



Attending the breast screening programme after breast cancer treatment: A population-based study

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ABSTRACT

Introduction: In the Netherlands, breast cancer patients are treated and followed at least 5 years after diagnosis. Furthermore, all women aged 50–74 are invited biennially for mammography by the nationwide screening programme. The relation between the outpatient follow-up (follow-up visits in the outpatient clinic for 5 years after treatment) and the screening programme is not well established and attending the screening programme as well as outpatient follow-up is considered undesirable. This study evaluates potential factors influencing women to attend the screening programme during their outpatient follow-up (overlap) and the (re-)attendance to the screening programme after 5 years of outpatient follow-up.

Methods: Data of breast cancer patients aged 50–74 years, treated for primary breast cancer between 1996 and 2007 were selected from the Netherlands Cancer Registry and linked to the National Breast Cancer Screening Programme in the Northern region. Cox regression analyses were used to study women (re-)attending the screening programme over time, possible overlap with the outpatient follow-up and factors influencing this.

Results: In total 11 227 breast cancer patients were included, of whom 19% attended the screening programme after breast cancer treatment, 4.4% within 5 years and 15.4% after more than 5 years. Factors that independently influenced attendance within 5 years as well as more than 5 years after treatment were: interval tumours (HR 0.77; 95%CI 0.61–0.97 and HR 0.69; 95%CI 0.53–0.88, ref: screen-detected tumours), receiving adjuvant radiotherapy (HR 0.65; 95%CI 0.47–0.90 and HR 0.66; 95%CI 0.47–0.93; ref: none) and diagnosis of in situ tumours (HR 1.67; 95%CI 1.25–2.23 and HR 1.39; 95%CI 1.05–1.85; ref: stage I tumours). Non-screen related tumours (HR 0.41; 95%CI 0.29–0.58) and recent diagnosis (HR 0.89 per year; 95%CI 0.86–0.92) were only associated with attendance within 5 years after treatment.

Conclusion: The interrelation between outpatient follow-up and screening should be improved to avoid overlap and low attendance to the screening programme after outpatient follow-up. Breast cancer patients should be informed that attending the screening programme during the outpatient follow-up is not necessary.

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1. Introduction

Breast cancer is the most common type of cancer in women in the Netherlands, with an incidence of 16 000 new cases in 2011 (www.cancerregistry.nl) [1]. In the Netherlands a population-based breast cancer screening programme has been fully

implemented since 1996. Women aged 50–74 (70–74 since 1999) are invited biennially for mammography [2]. Due to the implementation of this screening programme, breast cancer is diagnosed at an earlier stage. Together with improved treatment options, this has led to an increasing number of women surviving 5 years and more after diagnosis. Although the optimal follow-up after breast cancer treatment is still unknown, women frequently attend scheduled outpatient follow-up visits (follow-up visits in the outpatient clinic for 5 years after treatment), including mammography [3–10].

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Women attending outpatient follow-up after breast cancer diagnosis aged 50–74 can also attend the screening programme which is considered undesirable. In the guideline for breast cancer, recommendations are given about outpatient follow-up after treatment of breast cancer for the first 5 years [11]. These visits focus on wound healing, adverse effects of the treatment, the need for psychosocial care and the early detection of second primary tumours. From the revision of 2008 onwards, the Dutch guideline for breast cancer states that breast cancer patients treated with mastectomy could, after 5 years of outpatient follow-up and then 60–74 years of age, be referred to the screening programme [12]. Nevertheless, little is known about the relation between the outpatient follow-up and the attendance to the screening programme after treatment for breast cancer, and which factors influence the screening participation.

The objective of this population-based study was to determine whether breast cancer patients attended the screening programme during their outpatient follow-up (overlap) and the (re-)attendance to the screening programme after more than 5 years of outpatient follow-up, and which factors (method of detection, tumour characteristics and primary and adjuvant treatment) influenced this attendance.

