Decision making in geriatric oncology
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Chapter 1
Breast cancer in the elderly: retrospective study on diagnosis and treatment according to national guidelines


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Chapter 1

Abstract

Introduction: We set out to investigate the level of accordance of diagnosis and treatment of elderly breast cancer patients with national guidelines and to study predictors of deviation.

Methods: Data on patient and tumour variables were collected from the charts of 166 patients aged 70 years and older, diagnosed at our hospital in 2002-2004. Diagnostic work-up and treatment were compared to guidelines and reasons for deviation were recorded.

Results: In all, 122 (74%) patients were diagnosed and treated in accordance with guidelines. Diagnosis was incomplete in 19 patients (11%). Surgery, radiotherapy and hormonal therapy were withheld in 19 (11%), 11 (7%) and 9 (5%) patients, respectively. Guideline deviation was motivated in 18 patients (11%) (comorbidity n=11, patients’ preferences n=5, age n=2), unmotivated in 18 (11%), and undeliberate in 8 (5%).

Conclusion: Our study demonstrates that deviation from guidelines in elderly breast cancer patients mainly occurs due to a deliberate adjustment to patient’s comorbidity and preference.
Introduction
In the Netherlands, breast cancer is diagnosed in over 11,500 women each year, of which 30% is aged 70 or older. It is the most frequently diagnosed cancer in women and its incidence increases with age. In western societies, due to increasing life expectancy and ageing of the population, the number of elderly patients with breast cancer will increase substantially over the next decades. It is expected that by the year 2035, 60% of all new breast cancer patients are 70 years or older.\(^1\)

Unfortunately, insufficient data are available on the optimal treatment of elderly patients with breast cancer. Various studies have demonstrated that treatment for women with breast cancer differs substantially with age.\(^2\)\(^-\)\(^13\) If patients are older, they are treated less extensively, and treatment guidelines are less likely to be followed.\(^6\)\(^,\)\(^14\)

However, this does not automatically imply that elderly patients are undertreated. Treatment guidelines are based on clinical trials in which patients 65 years of age or older are greatly underrepresented or even excluded.\(^15\)\(^-\)\(^17\) Increasing comorbidity with age results in an increasingly heterogeneous patient population.\(^5\)\(^,\)\(^6\)\(^,\)\(^10\) Both the physiological process of ageing as well as comorbidity result in a decreased physical reserve, and the question whether or not older patients are able to tolerate treatment as well as younger patients has not been answered conclusively.\(^18\)

Comorbidity in elderly patients may also increase the risk of dying of other causes, thereby decreasing the relative impact of breast cancer on overall survival.\(^19\)\(^-\)\(^23\) In addition, studies have demonstrated that elderly women are often diagnosed at a later stage of the disease,\(^4\)\(^,\)\(^19\) and that the biology of breast cancer changes with age.\(^19\) Furthermore, patient’s preferences in treatment modalities need to be taken into account, as older patients may be less willing to trade current quality of life for survival.\(^24\)

These differences suggest that guidelines based on studies examining mainly non-elderly patients without comorbidity cannot automatically be extended to elderly patients. It may be possible that observed differences in treatment between older and younger patients are not a reflection of age but are adequate adjustments to altered biology, physiology, comorbidity and preferences of older patients.

We set out to investigate the level of adherence to Dutch guidelines in newly diagnosed breast cancer patients aged 70 years or older and to study various predictors of deviation at our hospital.

Methods
This study is a retrospective cohort study of women aged 70 years and older diagnosed with breast cancer at the Medical Centre Alkmaar in the Netherlands between January 2002 and December 2004. Patients with non-invasive breast cancer or a second primary breast tumour were excluded from this study.
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Using patient’s charts, surgical records, and pathology reports, we collected data on the following variables: patient’s age, comorbidities, date of diagnosis, tumour histology, tumour grade, mitotic activity index (MAI), stage of disease (TNM), oestrogen receptor status, progesterone receptor status, as well as the initial treatment with surgery, chemotherapy, radiotherapy and/or hormonal therapy. Breast cancer histology was classified as ductal carcinoma, lobular carcinoma, other, or “not determined” if no histological or cytological examination was performed. Steroid receptors were determined by immunohistochemistry and classified as positive (10% or more cells stained positive), negative (<10%) or unknown. Stage of disease was classified in five groups: stage I (T1 N0 M0), stage II (T0-2 N1 M0, or T2 N0-1 M0, T3 N0 M0), stage III (T3 N1 M0, Tany N2-3 M0), stage IV (Tany Nany M1) and unknown. Information on functional status was lacking in most patient charts and subsequently was not collected. Patients were followed until March 1st 2007. Data on survival was collected from the charts; if this was insufficient, the patient’s general practitioner was contacted for additional information.

