Use of Sickness Benefits by Patients With Metastatic Breast Cancer – A Swedish Cohort Study

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Abstract

Background

Advances in the treatment of metastatic breast cancer (mBC) have led to improved life expectancy. Many cancer survivors desire to return to paid work to enhance their sense of well-being. For patients with mBC, little is known about how the diagnosis impacts ability to work or the factors that increase the need for sickness benefits.

Patients and methods

Data were collected from two Swedish national registers, for females ages 18 to 63 years in the Stockholm-Gotland healthcare region with a new diagnosis of mBC from 1997 through 2011. Type of first-line palliative treatment was identified in medical records of a subset of the study population. Use of sickness absence (SA) and disability pension (DP) by these patients during the year before and one and two years after mBC diagnosis was determined from a third register. Regression analysis was performed to ascertain which covariate factors were associated with long-term (> 30 days) SA.

Results

A total of 1,240 patients were evaluated the year before and the first year after mBC diagnosis; only 805 patients were still alive and evaluated the second year after diagnosis. The proportions of patients having SA and DP were 56.0% and 24.8% the year before, 69.9% and 28.9% the first year after, and 64.0% and 34.7% the second year after diagnosis, respectively. Adjusted odds of having long-term SA were significantly higher at 1 and 2 years after diagnosis for patients with age < 45 years (AOR = 3.43 and AOR = 1.70, respectively), early calendar year of diagnosis (AOR = 1.72 and AOR = 1.79, respectively), metachronous mBC (AOR = 4.85 and AOR = 4.52, respectively), and SA ≥ 90 days the year before diagnosis (AOR = 3.44 and AOR = 1.98, respectively). Odds were also significantly higher the second after diagnosis for patients treated with chemotherapy (AOR = 1.81) or radiotherapy (AOR = 2.23), compared to those treated with hormonal therapy,

Conclusions

Rates of SA and DP increase after a diagnosis of mBC. Women who are younger, develop metachronous mBC, use SA heavily before mBC, and receive chemotherapy or radiotherapy have a greater need for sickness benefits after an mBC diagnosis.

Highlights

1. In Sweden, rates of sickness absence and disability pension increased after a diagnosis of metastatic breast cancer.
2. Odds of sickness absence were highest in women who were younger, had metachronous metastases, or were often absent from work before their diagnosis.
3. Odds of sickness absence were higher when women received chemotherapy or radiotherapy rather than hormonal therapy.

Introduction

On a global level, breast cancer is the most prevalent malignant disease in women [1]. Up to 10% of patients with breast cancer present with metastatic breast cancer (mBC) that is synchronous [2], whereas up to 30% of patients with early breast cancer (eBC) develop metachronous metastases [3, 4]. It is estimated that 15,000 women in Sweden are living with mBC [5, 6].

Advances in the treatment of mBC have led to improved progression-free survival and life expectancy [7–9], with median overall survival for women in western countries ranging from two to three years [2]. About half of women with mBC are of working age [7, 10], and novel treatments for mBC may enhance the possibility of these women returning to work and being productive [11, 12].

Sweden provides sickness benefits when citizens are unable to work [13]. These benefits include compensated sickness absence (SA) for temporary illness and disability pension (DP) for permanent impairment, and they can vary depending upon the severity of the incapacity [14–16]. Patients in Sweden with illnesses like mBC are expected to work to the extent that they are able [17, 18]. As patients with mBC become more likely to enjoy good health for a period of time [11, 12], the ability to return to work may contribute to their sense of well-being [19].

Often forced because of illness to leave full-time work, many cancer survivors eventually desire to return to paid work or other meaningful activities that can provide them with daily structure [20, 21], and this may also be the case for the subset of patients who are receiving palliative treatment for incurable cancer [2]. Recent studies suggest that factors such as lower performance scores, higher symptom burdens, belonging to ethnic minority groups, and lack of capacity to work full-time have been associated with lower rates of employment in women with mBC [19, 22, 23]. However, it is largely unknown how much women use sickness benefits after their mBC diagnosis, and what the factors are that influence this.

To the best of our knowledge, sickness benefit data has not previously been applied to the study of factors associated with the use of those benefits in women with newly diagnosed mBC. In this study, we aimed to determine the rates of SA and DP for working-age women with a new diagnosis of mBC in a region of Sweden that includes Stockholm, covering a three-year period which extended from the year before to two years after their diagnosis. In addition, we aimed to determine the patient-, disease-, and treatment-related factors associated with long-term SA in those patients with mBC.

