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PAPER

Trends in incidence and associated risk factors of suicide mortality among breast cancer patients

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Abstract

Objective: Breast cancer patients are associated with an increased risk for committing suicide. The purpose of this study was to study the trends in the incidence of suicide mortality and identify pertinent risk factors among patients with breast cancer.

Methods: A retrospective examination of the Surveillance Epidemiology and End Results database between years 1973 and 2013 was performed.

Results: Overall, 474 128 patients were identified of which 773 had committed suicide. There were no significant differences in the incidence of suicide mortality over the last 3 decades (1984-1993: 0.14%, 1994-2003: 0.16%, 2004-2013: 0.17%, $P = 0.173$). On logistic regression, younger age (<30 y: OR 6.34, 95% CI: 1.98-20.33, $P = 0.002$; 30-49 y: OR 10.64, 95% CI: 7.97-14.2, $P < 0.001$; 50-69 y: OR 4.7, 95% CI: 3.64-6.07, $P < 0.001$), male sex (OR 4.34, 95% CI: 2.57-7.31, $P < 0.001$), nonwhite-nonblack race (OR 1.39, 95% CI: 1.01-1.91, $P = 0.046$), marital status (single: OR 1.35, 95% CI: 1.04-1.76, $P = 0.024$; separated/divorced/widowed: OR 1.25, 95% CI: 1.01-1.55, $P = 0.043$), undergoing surgery (OR 2.13, 95% CI: 1.23-3.67, $P = 0.007$), and short-time elapsed from diagnosis (first year: OR 4.67, 95% CI: 3.39-6.42, $P < 0.001$; second year: OR 2.35, 95% CI: 1.69-3.27, $P < 0.001$) were independent risk factors of suicide mortality.

Conclusions: There have been no identifiable improvements in preventing suicide mortality in the United States. Younger age, male sex, race, marital status, and undergoing surgery are independent risk factors for committing suicide, especially in the first year after diagnosis.

KEYWORDS

breast, cancer, mortality, oncology, psycho-oncology, SEER, suicide

1 | BACKGROUND

Suicide is the 10th leading cause of death in the United States, accounting for 1.6% of all deaths[1] in 2014, and a decade-long strategy has been implemented by the US Surgeon General to prevent suicide mortality.[2] Patients with cancer are at considerable risk for committing suicide, with a 2-fold higher risk of suicide compared to the general population. This may be related to several associated comorbidities, such as depression, pain, surgery-related anxiety, financial issues, and side effects from treatment.[3-5] Lung cancer portends the greatest suicide mortality risk, with 5.74 times higher risk of suicide compared to the general population, followed by stomach and oropharyngeal cancers, with 4.68 and 3.66 times higher risk, respectively. Suicide risk for breast cancer patients has been reported to be 1.35 to 1.37 times higher than that of the general population in earlier studies.[3,6]

In particular, breast cancer survivors constitute a sensitive population whose quality of life is considerably affected and is reportedly worse compared to that of other female cancer survivors,[7] while their cognitive functions and memory performances may also be compromised.[8,9] Long-term hormonal therapy may also contribute towards lower quality of life.[10] All these factors may undermine patients' psychological status and predispose towards depression and suicidal ideation. In fact, the rate of depression among breast cancer patients has been estimated[11] at 52.7% and is highest during the first year after diagnosis,[12] while approximately 1 of 10 patients reports suicidal ideation 1 year after breast cancer surgery.[13] Genetic associations have also been reported, with the brain-derived neurotrophic factor *met* allele having been associated with an increased risk for suicidal ideation among breast cancer patients.[13] The purpose of this study is to identify the trends in the incidence of suicide mortality among

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breast cancer patients in the United States over the past decades and associated risk factors for recognizing patients at risk.