In addition, diagnostic work-up and treatment modalities were compared with work-up and treatment advised by national guidelines. In the Netherlands, guidelines on diagnosis and treatment of breast cancer are frequently updated by the Dutch National Breast Cancer Platform (NABON) and the Dutch Society for Medical Oncology (NVMO). Table 1 summarizes these guidelines for patients aged 70 and older, as used in the period 2002-2004. This guideline is similar to that of younger post-menopausal women for diagnostic work-up, surgery, hormonal therapy and radiotherapy. The guideline provides no strict indication for adjuvant chemotherapy, stating that this can be considered in patients with high-risk hormone receptor negative disease.

For patients not receiving the standard treatment, reasons for deviating from guidelines were collected from the charts. These reasons were classified in three categories: “motivated” if the reason for deviation was documented, “deliberate, reason not documented” if the treating physician had noted that the guideline was not followed, without motivating this decision in the patient’s chart; and “undeliberate” if the chart showed no remark on any deviation from guidelines.

**Statistical analysis**

To compare different groups in terms of comorbidity, disease stage, and different treatment modalities, a chi-square test was used. A p-value of lower than 0.05 was considered to be statistically significant. Statistical analyses were performed using the statistical program SPSS for Windows version 14.0.
Table 1: Diagnosis and treatment guidelines for patients aged 70 and older in accordance with the Dutch multidisciplinary guidelines for treatment of breast cancer 2002

I. Diagnosis

Histology
In all patients, histological confirmation of breast cancer should be sought.

Lymph node status
In all patients with invasive tumours receiving surgery, a diagnostic procedure to determine axillary node status is required.

Distant metastases
In all patients with T3-4 and/or N2-3 tumours, imaging studies for distant metastases is recommended.

II. Treatment

Surgery
In all tumours except T4 and/or M1, surgery is required.

Radiotherapy
1. After breast conserving therapy
   a. radiation of the breast is always required
   b. regional lymph nodes: in case of pN2-N3 tumours
2. After modified radical mastectomy, locoregional radiation is required if:
   a. mastectomy was irradical
   b. pN2-N3
   c. positive top axillary node
   d. cT4
   e. to be considered in T3 tumours

Hormonal therapy
1. If tumour is hormone receptor negative, no hormonal treatment is necessary.
2. In case of lymph node N0 and receptor positive tumour, hormonal therapy is required if:
   a. tumour size is > 3 cm
   b. tumour size is 1-3 cm and mitotic activity index > 10
3. Lymph nodes N1-2 and receptor positive tumour always require treatment.
4. M1 disease if hormone receptor positive

Chemotherapy
For patients over age 70, there is no strict guideline with indications for (neo)adjuvant chemotherapy.
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Results

Patient and tumour characteristics
Between January 2002 and December 2004, 791 patients were diagnosed with breast cancer in our hospital, of which 205 patients (26%) were aged 70 years or older. Thirty-nine patients were excluded from our analysis because of a second primary breast tumour (n=23), non-invasive breast cancer (n=14) and treatment elsewhere (n=2). As a result, 166 patients were included in this study (165 females and one male). Patient characteristics are listed in Table 2. The median age at diagnosis was 78 years (range 70-96 years).

In our series, 51 patients presented with stage I disease (31%), 57 with stage II (34%, node-negative n=29, node-positive n=28), 29 with stage III (17%) and 17 with metastatic disease (stage IV, 10%). Overall, older patients presented with more advanced disease (p=0.003). Tumour stage was unknown in 12 patients (7%) because of insufficient data on lymph node involvement or tumour size. The percentage of patients with unknown stage correlated with increase in age.