Patients And Methods

This study complied with the Declaration of Helsinki, and it was approved by the Regional Ethics Review Board at the Karolinska Institute (Dnr 2012/745-31). Based on past Swedish legislation, patients registered in the national quality registers did not need to provide written informed consent for their data to be included in this healthcare research; however, they were informed that their data was included in registers and that they could opt out at any time.

Data sources

Diagnostic data for the study were obtained from two national Swedish registers: (i) the Breast Cancer Registry (RBC) for patients from the Stockholm-Gotland healthcare region diagnosed with mBC from January 1997 through December 2007; and (ii) the National Quality Register for Breast Cancer (NKBC) for patients from the Stockholm-Gotland healthcare region diagnosed with mBC from January 2008 through December 2011.

The Swedish Social Insurance Agency (SSIA) Microdata for Analyses of Social Insurance (MiDAS) database was used to retrieve data about SA and DP benefits from January 1996 through December 2013. The MIDAS database contains information about all continuous payments of sickness benefits by the SSIA, which start on day 15 of sick leave episodes. The Swedish Cause of Death Register, maintained by the Swedish National Board of Health and Welfare, was used to collect information about the time of death. The Swedish Longitudinal Integrated Database for Health Insurance and Labour Market Studies (LISA) was used to collect data about marital status. Patient data from all of the registers were linked using the unique national identification number assigned to each resident in Sweden at birth or when establishing permanent residency.

Data concerning first-line oncological treatment received by patients for mBC was more challenging to obtain, as it was not available in the RBC or NKBC. Because collecting this data for the entire study population was going to be prohibitively cumbersome, and would involve a manual search through individual patient healthcare records, we elected to seek this information for only a subset of the study population. To do this, we created a sequential list of the unique national identification numbers used for patients in the study, and one of the investigators (UW) reviewed the healthcare records of patients based on a consecutively chosen subset of that list. The records reviewed were paper for 1997 through 2001 and electronic beginning in 2002.

Study population

For this study, we included all patients who were registered in the RBC and NKBC as having a diagnosis of eBC and then as receiving a diagnosis of mBC from January 1997 through December 2011. Patients were included if they were female, were between 18 years and 63 years old at the time of their mBC diagnosis (the pension age in Sweden is 65 years old), and had data available from the MiDAS database

on SA or DP from the year before until two years (or at least one year if they died) after their mBC diagnosis.

About SA and DP in Sweden

Beginning at age 16 years and continuing until age 65 years, all Swedish residents who have had an income from work or unemployment benefits, and who then have reduced capacity to work as a result of disease or injury, may be granted SA benefits by the SSIA. Employers are required to pay for these benefits up to the first 14 days of sick leave for each separate episode of illness. Thus, only sick leave episodes longer than 14 days are recorded by the SSIA and are included in this study. SA benefits can be granted by the SSIA as being full-time (100%) or part-time (25%, 50%, or 75%) relative to ordinary working hours.

In addition, all Swedish residents ages 19 years to 65 years may be granted DP by the SSIA if they permanently lose the capacity to work because of disease or injury. If work capacity is permanently reduced by at least 25%, DP benefits can be granted at 25%, 50%, 75%, or 100 % levels, and are paid by the SSIA commencing on the first day disability.

Covariates

For each patient, we recorded age (categorized into less than 45, 45 to 55, and more than 55 years), calendar year (categorized into 1997–2000, 2001–2004, 2005–2008, and 2009–2012), and marital status (married or not married), all at the time of their initial mBC diagnosis. We documented whether the mBC was synchronous (i.e., primary mBC or the development of mBC within six months after an eBC diagnosis) or metachronous (i.e., development of mBC more than six months after an eBC diagnosis). We also logged the site of first distant metastasis (bone only, visceral non-brain, brain only, or non-visceral only), based on International Classification of Diseases, Ninth Edition (ICD-9) codes (**Supplementary Table 1**); number of distant metastases present at the time of the initial mBC diagnosis; and the first-line oncological treatment received for mBC (chemotherapy, hormonal therapy, or radiotherapy). Finally, SA and DP one year before mBC diagnosis were each categorized into none or any, and SA both one year before and one year after mBC diagnosis was categorized into less than 90 days and 90 or more days, when these were used as covariates in some of the analyses.

Outcome measures

For each patient, we used only data on SA and DP that began one year before and extended two years after mBC diagnosis. We calculated annual SA net days by multiplying the level of SA benefit received (i.e., 25%, 50%, or 75%) by the total number of SA days taken within the year. Then, SA net days were categorized into 0, 1 to 30, 31 to 90, 91 to 180, and over 180 days. We defined *long-term SA* as any SA longer than 30 net days per year. We calculated annual net days of DP in a similar manner, but then dichotomized these as either none or any (which included part-time and full-time disability).