2 | METHODS

A retrospective search of the National Cancer Institute's Surveillance Epidemiology and End Results (SEER) database was performed for cases diagnosed between years 1973 and 2013. The SEER database is a comprehensive database established by the US National Cancer Institute that collects clinical and pathologic data pertaining to various aspects of cancer management and encompasses approximately 28% of the US population.[14] Patients were identified using the SEER*Stat software (v. 8.3.3, Cancer Statistics Branch, NCI, Bethesda, Maryland) with data collection and analysis occurring between March and April 2017 by 2 authors (A.G., M.A.). All patients with breast cancer that died of any cause were included, and among them, patients who successfully committed suicide were identified. Patients without malignant tumors or whose diagnosis was not microscopically confirmed were excluded from the analysis. Disease stage for the analysis of the entire cohort was coded on the basis of the variable "SEER Historic Stage A". A subanalysis of patients diagnosed after 2004 was also performed, since some variables were only available for this period (ie, estrogen-receptor status, progesterone-receptor [PR] status, American Joint Committee on Cancer [AJCC] stage). Health insurance status was only available for patients diagnosed after 2007. AJCC stage was determined on the basis of the seventh edition of the staging manual.[15] The study was exempted from Institutional Review Board approval, because of the use of a large cancer database with unidentifiable patient information.

2.1 | Statistical analysis

Univariate statistical analysis using chi-square test was used to identify differences between patients that committed suicide and those that died of other causes. Multivariable logistic regression was used to identify independent risk factors for committing suicide. Only parameters that were found to be significant on univariate analysis were included on logistic regression. All statistical tests were performed on SPSS v. 24 (IBM Corp, Armonk, New York). Two-tailed *P*-values were used, and 0.05 was set as threshold of significance.

3 | RESULTS

3.1 | Patient cohort characteristics

Overall, 474 128 deceased patients with microscopically confirmed malignant breast tumors were identified, of which 773 (0.16%) had successfully committed suicide. Among all patients, 93 889 (19.8%) were diagnosed between 1973 and 1983, 114 615 (24.2%) were diagnosed between 1984 and 1993, 164 490 (34.7%) were diagnosed between 1994 and 2003, and 101 134 (21.3%) were diagnosed between 2004 and 2013. Among the 773 patients that committed suicide, 179 (23.2%) were diagnosed in the interval between 1973 and 1983, 163 (21.1%) were diagnosed between 1984 and 1993, 255 (33%) were diagnosed between 1994 and 2003, and 176 (22.8%) were diagnosed between 2004 and 2013. In total, 469 748 (99.1%) were women and 4380 (0.9%) were men. In terms of disease stage, 235 625 (49.7%) had localized disease, 165 037 (34.8%) had regional metastases, and 56 882 (12%) had distant metastatic disease (see Table S1).

3.2 | Differences in rates of suicide mortality by decade and state

Comparison of the respective rates of suicide mortality from consecutive decades showed that although there are significant differences among the rates observed between all 4 time intervals (1973-1983: 0.19%, 1984-1993: 0.14%, 1994-2003: 0.16%, 2004-2013: 0.17%, $P = 0.031$), there are no identifiable differences when comparing only the 3 latter intervals ($P = 0.173$). When considering differences between different time intervals, only the state of California displayed a significant drop in the rate of suicide mortality (1973-1983: 0.4%, 1984-1993: 0.2%, 1994-2003: 0.17%, 2004-2013: 0.2%, $P < 0.001$), but the differences were again not significant when considering only the 3 latter time intervals ($P = 0.457$, Table 1).

3.3 | Risk factors of suicide mortality in the entire cohort

On univariate analysis, the rates of suicide mortality were significantly higher in younger patients, male patients, patients of nonwhite-nonblack race, single patients, those that had undergone surgery, those with lower tumor grades, and earlier disease stages. In terms of time elapsed from diagnosis, the highest rates of suicide mortality were identified during the first years after cancer diagnosis.