Table 2: Patient characteristics per age group

<table>
<thead>
<tr>
<th></th>
<th>70 - 79 yrs</th>
<th>80 - 89 yrs</th>
<th>90+ yrs</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>100</td>
<td>56</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Chronic and/or current disease</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>42 (42%)</td>
<td>10 (19%)</td>
<td>1 (11%)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>29 (29%)</td>
<td>14 (26%)</td>
<td>2 (22%)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>16 (16%)</td>
<td>17 (31%)</td>
<td>3 (33%)</td>
<td></td>
</tr>
<tr>
<td>3+</td>
<td>13 (13%)</td>
<td>13 (24%)</td>
<td>3 (33%)</td>
<td>0.04</td>
</tr>
<tr>
<td>Stage of disease</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>40 (40%)</td>
<td>10 (19%)</td>
<td>1 (10%)</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>34 (34%)</td>
<td>22 (39%)</td>
<td>1 (10%)</td>
<td>0.002</td>
</tr>
<tr>
<td>III</td>
<td>14 (14%)</td>
<td>10 (19%)</td>
<td>5 (50%)</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>8 (8%)</td>
<td>7 (12%)</td>
<td>1 (10%)</td>
<td></td>
</tr>
<tr>
<td>unknown</td>
<td>3 (3%)</td>
<td>7 (12%)</td>
<td>2 (20%)</td>
<td>0.003</td>
</tr>
<tr>
<td>Tumour morphology</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not determined</td>
<td>1 (1%)</td>
<td>3 (5%)</td>
<td>2 (20%)</td>
<td></td>
</tr>
<tr>
<td>Ductal</td>
<td>77 (77%)</td>
<td>32 (57%)</td>
<td>4 (40%)</td>
<td></td>
</tr>
<tr>
<td>Lobular</td>
<td>15 (15%)</td>
<td>14 (25%)</td>
<td>1 (10%)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>7 (7%)</td>
<td>7 (12%)</td>
<td>3 (30%)</td>
<td></td>
</tr>
<tr>
<td>Hormone receptors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oestrogen receptor positive</td>
<td>81 (84%)</td>
<td>40 (82%)</td>
<td>4 (80%)</td>
<td>0.95</td>
</tr>
<tr>
<td>Progesterone receptor positive</td>
<td>67 (69%)</td>
<td>34 (72%)</td>
<td>4 (80%)</td>
<td>0.82</td>
</tr>
<tr>
<td>Tumour grade</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade I</td>
<td>12 (12%)</td>
<td>3 (5%)</td>
<td>1 (10%)</td>
<td>ns</td>
</tr>
<tr>
<td>Grade II</td>
<td>35 (35%)</td>
<td>13 (23%)</td>
<td>0 (0%)</td>
<td>ns</td>
</tr>
<tr>
<td>Grade III</td>
<td>14 (14%)</td>
<td>10 (18%)</td>
<td>2 (20%)</td>
<td>ns</td>
</tr>
<tr>
<td>Not determined</td>
<td>39 (39%)</td>
<td>30 (54%)</td>
<td>7 (70%)</td>
<td>0.02</td>
</tr>
</tbody>
</table>

* p-value in bold signifies a significant differences between age groups (p<0.05); ns = not significant
In the majority of patients (n=160; 96%), a histological examination of tumour was performed. Tumour morphology and grade were less frequently determined in older age groups (p=0.023). Hormone receptor (HR) status was determined in 90% of tumours. There were no significant differences in HR status between age groups.

Data on comorbidity were available for 159 patients (96%). Only 53 patients (32%) had no current or chronic disease. Twenty-nine patients (18%) had three or more current diseases at the time of diagnosis. Both presence and number of comorbidities increased with age (p=0.044, Table 2). Cardiovascular disease was most frequently observed (53%), including hypertension (29%), coronary artery disease (16%), and TIA or stroke (7%). Other comorbidities were diabetes mellitus (13%), COPD (5%), thyroid disease (5%), dementia (3%), and depression (3%). Apart from a prior diagnosis of breast cancer (excluded), another 10 patients (6%) had a prior or concurrent malignancy.