Statistical methods

Age of the study population at the time of mBC diagnosis was presented as a median with interquartile range (IQR). Categorical covariates were described with frequencies and column percentages. SA and DP net day categories were stratified by year and presented with frequencies and column percentages as well as with means with standard deviations (SD). Patients who died during year one after the diagnosis of mBC were removed from prevalence and risk calculations for year two, which explains why the population denominator declined in year two.

Univariable and multivariable logistic regression analyses for long-term SA (more than 30 days) were performed to estimate crude odds ratios (OR) and adjusted odds ratios (AOR) with 95% confidence intervals (CI) for each covariate, and these were done separately for the first and second years after mBC diagnosis. For these analyses, the covariates of age at and calendar year of mBC diagnosis, site of first distant metastasis, first-line treatment, type of metastatic disease (synchronous vs. metachronous), and marital status were assessed as categorical factors. SA in the year before mBC and SA in the first year after mBC were also assessed as categorical factors in the second year analysis. The AORs were calculated by adjusting for age, calendar year, and SA net days in the year before mBC diagnosis, all as continuous variables. They were also adjusted for marital status, except when it was the variable of interest. We performed the data analyses with the Statistical Package for the Social Sciences (SPSS), version 25 (SPSS, Armonk, NY).

Results

Patient characteristics

The median (IQR) age at the time of mBC diagnosis was 53 (46 to 58) years old (Table 1). Of the 1,240 patients, 694 (56.0%) had SA and 308 (24.8%) received DP during the year before their mBC diagnosis. When we compared the characteristics of the 464 patients who had data about first-line oncological treatment to the 776 who did not, no significant differences in their baseline characteristics were identified (data not shown).

Table 1
Demographic and clinical characteristics of 1240 female patients with new metastatic breast cancer (mBC) diagnosis.

Characteristics	**Patients** **n (%)**
Total patients	1240 (100.0)
Age at mBC diagnosis, *years*	
< 45	247 (19.9)
45–55	522 (42.1)
> 55	471 (38.0)
Calendar year of mBC diagnosis	
1997–2000	387 (31.2)
2001–2004	416 (33.6)
2005–2008	304 (24.5)
2009–2012	133 (10.7)
Site of first distant metastasis	
Bone only	416 (33.5)
Visceral non-brain	434 (35.1)
Brain only	74 (6.0)
Non-visceral only	73 (5.9)
Data missing	243 (19.6)
Total first distant metastasis sites	
1	758 (61.2)
2	223 (18.0)
3	66 (5.3)
4	21 (1.7)
Data missing	172 (13.9)
First-line oncological treatment for mBC[a]	
Chemotherapy	154 (12.4)
Radiotherapy	60 (4.8)

Characteristics	**Patients n (%)**
Hormonal therapy	250 (20.2)
No data	776 (62.6)
Type of mBC diagnosis	
Synchronous[b]	109 (8.8)
Metachronous[c]	1131 (91.2)
Marital status	
Married	632 (51.9)
Not married	585 (47.2)
Data missing	23 (1.9)
Sickness absence (SA) in year before mBC diagnosis	
None	546 (44.0)
Any	694 (56.0)
Disability pension (DP) in year before mBC diagnosis	
None	932 (75.2)
Any	308 (24.8)

[a] Oncological treatment data collected for only 464 consecutive patients of original 1240 patients with mBC.

[b] Synchronous type defined as primary mBC or the development of mBC within six months after a previous breast cancer diagnosis.

[c] Metachronous type defined as development of mBC more than six months after a previous breast cancer diagnosis.

Sickness absence (SA) and disability pension (DP)

A total of 1,240 patients were analyzed during the year before and the year after mBC diagnosis. During the second year after mBC diagnosis, only 805 (64.9%) patients were available for analysis, because 435 (35.1%) patients had died during year one (Table 2). For the populations analyzed, the mean (SD) net days that patients were on SA during the year before, first year after, and second year after mBC diagnosis were 75.4 (116.3), 202.0 (155.7), and 148.1 (149.2), respectively (Fig. 1). The mean (SD) net

days that patients received DP during the year before, first year after, and second year after mBC diagnosis were 62.1 (125.4), 76.1 (134.6), and 80.3 (133.2), respectively.

Of 1,240 patients analyzed for year 1 after mBC diagnosis, 867 (69.9%) had any SA and 567 (45.7%) had more than 180 days of SA. Furthermore, 358 (28.9%) patients received DP (Table 2). And, of the 805 patients analyzed for year 2 after mBC diagnosis, 515 (64.0%) had any SA and 334 (41.5%) had more than 180 days of SA. Furthermore, 279 (34.7%) patients received DP during year 2 after mBC diagnosis.