Multivariable logistic regression was then performed including factors that were significant on univariate analysis. In terms of demographic factors, age (<30 y vs ≥70 y: OR 6.34, 95% CI: 1.98-20.33, $P = 0.002$; 30-49 y vs ≥70 y: OR 10.64, 95% CI: 7.97-14.2, $P < 0.001$; 50-69 y vs ≥70 y: OR 4.70, 95% CI: 3.64-6.07, $P < 0.001$), male sex (OR 4.34, 95% CI: 2.57-7.31, $P < 0.001$), race (African Americans vs Caucasians: OR 0.26, 95% CI: 0.16-0.41, $P < 0.001$; nonwhite-nonblack vs Caucasians: OR 1.39, 95% CI: 1.01-1.91, $P = 0.046$), and marital status (single vs married: OR 1.35, 95% CI: 1.04-1.76, $P = 0.024$; separated/divorced/widowed vs married: OR 1.25, 95% CI: 1.01-1.55, $P = 0.043$) were independently associated with higher risk of suicide mortality. In terms of clinical factors, undergoing cancer-directed surgery (OR 2.13, 95% CI: 1.23-3.67, $P = 0.007$), lower tumor grade (well differentiated: OR 4.83, 95% CI: 2.23-10.49, $P < 0.001$; moderately differentiated: OR 3.05, 95% CI: 1.43-6.51, $P = 0.004$; poorly differentiated: OR 2.26, 95% CI: 1.06-4.82, $P = 0.034$), and earlier disease stage were associated with increased risk of suicide (localized vs metastatic: OR 6.21, 95% CI: 3.73-10.33, $P < 0.001$; regional vs metastatic: OR 3.81, 95% CI: 2.29-6.37, $P < 0.001$). Finally, time elapsed from cancer diagnosis was also independently associated with increased risk of suicide mortality ($P = 0.002$), with the first year of diagnosis carrying the highest risk (OR 4.67, 95% CI: 3.39-6.42, $P < 0.001$), followed by the second (OR 2.35, 95% CI: 1.69-3.27, $P < 0.001$) and third years after diagnosis (OR 1.93, 95% CI: 1.37-2.72, $P < 0.001$, Table 2). An analysis of the suicide rates per stage/grade and year of follow-up revealed that

TABLE 1 Suicide mortality rates by state and decade of diagnosis

	All Patients	Decade of diagnosis				P-value
		1973-1983	1984-1993	1994-2003	2004-2013	
Alaska	5 (1.4%)	…	0	4 (1.92%)	1 (0.9%)	0.567
California	304 (0.21%)	68 (0.4%)	50 (0.2%)	108 (0.17%)	78 (0.2%)	**<0.001**
Connecticut	57 (0.11%)	22 (0.13%)	16 (0.09%)	13 (0.1%)	6 (0.12%)	0.668
Georgia	58 (0.15%)	9 (0.17%)	9 (0.12%)	18 (0.14%)	22 (0.19%)	0.559
Hawaii	17 (0.16%)	2 (0.07%)	6 (0.17%)	5 (0.15%)	4 (0.29%)	0.428
Iowa	58 (0.13%)	20 (0.14%)	12 (0.08%)	21 (0.19%)	5 (0.12%)	0.123
Kentucky	16 (0.15%)	…	…	6 (0.12%)	10 (0.17%)	0.562
Louisiana	9 (0.08%)	…	…	2 (0.04%)	7 (0.12%)	0.184
Michigan	66 (0.11%)	26 (0.14%)	23 (0.12%)	10 (0.07%)	7 (0.12%)	0.220
New Jersey	20 (0.09%)	…	…	9 (0.08%)	11 (0.09%)	0.928
New Mexico	41 (0.25%)	7 (0.17%)	13 (0.25%)	18 (0.36%)	3 (0.14%)	0.216
Utah	27 (0.17%)	5 (0.12%)	4 (0.08%)	13 (0.27%)	5 (0.23%)	0.091
Washington	95 (0.21%)	20 (0.18%)	30 (0.2%)	28 (0.21%)	17 (0.33%)	0.269
All states	773 (0.16%)	179 (0.19%)	163 (0.14%)	255 (0.16%)	176 (0.17%)	**0.031**

Bold values indicate statistical significance.

increasing stage was significantly associated with higher suicide rates at years 1 to 3 after diagnosis, while higher tumor grade was significantly associated with higher suicide rates at the first year after diagnosis (see Table S2).

3.4 | Subanalysis of patients diagnosed from 2004 to 2013

A number of demographic and clinical factors (eg, current AJCC staging system, estrogen-receptor and PR status, and health insurance status) were available only for patients diagnosed after 2004. This subset of patients may also better resemble contemporary patient demographics, so a subanalysis of patients diagnosed after 2004 was performed. On univariate analysis, younger patients, those of nonwhite-nonblack race, married patients (in contrast to the entire cohort), those that had undergone surgery, patients with lower tumor grades and earlier disease stages, and those with PR+ tumors were associated with higher rates of suicide mortality.