Treatment

Early breast cancer (Stage I-II)

In accordance with guidelines, 99 out of 108 patients (92%) with early breast cancer (stage I and II disease) had surgery; 66 patients had a modified radical mastectomy (MRM), and 33 patients had breast conserving therapy (BCT). A sentinel lymph node procedure (SNP) was done in a majority of 62 patients (63%), of whom 14 were tumour positive and followed by an axillary lymph node dissection (ALND). A primary ALND was performed in 34 patients (34%). In three out of 99 patients (3%), no axillary lymph node surgery was done. Nine patients did not have any surgery.

Twenty-nine out of 33 patients (88%) with BCT received radiotherapy as indicated by guidelines. According to the guidelines, radiotherapy was indicated in eight patients after MRM, and seven patients (88%) were treated accordingly.

Adjuvant hormonal therapy was indicated in 47 patients and 40 patients (85%) were treated accordingly. Four patients with stage II disease received adjuvant chemotherapy due to irradical surgery or lymph node metastases.

Figure 1 lists treatment modalities per age group for patients with early stage breast cancer. Older patients were less likely to receive surgery (97% in patients aged 70-79 years vs. 50% in the patients aged 90 and over, p=0.002). If surgery was performed, older patients more often had a MRM than BCT (84% in patients aged 80-89 years vs. 52% in patients aged 70-79 years, p<0.05 after correction for stage of disease). Differences in the type of lymph node staging procedure were not significant after correction for stage of disease. Older patients were less likely to receive radiotherapy as compared to younger patients (0% vs. 49%, p<0.001). The use of hormonal therapy increased with age: 38% in patients aged 70-79 compared to 100% of patients aged >90 (p=0.024).
**Locally advanced disease (stage III)**
Twenty-nine patients were diagnosed with stage III disease. In 19 patients with locally advanced disease, diagnostic work-up consisted of a chest X-ray, abdominal ultrasound, and skeletal scintigraphy. In five patients, a chest X-ray and ultrasound were done and in another three patients a chest X-ray only. In the remaining two patients, both with T4 disease, no further work-up was done despite guidelines.
Eleven patients (38%) with locally advanced disease had primary surgery; eight patients had a MRM and three patients had BCT. Another eight patients had an MRM after neoadjuvant treatment (hormonal therapy in five patients and chemotherapy in three patients). Ten patients (35%) did not have any surgical therapy. Radiotherapy was given to 24 out of 25 patients in accordance with guidelines. Hormonal treatment was not indicated in four patients due to HR negative tumours. In HR positive breast cancer, 24 out of 25 patients received adjuvant hormonal therapy.

**Metastatic disease (stage IV)**
Sixteen out of 17 patients (94%) with metastatic disease received hormone therapy. In three patients chemotherapy was part of palliative therapy. The oldest patient to receive chemotherapy was 78 years old. One patient received no form of systemic therapy, and none had surgery or radiotherapy as primary treatment.
**Unknown stage of disease**

Two out of 12 patients (17%) with unknown stage of disease had surgery; one BCT and one MRM. No axillary lymph node surgery was performed. One patient, with HR negative disease, received no adjuvant treatment. Eleven patients, with either HR positive disease or in which receptor status was unknown, received primary or adjuvant hormonal therapy.

**Adherence to guidelines**

The accordance with guidelines and reasons for deviation are listed in Table 3. Overall, 122 out of 166 patients (74%) were adequately staged and given surgical and adjuvant treatment in accordance with guidelines.

Diagnosis and staging were incomplete in 19 patients (11%). In six patients (4%), diagnosis was made on clinical data only, without cytological or histological confirmation; furthermore, for three of these patients, stage was not determined. In six patients (4%), no lymph node staging procedure was performed during surgery, and in another seven patients (4%), the diagnostic strategy supplied insufficient information for staging.

In older patients, treatment guidelines were followed less frequently than in younger patients (88% of patients aged 70-79 was treated in accordance to guidelines vs. 40% in patients aged 90+, p<0.001).

Surgery was withheld in nineteen patients (11%), of whom nine with stage I-II disease and ten with stage III disease. The reason stated most frequently was the presence of comorbidity (n=10), varying from moderate chronic obstructive pulmonary disease to severe cardiovascular disease, dementia or other metastatic malignancy. Other reasons stated were patient’s request (n=4), age (n=2) and in two patients the reason was not clear. One patient died of myocardial infarction before any treatment could be started.

