and size or axillary status.

**Conclusion**

**Limitations of the Hungarian breast screening programme**

In order to get a detailed database containing diagnostic, clinical and pathological information, we must set up a comprehensive screening database for the monitoring and quality assurance of the breast screening programme. Currently, in the organisation and monitoring of the Hungarian breast cancer screening programme, the OEP has an important role in the selection of women eligible for screening, in the financing of mammography screening and in the follow-up and monitoring of the programme. These data are collected at nationwide level with a primary goal of financial reimbursement of providers’ costs, but in the lack of systematic database of the Screening Coordinating Centre of the ÁNTEZ we should rely on routinely collected financial data. Some problems related to data collection were reported in the early phase of the Finnish breast screening programme [15].

Because of the large number of missing data, sometimes we cannot have a clear picture on the whole programme (Table 2). The lack of reliable data on the grade, size and axillary status of screened women represents a weak point of the Hungarian programme. Due to the lack of data on interval carcinomas, we are not able to calculate the sensitivity of the programme. These problems related to data collection are important experiences of our programme and might be of significant importance for countries with similar social and economic background.

The coverage also needs further elucidation. It may be that the exceptionally high proportion of the target population deemed ineligible to attend screening simply results from the current programme policy of restricting screening to women who have not had a diagnostic mammogram in the past 2 years or underwent mastectomy. Such a policy, though counterproductive, explains the fact that the overall level of diagnostic mammography actually increased after introduction of the national screening programme because many women who had previously used diagnostic mammography as a substitute for the not yet available screening programme would not be allowed to attend the first 2-year round of screening. These women would therefore have no other choice than to continue with diagnostic mammography as a substitute for organised screening. A new policy which could enable women to easily switch from diagnostic mammography to the organised screening programme would require only 12, rather than 24 months abstinence from mammography before a screening examination. Such a policy should lead to a steady decrease, rather than an increase in the number of women using diagnostic mammography as a (inadequate) substitute for organised screening.

We must emphasise the extremely limited scope of performance parameters for which national data are currently available. The quality management system of the Hungarian organised breast cancer screening programme is on the basis of the previous recommendations of the European Guideline [16]. Despite every effort made to increase the appropriateness of screening units’ reports, however, there are lack of several data, which leads to an incomplete database. As we can see in Table 3, we do not have data on one-third of invasive cases according to axillary status.

**International comparison and conclusion**

The 45.1% uptake of the initial screening round of the Hungarian breast screening programme is lower than reported

<table>
<thead>
<tr>
<th>Grade</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>pN0</td>
<td>529</td>
</tr>
<tr>
<td>pN1–2</td>
<td>449</td>
</tr>
<tr>
<td>pN3</td>
<td>146</td>
</tr>
<tr>
<td>Unknown</td>
<td>590</td>
</tr>
<tr>
<td>Total</td>
<td>1714</td>
</tr>
</tbody>
</table>

**Table 3. Distribution of invasive cases according to axillary status (2002–2003)**
in many other countries: 78.5% in the The Netherlands [17], 79.5% in Norway [18] 9% in Finland [19] and 89% in the Swedish trials [20]. But on the other hand the Hungarian uptake is similar to the Swiss pilot’s values of 42%–45% [21], a bit higher than the 36.7% of the French pilot programme [22], 36% in Luxembourg [23]. In order to reach the 70% uptake recommended by the European Guideline and to realise the expected benefits of the programme as a significant mortality reduction up to 30% [1], we have to improve the uptake of the programme.

The recall for assessment was 7.2% in the Hungarian programme, which is an average value on the series of screening programmes varying between 1.3%–18.4% reported by Lynge et al. [13]. The cancer detection rate of 0.36% or 3.6 per 1000 screened women was similar to the 0.37% value of Finland belonging to the lowest values of screening programmes analysed by Lynge et al. [13]. The detection rate of the prevalence (first) screen in Hungary is a bit lower than the observed (5.4) and expected minimum (4.1) values of the UK Breast Screening Programme [24]. Of the tumours, 50.7% were <15 mm in diameter, comparable to the 53.1% of the Norwegian [18] and 51% of the English programme [25]. DCIS represented 10.8% of all screening-detected cancers similarly to the Italian values 11% [26].

We can conclude that many of the performance indicators of the Hungarian breast cancer screening programme are still not available, and many of them did not meet the quality standard recommendations of the European Union [27]. And we have to acknowledge that the European standards are much more comprehensive than the few parameters currently available from the Hungarian national programme.

There is an urgent need to review and revise programme policy in order to increase participation and to reduce the large number of women in the target age group who currently are not eligible to attend screening. There also seems to be an urgent need to improve the information system used to monitor programme performance.

Finally, we would like to emphasise that according to our best knowledge, in the Central and Eastern region of Europe and the European Union, the Hungarian nationwide organised breast cancer screening programme represents one of the earliest nationwide breast screening programmes. Taking into consideration the health educational and cultural gap between the ‘old’ and ‘new’ Member States of the European Union, one might assume that it will be difficult to realise the potential benefits of the organised breast screening programme, therefore we have to put more effort into the organisational issues of screening.

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References