Prevalence of self-reported screening mammography and impact on breast cancer mortality in Austria

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Summary

Mammography – Screening in Österreich: Prävalenz und Auswirkungen auf die Brustkrebssterblichkeit


Key words: Breast cancer, screening, mortality, stage distribution, Austria

Introduction

In various analyses it has been clearly demonstrated that the use of regular screening mammography reduces breast cancer mortality in women aged 50 years and older [6, 10–12]. Mammography for early detection of breast cancer in primarily asymptomatic women in Austria is available on demand free of charge within the annual health check up, which has been recommended to men and women since 1974 and is funded by the General Health Insurance Plan (compulsory insurance system in Austria). First screening guidelines, targeting risk groups and not directly supporting mass screening, were published by the Austrian Health Authorities in 1977 [1]. In a revised version published in 1980 [2] mass screening was explicitly mentioned. It was recommended that women aged 35–49 years obtain an initial screening mammogram and women aged 50 years or older a regular screening
mammogram every 1 to 2 years, as well as women aged 40–49 years with a family history of breast cancer or other known risk factors. The Austrian Cancer Society and other professional organizations recommend regular screening every 1 to 2 years for women aged 40–49 years and annual screening for women aged 50 years or older. Over the past two decades medical authorities, various health organizations and the mass media have regularly been informing women about screening mammography and this service has been offered free of charge ever since. The type of screening is opportunistic. An organized population-based screening programme has never been established in Austria and screening activities have never been monitored. Hence, an evaluation of the effectiveness of breast cancer screening based on individual data is not feasible in Austria.

The end point of screening is a reduction of breast cancer mortality. This should be anticipated by changes in the stage distribution and in a reduction of the absolute incidence of advanced cancers [3]. The evaluation of population-based data is less sensitive, however these data are readily available in official statistics and, additionally, can be collected in population-based cross-sectional studies.

In this paper we report for the first time on the prevalence of self-reported participation and frequency of screening mammography in women aged 40–79 years, the age range that has been targeted for mass screening since 1980. In a further step, by analysing the trends of mortality and tumor stage at the time of diagnosis in the age groups corresponding to the age groups surveyed in the cross-sectional study, we evaluate whether opportunistic screening has a positive effect on mortality in Austria.

Materials and methods
Cross sectional study

The analysed data were extracted from a population-based cross-sectional study conducted in September 1995, which covered all parts of Austria (population: 7.98 million; 6.57 million 15 years of age). The aim of the study was to evaluate knowledge, attitudes and behaviour of the Austrian population regarding various aspects of cancer [4]. In cooperation with a public opinion survey institute a quota sample of 2400 Austrians aged 15 years and over was selected. The sample comprised 0.04% of the population 15 years of age and was representative in terms of age, sex, occupational status, and area of residence (source: population census 1991). The respondents were visited in their homes by 217 trained interviewers. The interview was face to face, using an anonymous standardized questionnaire. Of the 2400 planned interviews a quota of 86.4% could be realised, 327 persons were not at home or refused interview. The remaining sample of 2073 persons (972 men and 1101 women) meets the inclusion criteria regarding representativity. For validation purposes, 30% of the interviews were reexamined by mail (45%) and by telephone (35%), and no significant differences to the original face-to-face interview were found.

The evaluation of prevalence of self-reported screening mammography was restricted to women aged 40–79 years, thus 566 women formed the study group for this analysis. Women were asked whether they had had a screening mammogram ever during their life; if so, they were asked about the number of screening mammograms they had undergone and the time intervals between screening mammograms. The following categories were defined: (1) 4 or more mammograms within time intervals of less than 2 years; (2) 2 or 3 mammograms within less than 2 years; (3) more than 1 mammogram within more than 2 years; (4) only 1 mammogram ever; (5) number and/or interval not given; (6) never had a screening mammogram.