Eleven patients (7%) did not receive radiotherapy despite guidelines. One patient refused radiotherapy, and for the other patient, the reason stated was her age and comorbidity. In the remaining patients, it remains unclear why the guidelines were not followed.

Nine patients (5%) did not receive hormonal therapy according to guidelines; reasons for this were not stated in patients’ charts.

Overall, deviation from diagnostic and treatment guidelines was deliberate in 36 patients (22%); in 18 of them the decision was motivated in patient’s charts. In only eight patients (5%), the treating physician seemed unaware of the fact that guidelines were not followed. In the majority of these patients, this consisted of omitting adjuvant hormonal or radiotherapy. All eight had early stage breast cancer.

Patients not treated according to guidelines were significantly older (83.0 vs. 76.9 years, p<0.001), and had more comorbidity (1.7 vs. 1.2 comorbid conditions, p=0.024). There were no differences in hormone receptor status or stage of disease. In a multivariate analysis, no single factor was an independent predictor of adherence to guidelines, with
the exception of patients with stage II disease, in which case both advanced age (p=0.028) and increasing comorbidity (p=0.016) were significantly correlated with deviation from guidelines.

Table 3: Adherence to national guidelines

<table>
<thead>
<tr>
<th></th>
<th>70-79 yrs n=100</th>
<th>80-89 yrs n=56</th>
<th>90+ yrs n=10</th>
<th>Total n=166</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A.</strong>* Treatment and diagnosis in accordance with guidelines***</td>
<td>86 (86%)</td>
<td>34 (61%)</td>
<td>4 (40%)</td>
<td>122 (74%)</td>
</tr>
<tr>
<td>Incomplete diagnosis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No histological/cytological confirmation</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>No axillary lymph node procedure during surgery</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Insufficient information for staging</td>
<td>2</td>
<td>6</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Insufficient treatment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No surgery</td>
<td>4</td>
<td>12</td>
<td>3</td>
<td>19</td>
</tr>
<tr>
<td>No radiotherapy</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>No hormonal therapy</td>
<td>5</td>
<td>4</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td><strong>B.</strong> Motivated deviation***</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comorbidity</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Malignancy of another origin</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Dementia</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate to severe cardiovascular disease</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiple sclerosis</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parkinson’s disease</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderately severe COPD</td>
<td>1</td>
<td></td>
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<td></td>
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<tr>
<td>Age</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>At patient’s request</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Deliberate deviation, reason not documented</td>
<td>4</td>
<td>9</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>Undeliberate deviation</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>8</td>
</tr>
</tbody>
</table>

* Panel A lists the number of patients in which guidelines were followed and the ways in which treatment or staging deviated from guidelines.

** Panel B lists the reasons for deviating from guidelines as stated in the patients’ chart.

*** In some patients, both staging and treatment was not according to guidelines, or more than one treatment modality was withheld. Similarly, in some patients, multiple reasons for deviating from guidelines were given. Therefore, patients may be listed more than once.
Survival
After a median follow-up of 38 months, 70.5% of patients were still alive. Figure 2 shows Kaplan Meier plots, stratified per stage of disease. Patients who died were significantly older (p<0.001), had more comorbidity (p=0.001), had more advanced disease (p=0.034) and were less likely to have been treated in accordance with guidelines (p=0.003). In a multivariate analysis, only comorbidity and stage of disease remained independent predictors of mortality.