On multivariable logistic regression including only those factors that were significant on univariate analysis, age (<30 y vs ≥70 y: OR 10.17, 95% CI: 1.35-76.53, $P = 0.024$; 30-49 y vs ≥70 y: OR 12.44, 95% CI: 7.29-21.21, $P < 0.001$; 50-69 y vs ≥70 y: OR 5.94, 95% CI: 3.67-9.62, $P < 0.001$), race (African Americans vs Caucasians: OR 0.38, 95% CI: 0.19-0.79, $P = 0.01$; nonwhite-nonblack vs Caucasians: OR 1.99, 95% CI: 1.18-3.34, $P = 0.009$), earlier AJCC stage (stage I: OR 7.99, 95% CI: 3.94-16.23, $P < 0.001$; stage II: OR 5.09, 95% CI: 2.49-10.41, $P < 0.001$), and PR+ tumors (OR 1.74, 95% CI: 1.19-2.53, $P = 0.004$) were independently associated with increased risk of suicide mortality (Table 3).

4 | DISCUSSION

The results of this study show that there have been no identifiable improvements in preventing suicide mortality in breast cancer patients over the past decades, either at a national or a state level. Younger age, male sex, nonwhite-nonblack race, single or separated/divorced/widowed marital status, cancer-directed surgery, lower tumor grade, earlier disease stage, PR positivity, and shorter period elapsed from diagnosis were independent risk factors for committing suicide.

Cancer patients constitute a high-risk population for committing suicide, with this risk being evident immediately after diagnosis[16,17] and continuing into several years of follow-up.[18] In a report by Schairer and colleagues,[6] containing data from 1953 to 2002, the cumulative suicide prevalence for breast cancer patients was 0.20% at 30 years after diagnosis, a rate similar to the 0.16% rate we identified and close to the rates that were reported from Scandinavian countries in the same study (Norway 0.11%, Sweden 0.16%, Finland 0.18%, Denmark 0.24%), but lower compared to the suicide rate reported from Switzerland (0.5%).[6,19] Rather surprisingly, the aforementioned study by Schairer and colleagues found that African American patients were at higher risk for committing suicide, which is contradictory to our results. However, these differences could potentially be ascribed to the inclusion of a lower number of African American patients committing suicide in the previous study. Moreover, our findings are consistent with previous reports by the Center for Disease Control that African Americans have the lowest risk for committing suicide among all races in the United States.[20] Earlier disease stage and lower tumor grade were also found to be associated with higher risk for committing suicide, which could in part be explained by the fact that all patients in this study had died, regardless of cause of death. In this way, breast cancer is more likely to be the cause of death in patients with more aggressive disease compared to those with less aggressive disease. To examine whether longer follow-up in patients with less aggressive disease could account for these differences, an analysis of suicide rates per stage/grade and year of follow-up was performed, where significant differences in suicide rates were identified only for the first 3 years after diagnosis for disease stage and the first year after diagnosis for tumor grade. This result may be explained by the fact that during the first few years after diagnosis, a higher proportion of patients with

TABLE 2 Results of univariate analysis and multivariable logistic regression for the entire cohort