Table 2
Sickness absence and disability pension net days among 1240 female metastatic breast cancer patients.

	Net Days[a]	Time to Diagnosis of Metastatic Disease		
	n	Year Before n (%)	Year After n (%)	2 Years After[b] n (%)
Total population analyzed	-	1240 (100.0)	1240 (100.0)	805 (100.0)
Sickness absence (SA)	0	546 (44.0)	373 (30.1)	290 (36.0)
	1–30	154 (12.4)	64 (5.2)	32 (4.0)
	31–90	130 (10.5)	98 (7.9)	74 (9.2)
	91–180	126 (10.2)	138 (11.1)	75 (9.3)
	> 180	284 (22.9)	567 (45.7)	334 (41.5)
Disability pension (DP)	0	932 (75.2)	882 (71.1)	526 (65.3)
	> 0	308 (24.8)	358 (28.9)	279 (34.7)

[a] Net days calculated by multiplying level of benefits received (i.e., 0%, 25%, 50%, 75%, or 100%) by total number of days of SA or DP benefits received.

[b] Total of 435 patients excluded from analysis in Year 2 because of death in previous year.

Long term sickness absence (SA)

At year 1 after mBC diagnosis, significantly higher adjusted odds of having long-term SA were observed in patients under 45 years old (AOR 2.92) vs. older than 55 years; with metachronous mBC (AOR 4.85) vs. synchronous mBC; on SA for 90 days or more during the year before mBC diagnosis (AOR 3.44) vs. less than 90 days; and diagnosed with mBC from 1997 to 2000 (AOR 1.72) vs. 2009 to 2012 (Table 3).

Table 3
Crude and adjusted odds-ratios for long-term (> 30 days) SA during year-one after mBC diagnosis.

Factors	Patients with Long-term SA / Patients in Cohort n/n (%)	Crude OR (95% CI)	Adjusted OR[a] (95% CI)
Age at mBC diagnosis, *years*			
<45	195/247 (78.9)	3.46 (2.43–4.94)	2.92 (2.02–4.23)
45–55	363/522 (69.5)	2.11 (1.62–2.73)	2.16 (1.64–2.83)
>55	245/471 (52.0)	1	1
Calendar year of mBC diagnosis			
1997–2000	271/387 (70.0)	1.36 (0.90–2.06)	1.72 (1.10–2.70)
2001–2004	265/416 (63.7)	1.02 (0.68–1.54)	1.08 (0.70–1.67)
2005–2008	183/304 (60.2)	0.88 (0.58–1.34)	1.02 (0.65–1.60)
2009–2012	84/133 (63.2)	1	1
Site of first distant metastasis			
Bone only	296/416 (71.2)	1.45 (0.86–2.44)	1.53 (0.87–2.68)
Visceral non-brain	294/434 (67.7)	1.23 (0.74–2.07)	1.29 (0.74–2.26)
Brain only	48/74 (64.9)	1.08 (0.55–2.13)	0.88 (0.43–1.84)
Non-visceral	46/73 (63.0)	1	1
Data missing	119/243 (49.0)	0.56 (0.33–0.96)	0.51 (0.28–0.92)
First-line oncological treatment for mBC[b]			
Chemotherapy	107/154 (69.5)	1.44 (0.94–2.21)	1.11 (0.70–1.75)
Radiotherapy	47/60 (78.3)	2.29 (1.18–4.46)	1.57 (0.77–3.19)
Hormonal therapy	153/250 (61.2)	1	1
No data	496/776 (63.9)	1.12 (0.84–1.51)	0.58 (0.40–0.83)

Factors	Patients with Long-term SA / Patients in Cohort n/n (%)	Crude OR (95% CI)	Adjusted OR[a] (95% CI)
Type of mBC diagnosis			
Synchronous[c]	33/109 (30.3)	1	1
Metachronous[d]	771/1131 (68.1)	4.91 (3.20–7.53)	4.85 (3.05–7.70)
Marital status			
Married	421/632 (66.6)	1.15 (0.91–1.46)	1.17 (0.91–1.51)
Not married	371/585 (63.4)	1	1
Data missing	11/23 (47.8)	0.53 (0.23–1.22)	0.31 (0.12–0.77)
Sickness absence (SA) in year before mBC diagnosis, *days*			
< 90	466/830 (56.1)	1	1
≥ 90	337/410 (82.2)	3.61 (2.70–4.81)	3.44 (2.56–4.63)

Abbreviations: Odds-ratios (OR), confidence-intervals (CI), sickness absence (SA), metastatic breast cancer (mBC)

[a] Adjusted ORs were calculated by adjusting crude ORs for age, calendar year of diagnosis, and net days SA in year before mBC diagnosis, all as continuous variables, and by adjusting for marital status except when it was variable of interest.