Discussion
In this study, we examined the diagnosis and treatment patterns of women with newly diagnosed breast cancer, aged 70 and older, in relation to age, disease stage and comorbid conditions. Using Dutch national guidelines, which are stage-specific and modified for age, we found that in 74% of patients guidelines were followed, and that adherence to guidelines decreased with advancing age. Several other studies have examined adherence to treatment guidelines in elderly breast cancer patients. Giordano et al noticed that in patients aged >75 years, accordance with a stage-specific guideline decreased with age, varying from 80% for surgical therapy to 29%
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for adjuvant chemotherapy.\textsuperscript{14} Yancik \textit{et al} found that only 7\% of 448 patients with stage I and II breast cancer aged >70 were given less than minimally expected treatment, but this study only examined surgical treatment.\textsuperscript{6} Bouchardy \textit{et al} observed that nearly 50\% of patients aged >80 had sub-optimal treatment strategies;\textsuperscript{7} however, optimal treatment was not clearly defined and was not stage-specific. As breast cancer treatment guidelines depend on age and stage of disease, both factors need to be taken into account to examine accordance to these guidelines. One of the strengths of our study is that national guidelines we used are stage-specific and have been modified for age. Several studies have shown that patients with comorbidity are less likely to be treated according to guidelines than patients without comorbidity.\textsuperscript{5,7,9,20,24} Similarly, we found that comorbidity was the most frequently stated reason for deviating from guidelines (11 out of 18 motivated deviations, Table 3), also being an independent predictor of mortality. Other studies have demonstrated that the impact of breast cancer on prognosis decreases as the risk of dying from comorbid disease increases.\textsuperscript{20-23} For example, Coebergh \textit{et al} found that, although overall 10-year survival is much lower in women aged >70 as compared to younger patients (16\% vs. 41\%, respectively), the cancer-specific survival is quite similar (49\% vs. 53\%).\textsuperscript{27} Therefore, serious comorbidity can be a legitimate reason for deviating from treatment guidelines if the life-expectancy of a patient is significantly reduced by it. In our study, the adjustment of treatment in ten patients because of comorbidity seems adequate, considering the severity of these comorbid conditions (Table 3).

Age was not a major factor in determining whether guidelines were followed, being a reason for deviating from treatment guidelines in only two patients in our study. Although older women were less likely to be treated according to guidelines, age was not an independent predictor of guideline deviation after correcting for comorbidity and stage of disease. Bickell \textit{et al} recently published a study on reasons for omitting adjuvant therapy in both elderly and non-elderly breast cancer patients.\textsuperscript{26} Physicians did not recommend therapy because of older age, comorbidity or unawareness of treatment benefit in 14\%, 11\% and 3\% of treatment omissions, respectively, while 31\% of treatment omissions was due to patient preference. In our study, deviation from guidelines was undeliberate in eight out of 44 patients with any guideline deviation; this occurred primarily in patients with early stage breast cancer and frequently involved hormonal therapy. Given the relatively low treatment burden for the patient, this possibly implies undertreatment. Of notice, other studies have observed that older women with a relatively low risk of recurrence (i.e. early stage disease) are less likely to receive treatment according to guidelines. For example, Giardano \textit{et al} found that in post-menopausal women, deviations from guidelines were found primarily in early stage breast cancer, while advanced disease
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was highly predictive of accordant therapy. This suggests that in early stage disease the need for adjuvant therapy is not as obvious as it is in advanced disease. At present, diagnostic and therapeutic decisions for patients with breast cancer in the Netherlands are made in multidisciplinary meetings with dedicated breast surgeons, radiographers, pathologists, oncologists, radiation oncologists and breast care nurses. In our hospital, these meetings were initiated in 2006, thus after the time period of this study. We intend to evaluate the effect of these multidisciplinary meetings on the adherence to national guidelines in the elderly.

Most studies on the effect of age and comorbidity in elderly breast cancer patients have used national databases, with central data collection by national cancer institutes. However, patient’s medical records are generally regarded as the most complete source of information on the patient’s past and current health status. Thus, one of the strengths of this study is that the data we accumulated using patients’ charts may be more clinically precise than those obtained from self-reports or administrative databases using discharge data.

However, in a retrospective analysis, it is impossible to determine whether discordance with guidelines is justifiable based on patient’s health status or should be considered as undertreatment. Furthermore, it is still not certain how to measure health status or functional reserves in elderly cancer patients. Therefore, prospective studies are needed to validate comprehensive geriatric assessments as a decision-making tool in geriatric oncology. Until such a tool is developed and incorporated into guidelines, treating physicians will have to determine for each individual patient whether or not guidelines provide adequate treatment.

In conclusion, this study provides new insight into the accordance with diagnosis and treatment guidelines in elderly breast cancer patients. Our study demonstrates that deviation from treatment guidelines occurs in a fourth of patients, mainly due to deliberate deviation from guidelines as an adjustment to the patient’s comorbidity and preference.
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References
Breast cancer in the elderly