2. Patients and methods

2.1. Patients

Women with breast cancer were selected from the population-based Netherlands Cancer Registry (NCR) of the Comprehensive Cancer Centre the Netherlands (IKNL). The NCR contains data on patient and tumour characteristics, stage and treatment of all newly diagnosed malignancies [13]. The National Breast Cancer Screening Programme invites women 50–74 years of age (70–74 since 1999). All women aged 50–74 at the time of their first invasive or in situ breast cancer between 1996 and 2007 were selected ($N = 12\,010$). Women with metastases at diagnosis ($N = 497$) and women without primary treatment ($N = 46$) were excluded, as well as women with bilateral mastectomy ($N = 240$). In total 11 227 women were included in this study. For the analyses of women attending the screening programme after more than 5 years of outpatient follow-up, women aged 50–69, diagnosed between 1996 and 2004, not attending screening within 5 years after treatment were included ($N = 6251$).

2.2. Relation to screening

Data of the NCR were merged with the data of the National Breast Cancer Screening Programme, region North, covering an area of 3.3 million inhabitants comprising 1.6 million women. Thereafter only data from the NCR covering the same area as the screening programme were selected, to ensure that all breast cancer patients had the chance to be invited by the National Breast Cancer Screening Programme, region North. Dutch legislation states that the breast screening programme is obliged to invite all women aged 50–74 (70–74 since 1999), even after breast cancer treatment. Women do have the option to return a non-attender form on which they can state that they are in follow-up after breast cancer treatment in the hospital. The data of the screening programme include the date of attendance and the screening result. Three groups were defined: the first group comprised of women with a suspect mammography by breast cancer screening who were subsequent diagnosed with breast cancer within 12 months (“screen-detected tumour”). The second group comprised of women who developed breast cancer within 24 months after a normal mammogram by breast screening (“interval tumour”). The third group comprised of women with breast cancer without a

relation to the screening programme (“non-screen related tumours”). This group included women who never attended the screening programme before their breast cancer diagnosis and women diagnosed with breast cancer more than 24 months after the last biennial screening mammography. Data until 31 December 2009 were available.

2.3. Statistical analysis

Chi-squared analysis was used to compare categorical variables. The time period between diagnosis and attendance to the screening programme was defined as the date of pathological confirmation and the first screen mammography afterwards. Patients were censored at the date of a new primary breast tumour, death, date when a woman reached the age of 75, or end of the study period (31 December 2009). The percentage of women attending the screening programme was calculated using Kaplan Meijer analysis. Multivariable Cox regression analyses were used to identify independent prognostic factors for the chance of attending the screening programme. Factors considered were: age, year of diagnosis, stage, type of surgery and adjuvant therapy (radio-, chemo- and/or endocrine). Analyses were performed using the STATA software package, version 12.0 for Windows (Stata Corporation LP, College Station, TX, USA).

3. Results

3.1. Attendance to the screening programme within 5 years after treatment

In total 11 227 breast cancer patients were included in the study and tumour and treatment characteristics are shown in Table 1. In total 19% attended the screening programme after breast cancer treatment. Of 11 227 breast cancer patients, 4.4% attended the screening programme within 5 years after treatment. Of the screen-detected cases, 5.2% attended the screening programme within 5 years. Furthermore, 4.0% of women with an interval tumour and 2.7% of women with a non-screen related tumour attended the screening programme within 5 years after treatment. Fig. 1a shows the results of multivariable analysis for attending screening within 5 years after treatment. Breast cancer patients with interval and non-screen related cancer attended the screening programme after breast cancer treatment less often than breast cancer patients with screen-detected tumours (HR 0.77; 95%CI 0.61–0.97 and 0.41; 95%CI 0.29–0.58 resp.; Table 2), as well as later year of diagnosis (HR 0.89 per year; 95%CI 0.86–0.92) and breast cancer patients who received adjuvant radiotherapy (HR 0.65; 95%CI 0.47–0.90 compared to patients without adjuvant radiotherapy). Breast cancer patients with in situ tumours (HR 1.67; 95%CI 1.25–2.23) were more likely to attend the screening programme than patients with stage I tumours.

3.2. Attendance to the screening programme after more than 5 years after treatment

Of 6251 women, 15.4% attended the screening programme more than 5 years after treatment. Of women with screen-detected tumours 15.4% of patients attended the screening programme more than 5 years after treatment, compared to 13.0% and 18.3% women with an interval tumour and women with a non-screen related tumour, respectively. In multivariable analysis for attending screening more than 5 years after treatment, breast cancer patients with interval tumours attended the screening programme after breast cancer treatment less often than breast cancer patients with screen-detected tumours (HR 0.69; 95%CI 0.53–0.88; Table 2; Fig. 1b). Furthermore, breast cancer patients who received

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