[b] Oncological treatment data collected for only 464 consecutive patients of original 1240 patients with mBC.

[c] Synchronous type defined as primary mBC or the development of mBC within six months after a previous breast cancer diagnosis.

[d] Metachronous type defined as development of mBC more than six months after a previous breast cancer diagnosis.

At year 2 after mBC diagnosis, similar to year 1, significantly higher adjusted odds of having long-term SA were observed in patients under 45 years old (AOR 3.43) vs. older than 55 years; with metachronous mBC (AOR 4.52) vs. synchronous mBC; on SA for 90 days or more during the year before the mBC diagnosis (AOR 1.98) vs. less than 90 days; and diagnosed with mBC from 1997 to 2000 (AOR 1.79) vs. 2009 to 2012 (Table 4). In contrast to the findings at year 1, at year 2 after mBC diagnosis significantly higher adjusted odds of having long-term SA were also observed in those who received first-line chemotherapy

(AOR 1.81) or radiotherapy (AOR 2.23), when compared to those treated with hormonal therapy. In addition, patients who had SA of 90 days or more during year 1 after mBC diagnosis had significantly higher odds of having long-term SA during year 2 (AOR 68.06) than those who had SA of less than 90 days.

Table 4
Crude and adjusted odds-ratios for long-term (> 30 days) SA during year-two after mBC diagnosis.

Factors	Patients with Long-term SA / Patients in Cohort n/n (%)	Crude OR (95% CI)	Adjusted OR[b] (95% CI)
Age at mBC diagnosis, *years*			
<45	124/173 (71.7)	3.43 (2.28–5.16)	3.43 (2.17–4.97)
45–55	240/353 (68.0)	2.88 (2.08–3.99)	2.99 (2.14–4.18)
>55	118/278 (42.4)	1	1
Calendar year of mBC diagnosis			
1997–2000	169/244 (69.3)	1.68 (1.02–2.77)	1.79 (1.06–3.02)
2001–2004	148/257 (57.6)	1.01 (0.62–1.65)	1.00 (0.60–1.66)
2005–2008	114/214 (53.3)	0.85 (0.52–1.40)	0.89 (0.53–1.50)
2009–2012	51/89 (57.3)	1	1
Site of first distant metastasis			
Bone only	211/330 (63.9)	1.42 (0.79–2.54)	1.30 (0.71–2.38)
Visceral non-brain	160/242 (66.1)	1.56 (0.86–2.84)	1.50 (0.80–2.80)
Brain only	9/17 (52.9)	0.90 (0.30–2.69)	0.67 (0.21–2.14)
Non-visceral	30/54 (55.6)	1	1
Site missing	72/161 (44.7)	0.65 (0.35–1.20)	0.61 (0.32–1.18)
First-line oncological treatment for mBC[c]			
Chemotherapy	81/122 (66.4)	2.08 (1.32–3.29)	1.81 (1.12–2.92)
Radiotherapy	31/42 (73.8)	2.97 (1.42–6.20)	2.23 (1.04–4.78)
Hormonal therapy	110/226 (48.7)	1	1
No data	260/414 (62.8)	1.78 (1.28–2.47)	1.07 (0.71–1.60)
Type of mBC diagnosis			
Synchronous[d]	26/83 (31.3)	1	1
Metachronous[e]	456/722 (63.2)	3.77 (2.32–6.15)	4.52 (2.67–7.65)

Factors	Patients with Long-term SA / Patients in Cohort n/n (%)	Crude OR (95% CI)	Adjusted OR[b] (95% CI)
Marital status			
Married	260/415 (62.7)	1.25 (0.95–1.66)	1.31 (0.98–1.77)
Not married	222/388 (57.2)	1	1
Sickness absence in year before mBC diagnosis, *days*			
< 90	321/577 (55.6)	1	1
≥ 90	161/227 (70.9)	1.95 (1.40–2.71)	1.98 (1.40–2.79)
Sickness absence (SA) in year after mBC diagnosis, *days*			
< 90	29/279 (10.4)	1	1
≥ 90	253/525 (86.3)	54.24 (34.31–85.74)	68.06 (40.77-113.62)

Abbreviations: Odds-ratios (OR), confidence-intervals (CI), sickness absence (SA), metastatic breast cancer (mBC)

[a] For this analysis, 435 of the original 1240 patients were excluded because of death in previous year, leaving 805 patients for evaluation. In addition, data was missing for at least one patient for almost every Factor, so that the total patients evaluated for each Factor ranged from 803 to 805.