Mortality rates, incidence rates and stage distribution

From figures provided by the Austrian Central Statistical Office, age standardized (European Standard Population) mortality and incidence rates were computed for the period 1980 to 1995. Apart from self-reported prevalence and mortality, the figures for incidence and tumor stage are available only aggregated in 5-year age groups. In addition, age-specific mortality rates (5-year age groups corresponding to the age-range of self-reported screening mammography), rates for stage I tumors, stage II or worse tumors (II + III) at the time of diagnosis and the quotient of stage I to stage II or worse tumors were calculated for 1980 to 1995. Based on histological examination stage I is defined as localised tumour measuring less than 20 mm in diameter and no involvement of the nodes, stage II as tumour with involvement of the nodes, and stage III with distant metastases. Tumor size as the other relevant variable [3] could not be evaluated because data are not available in computerized form.

Table 1. Prevalence of self-reported screening mammography by 5-year age groups according to categories of number of mammograms and time intervals between mammograms and for women who never had a mammography, women aged 40–79 years (n = 566), Austria 1995

<table>
<thead>
<tr>
<th>Age (yr)</th>
<th>n</th>
<th>Number of mammograms ever had/time interval between mammograms in years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>4+/≤ 2</td>
</tr>
<tr>
<td>40–44</td>
<td>86</td>
<td>5.8</td>
</tr>
<tr>
<td>45–49</td>
<td>83</td>
<td>13.3</td>
</tr>
<tr>
<td>50–54</td>
<td>70</td>
<td>15.7</td>
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<td>55–59</td>
<td>66</td>
<td>9.1</td>
</tr>
<tr>
<td>60–64</td>
<td>98</td>
<td>15.3</td>
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<tr>
<td>65–69</td>
<td>82</td>
<td>11.0</td>
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<tr>
<td>70–74</td>
<td>56</td>
<td>8.9</td>
</tr>
<tr>
<td>75–79</td>
<td>25</td>
<td>20.0</td>
</tr>
<tr>
<td>All ages</td>
<td>566</td>
<td>11.8</td>
</tr>
</tbody>
</table>
Statistical analysis

Trends of the age-standardized mortality rates, of the incidence rates and of the age-specific quotients of stage I to stage II or worse tumors at time of diagnosis were analysed by calculating the Spearman's correlation coefficient with time. The time trends of the age-specific mortality rates and age-specific rates of stage I and stage II or worse tumors were analysed by means of Poisson regression models using SAS [9] where a linear and a quadratic term for time was tested. P-values below 0.05 were considered to be significant.

Results

Prevalence of self-reported screening mammography

The prevalence of self-reported screening mammography by 5-year age groups according to categories for number of mammograms and time interval between mammograms and for women who never had a mammography during their life, is shown in Table 1. In 1995, the prevalence of women aged 40–79 years who reported ever having had a screening mammography was 58%; the highest prevalence (71.4%) was reported by women 50–54 years old, the lowest prevalence (39.3%) by women 70–74 years old. 23.1% of all women reported that they had been screened at least 2 times within an interval of less than 2 years; again the highest prevalence (35.7%) was reported by women aged 50–54 years, the lowest prevalence (10.7%) by women aged 70–74 years. In conclusion, 50–54 years old women are best covered by screening and 70–74 years old women worst.

Mortality, incidence and stage distribution

Breast cancer has been the leading cause of cancer deaths in women in Austria since 1972. Age-standardized incidence and mortality rates have increased significantly since 1980 (Fig. 1), but since 1985 mortality has stabilized, whereas incidence has increased further. However, age-specific mortality trends are not as uniform (Fig. 2). In the age groups younger than 54 years mortality did not change significantly. Significantly increasing trends are observed in the age groups 55–59 years and 70–74 years (linear) and in the age groups 60–64 years, 65–69 years and 75–79 years (quadratic). In these age groups mortality rates peaked between 1988 and 1990 and decreased thereafter.

The trends of age-specific rates for stage I tumors at time of diagnosis are shown in Fig. 3 and for stage II or worse tumors in Fig. 4. In all age groups the rates of stage I cancers have increased significantly throughout the whole period of time. The trends are linear except in the age groups 55–59 years, 65–69 years, 70–74 years and 75–79 years, where they are quadratic, all peaking before the year 1990. However, during the past 3 to 6 years the absolute rates of advanced tumors decreased in all age groups; the trends to the quotients of stage I to stage II or worse tumors improved significantly in all age groups (Fig. 5); on average from 0.75 in 1980 to 1.20 in 1995. Trends are shown for 10-year age groups for better visibility.