[b] Adjusted ORs were calculated by adjusting crude ORs for age, calendar year of diagnosis, and net days SA in year before mBC diagnosis, all as continuous variables, and by adjusting for marital status except when it was variable of interest.

[c] Oncological treatment data collected for only 464 consecutive patients of original 1240 patients with mBC and for only 390 patients of the 805 patients with mBC still alive and included in this year two analysis.

[d] Synchronous type defined as primary mBC or the development of mBC within six months after a previous breast cancer diagnosis.

[e] Metachronous type defined as development of mBC more than six months after a previous breast cancer diagnosis.

Discussion

To our knowledge, this large, population-based Swedish cohort study is the most extensive investigation of sickness benefits (SA and DP) in patients with mBC, and it is the first such study to assess the possible impact of tumor burden (sites and numbers of metastases) and type of first-line oncological treatment on the utilization of sickness benefits.

In the study, we observed that net days of SA and proportion of patients having any SA, long-term SA (more than 30 days), and SA longer than 180 days all increased from the year before to the first year after mBC diagnosis, and then all decreased slightly (but stayed substantially above the initial baseline) the second year after mBC diagnosis. On the other hand, we also observed that net days of DP declined from the year before to the first year after mBC diagnosis and then rose the second year after mBC diagnosis (to a level above the initial baseline), while the proportion of patients receiving DP consistently increased annually from the year before to 2 years after mBC diagnosis. It is particularly noteworthy that among our observations, we also found that a non-negligible number of patients had already been receiving long-term SA or DP during the year before mBC diagnosis.

In our evaluation of patient-, disease-, and treatment-related factors potentially associated with long-term SA (more than 30 days) in patients with mBC, we identified that the adjusted odds of long-term SA were highest at both year 1 and year 2 after mBC diagnosis for patients who were less than 45 years of age, had been diagnosed with mBC between 1997 and 2000, had experienced metachronous metastases, and had 90 days or more of SA during the year before mBC diagnosis.

Using Swedish national registers, we determined that 2 years after mBC diagnosis, 35.1% of patients had died, and consequently they were not included in the year 2 analysis. We observed that of the remaining patients, 34.7% had utilized DP and 60.0% had received long-term SA during year 2. Previous studies have been published with comparable patient populations, though they were based on questionnaires and limited to self-reported employment data. Nevertheless, it is possible to draw some comparisons with our study, keeping in mind that in a general sense SA and DP have an inverse relationship with employment. Of 618 US patients, 47% continued to work part- or full-time after mBC diagnosis [24]. In an international study, it was reported that 41% and 34% of women left work temporarily and permanently, respectively, within a year after mBC diagnosis [25], while another international report noted that 50% of working women left their jobs within a year after mBC diagnosis [26]. Our results and others described above are not surprising, given that both progression of eBC and treatment of mBC are associated with a lower likelihood of returning to work [27], and that the burdens of metastatic disease and adverse treatment effects limit functional abilities and work participation [13, 28–31]. Furthermore, our finding of higher odds of long-term SA in those who received first-line chemotherapy or radiotherapy (as opposed to hormonal therapy) emphasize the negative relationship between the ability to work and both cancer burden and treatment intensity.

Based on regression analysis, we determined that risk factors for long-term SA during the first and second years after mBC diagnosis included having more than 90 days of SA in the year before mBC diagnosis, developing metachronous mBC, and being of younger age. Others have shown that the frequent use of

SA before a diagnosis of eBC can be a proxy for other comorbidities, as well as that the frequent use of SA before mBC diagnosis can be a proxy for prodromal illness just prior to the discovery of advanced cancer [13, 31–34]. Evidence suggests that the higher risk of long-term SA that we observed after the diagnosis of mBC in patients with metachronous (vs. synchronous) mBC could be the result of residual physical and recurrent emotional sequelae from the past diagnosis and treatment of eBC [32–34]. Our finding of a higher risk of long-term SA in younger patients after the diagnosis of mBC is consistent with a 1999 survey of patients with mBC, in which a multivariate regression model showed that younger age was one of the factors significantly associated with a reduced desire to resume working [35]. In addition, though they may be more physically able to work than those who are older, younger women who have developed mBC may have less desire to work, perhaps placing a higher priority on spending time with families and friends, in light of the shorter lifespan associated with their potentially incurable disease [2].

Furthermore, we also found that patients with mBC diagnosis in the earliest cohort (1997 to 2000) had higher odds of long-term SA than those in the other more recent cohorts. One possible explanation for this is that patients 20 years ago had fewer options for oncological therapy, these treatments were more toxic, and there were less effective agents to ameliorate side effects. Recent improvements in systemic therapies, resulting in longer periods of disease control and less symptoms, may have increased the ability of patients to continue working. Another possible explanation is that the regulations and eligibility requirements for SA in Sweden have undergone changes during the years covered by this study. SA rates in Sweden were low in the early 1990's, started to rise in 1997, and continued to rise further until 2002 [36]. After 2002, SA rates declined while DP rates rose, resulting in a net absence-from-work rate that was stable. Then beginning in 2005, both SA and DP rates declined. In 2008, a new SA process involving rehabilitation and fixed dates for work capacity assessment was introduced in Sweden. However, since 2010, SA rates have been rising, including for those with cancer [37]. These changes in regulations and the variations in the SA rates over time may have influenced our results, to the extent that SA rates were particularly high in the late 1990’s and early 2000's, and that all of our patients had metastatic cancer. A final possible explanation is that more recently patients with metastatic cancer have been able to access multidisciplinary rehabilitation programs, which may have resulted in a higher proportion of patients with mBC in the most recent years of the study who did not need full-time SA and could work.

Using a subset of our study population, we found that patients who received first-line treatment with chemotherapy or radiotherapy had higher adjusted odds of long-term SA after mBC diagnosis than those who received hormonal therapy. However, these higher odds were significant only during the second year after mBC diagnosis. This is understandable, given that the patients who received chemotherapy or radiotherapy likely had more symptoms and a higher disease burden than those treated with hormonal therapy. This is also consistent with the reports of others, in which having more substantial symptoms was associated with lower employment rates [19, 23, 35], and in which receiving more courses of chemotherapy or radiotherapy was associated with a lower likelihood of current employment [2, 35].

Limitations

This study has several limitations. First, although the longitudinal design of the study is a strength, the period of 16 years covered by the study allowed for bias to be introduced, both from the evolving sickness benefit regulations in Sweden and from the improving disease-control rates and more manageable toxicity of the agents used to treat mBC. Second, data was missing for some of the covariates, particularly for first-line oncological treatment, which we elected to analyze with only a subset of our population. However, attempts were made to mitigate the potential biases created by missing data, by demonstrating a lack of difference in the characteristics of the groups with and without treatment data. Third, we did not have data about the underlying reasons for SA and DP as well as about baseline and subsequent levels of employment, which may have been informative. Fourth, our results for SA were likely underestimations, given that the first 14 days of SA in Sweden are paid for by the employer and not recorded in the MiDAS database. Finally, we did not compare the sickness benefits of patients who remained alive with those of patients who died during the study period; doing so may have helped mitigate the potential bias related to the fact that the population analyzed was substantially smaller at two years than it was at one year after mBC diagnosis.

Conclusions

Rates of SA and DP increased significantly in Swedish women during the two years after a diagnosis of mBC, though a non-negligible number had already been receiving long-term SA or DP during the year before mBC diagnosis. Women with newly diagnosed mBC who were less than 45 years old, developed metachronous mBC, used SA heavily the year before their diagnosis, or received chemotherapy or radiotherapy had a greater need for long-term SA during each of the two years after diagnosis.

Declarations

Ethics approval and consent to participate: This study complied with the Declaration of Helsinki, and it was approved by the Regional Ethics Review Board at the Karolinska Institute (Dnr 2012/745-31). The permission was obtained to access and use the Breast Cancer Registry (RBC) and National Quality Register for Breast Cancer (NKBC) databases. Based on past Swedish legislation, patients registered in the national quality registers did not need to provide written informed consent for their data to be included in this healthcare research; however, they were informed that their data was included in registers and that they could opt out at any time.

Consent for publication: Based on past Swedish legislation, patients registered in the national quality registers did not need to provide written informed consent for their data to be included in this healthcare research; however, they were informed that their data was included in registers and that they could opt out at any time.

Availability of data and materials: The datasets generated and/or analysed during the current study are not publicly available due Swedish law and regulations, but are available from the corresponding author on reasonable request.

Competing interests: EH receives research funding from Roche and Pierre Fabre, all paid to Karolinska University Hospital. All remaining authors declare that they have no conflicts of interest.

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Authors' contributions: R.A., A.J., and E.H. wrote the main manuscript text, S.G. and N.K performed the analysis and prepared figures. All authors including U.W. reviewed the manuscript.