Discussion

Screening mammography has been available free of charge since the mid seventies in Austria, and been recommended as an instrument for mass screening since 1980. However, activities have never been monitored and evaluated.

The survey of the Austrian Cancer Society, conducted in 1995, revealed that 58% of women aged 40–79 years had received at least one screening mammogram during their lifetime. Our results are based on self-reports and could be subject to reporting error. Validation studies showed that women tend to overestimate their usage of screening mammography, especially in low-income populations [8]. For data protection reasons we could not incorporate a validation study in the nationwide survey.
Estimates of accuracy of women's self-reports, found in validation studies range between 74% [7] and 97% [5]. But, in general, the self-reports are fairly accurate when compared with medical records and our figures should provide a good estimate of the screening situation in Austria.

More than 50% of the women had utilized the mammography screening service at least once in their life. The lowest prevalence (39.3%) was reported by women belonging to the age group 70–74 years, the highest prevalence (71.4%) by women aged 50–54 years. Assuming that women reporting two or more mammograms within time intervals of less than two years represent the group of best screened women, women aged 70–74 years report the lowest prevalence (10.7%) and thus represent the worst screened group in Austria. On the other hand, every third woman aged 50–54 years or 75–79 years had reported at least two screening mammograms at intervals of less than two years. They represent the group of best screened women in Austria and it can be assumed that the screening had occurred after the age of 50, within the age range for which a significant reduction of breast cancer mortality is well documented in various screening programmes [6, 10, 11]. In our opinion, the differences in age-specific prevalence are not related to a selection bias, but they most likely reflect the true situation and correspond with the observed trends of age-specific mortality and of the absolute incidence of advanced tumors.

As shown in Fig. 1, age-standardized mortality has stabilized since 1985, although age-standardized inci-
The age-specific mortality rates (Fig. 2) have not changed in the groups 54 years and younger over the investigated period. However, the age groups 55 years and older showed a significant increase in age-specific mortality rates until around 1990, followed by a steady decrease in most of these groups since then. Most striking are the marked changes in the last few years in the age groups 70–74 years (1990 to 1995: +26%) and 75–79 years (1990 to 1995: −26%).

In all age groups the quotients of stage I to stage II or worse tumors improved significantly since 1980 (Fig. 5), based on a significant increase of the absolute rates of stage I tumors (Fig. 3). The absolute rates of stage II or worse tumors increased significantly, too, except in the
age groups 40–44 years and 55–59 years (Fig. 4). But for the last few years the absolute rates of advanced tumors started to decrease in all age groups. This downward trend was observed first and most markedly in the age group 75–79 years and last in the age group 70–74 years. On average, two years later these trends were followed by a reduction of the corresponding mortality rates. It is most likely that the drop in mortality observed in women aged 70–74 years in 1995 is already related to the declining rate of advanced tumors and improved survival of breast cancer cases.

As a whole the age-specific positive trends in the mortality rates and in the (preceding) absolute rates of advanced tumors occurred in the last few years and correspond to the prevalence of self-reported screening mammography. According to the time of introduction of screening in Austria and because the screening effect on breast cancer mortality will take 10 years or longer to emerge [3], the anticipated effect cannot be expected much earlier than observed.

We believe that the observed reduction of age-specific mortality can be related to screening because it is plausibly supported by the reduction of advanced cancer cases at time of diagnosis (improved survival from breast cancer). But we are aware that the shortcoming of our analysis is that it is derived from population-based data and not from individual data of screened and unscreened women. If the screening effect is true, its impact on age-specific rates of advanced cancer and mortality will increase in the years to come, when the screening effect will show up in the younger age groups who attend screening more often and regularly (Table 1). To obtain more uniform trends, mortality and stage distribution have to be observed and carefully evaluated in the years to come. If the positive effect of screening cannot be proven it has to be discussed openly whether the present system of opportunistic screening without any monitoring and evaluation, financed by public money, should be discontinued and replaced by an organized population-based screening programme with monitoring and evaluation.

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References

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