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Figures

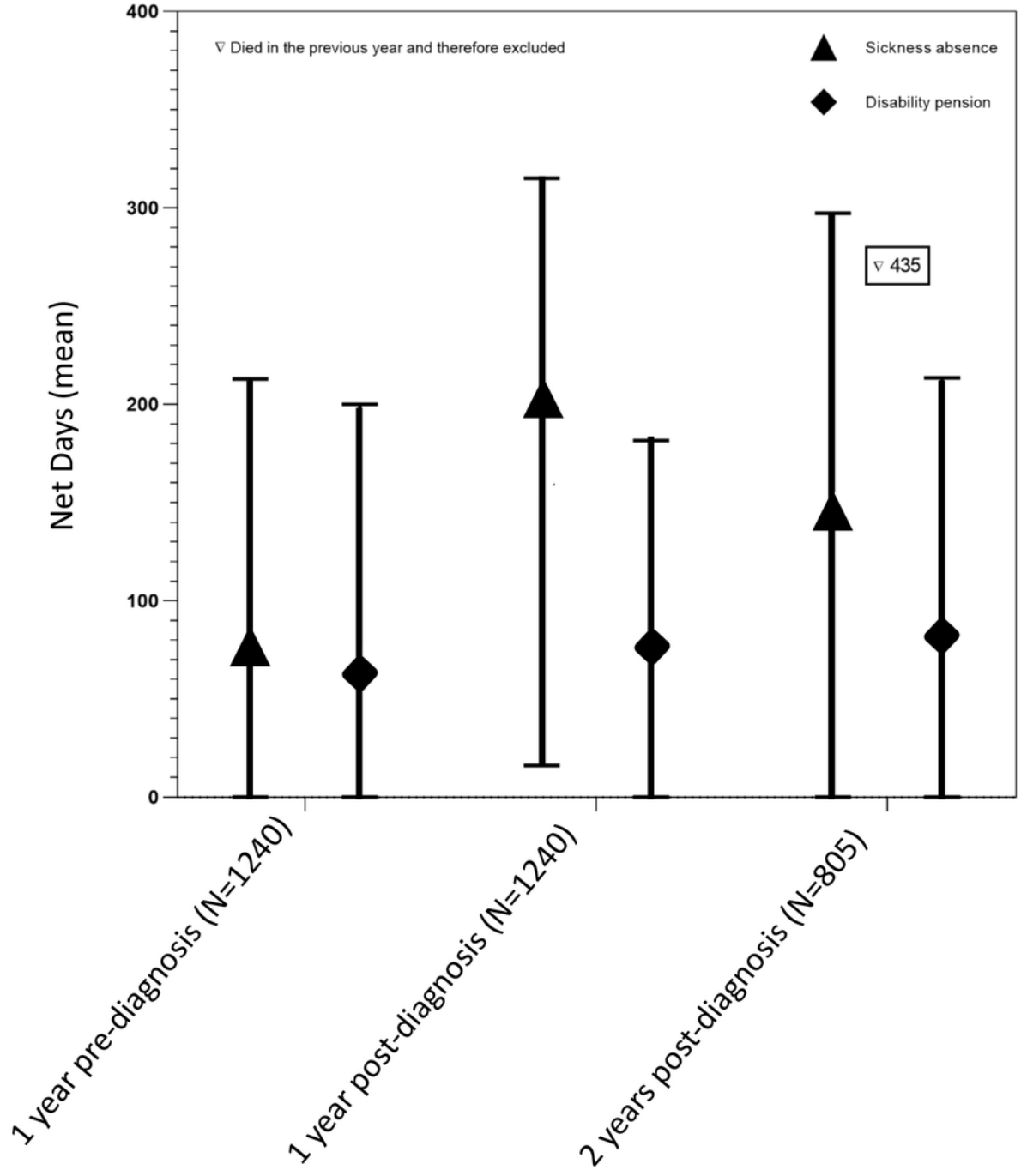

Figure 1

Net days of sickness absence (SA) and disability pension (DP) among women before and after the diagnosis of metastatic breast cancer (mBC). Net days calculated by multiplying level of benefits received (i.e., 0%, 25%, 50%, 75%, or 100%) by total number of days of SA or DP benefits received. For the populations analyzed, the mean net days that patients were on SA (triangle) 1 year before, 1 year after, and 2 years after mBC diagnosis were 75.4, 202.0, and 148.1, respectively; the mean net days that patients received DP (diamond) 1 year before, 1 year after, and 2 years after mBC diagnosis were 62.1, 76.1, and 80.3, respectively. Vertical lines represent standard deviations. Note: For 1 year before and the 1 year after diagnosis, 1,240 patients were analyzed; for 2 years after diagnosis, 435 patients were excluded from analysis because they died in the previous year (inverted triangle), so only 805 patients were analyzed.

Supplementary Files

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- SupplementaryTable1.docx