	Suicide Mortality	*P*-value on Univariate Analysis	Odds Ratio (95% CI)	*P*-value on Logistic Regression
Decade of diagnosis		**0.035**		0.246
1973-1983	179 (0.19%)		1.00	
1984-1993	163 (0.14%)		0.85 (0.68-1.07)	0.162
1994-2003	255 (0.16%)		0.77 (0.57-1.03)	0.08
2004-2013	176 (0.17%)		1.01 (0.68-1.51)	0.952
Age, y		**<0.001**		**<0.001**
<30	4 (0.17%)		6.34 (1.98-20.33)	**0.002**
30-49	242 (0.36%)		10.64 (7.97-14.2)	**<0.001**
50-69	372 (0.2%)		4.70 (3.64-6.07)	**<0.001**
≥70	155 (0.07%)		1.00	
Sex		**<0.001**		**<0.001**
Female	748 (0.16%)		1.00	
Male	25 (0.57%)		4.34 (2.57-7.31)	
Race		**<0.001**		**<0.001**
Caucasian	686 (0.17%)		1.00	
African American	30 (0.06%)		0.26 (0.16-0.41)	**<0.001**
Other	57 (0.26%)		1.39 (1.01-1.91)	**0.046**
Marital status		**<0.001**		**0.028**
Married/domestic partnership	397 (0.18%)		1.00	
Single	107 (0.21%)		1.35 (1.04-1.76)	**0.024**
Separated/divorced/widowed	235 (0.13%)		1.25 (1.01-1.55)	**0.043**
Cancer-directed surgery		**<0.001**		**0.007**
Not performed	45 (0.09%)		1.00	
Performed	724 (0.17%)		2.13 (1.23-3.67)	
Radiation therapy		0.341	...	...
No radiation	550 (0.16%)			
Adjuvant radiation	218 (0.17%)			
Neo-adjuvant radiation	4 (0.08%)			
Both	1 (0.11%)			
Histological grade		**<0.001**		**<0.001**
WD	99 (0.23%)		4.83 (2.23-10.49)	**<0.001**
MD	193 (0.17%)		3.05 (1.43-6.51)	**0.004**
PD	195 (0.15%)		2.26 (1.06-4.82)	**0.034**
UD	7 (0.07%)		1.00	
Disease stage		**<0.001**		**<0.001**
Localized	458 (0.19%)		6.21 (3.73-10.33)	**<0.001**
Regional	263 (0.16%)		3.81 (2.29-6.37)	**<0.001**
Distant	26 (0.05%)		1.00	
Years elapsed from diagnosis		**0.002**		**<0.001**
1	128 (0.23%)		4.67 (3.39-6.42)	**<0.001**
2	94 (0.18%)		2.35 (1.69-3.27)	**<0.001**
3	79 (0.16%)		1.93 (1.37-2.72)	**<0.001**
4	59 (0.14%)		1.45 (0.99-2.13)	0.056
5	50 (0.14%)		1.55 (1.05-2.29)	**0.027**
6	42 (0.14%)		1.45 (0.96-2.19)	0.076
7	48 (0.18%)		1.76 (1.18-2.64)	**0.006**
8	40 (0.17%)		1.14 (0.69-1.87)	0.611
9	36 (0.18%)		1.29 (0.79-2.14)	0.305
≥10	195 (0.14%)		1.00	

Abbreviations: CI, confidence interval; MD, moderately differentiated; PD, poorly differentiated; UD, undifferentiated; WD, well differentiated.
Bold values indicate statistical significance.

aggressive disease is expected to die of their disease rather than other causes of death, including suicide. Time elapsed from cancer diagnosis has previously been recognized as a major risk factor for committing suicide, and this study identified an almost 5-fold risk of suicide mortality during the first year after diagnosis, which is consistent with previous findings.[16]

Various other high-risk patient groups were identified in this study. Single or separated marital status was associated with an increased risk for committing suicide, which has also been reported for the general population.[21,22] Nonmarried breast cancer patients have also been associated with an increased risk for having suicidal ideation compared to married breast cancer patients,[13] but marital status has not been examined in population studies of suicide mortality from other countries to allow comparisons. Interestingly, married patients were more likely to commit suicide than single patients on univariate analysis in the subset of patients diagnosed from 2004 to 2013, but this result was not significant on multivariate analysis, so this finding may be attributed to the smaller sample size in this subset of patients. Male sex also conferred an increased suicide risk, which is concurrent with the fact that men are more likely to commit suicide compared to women.[23] In addition, a substantial difference between the awareness for female and male breast cancers has been described, and as a result access to support groups for the often forgotten male population may be suboptimal.[24] Furthermore, younger and middle-

TABLE 3 Results of univariate analysis and multivariable logistic regression for patients diagnosed from 2004 to 2013

	Suicide Mortality	*P*-value on Univariate Analysis	Odds Ratio (95% CI)	*P*-value on Logistic Regression
Age, y		**<0.001**		**<0.001**
<30	1 (0.2%)		10.17 (1.35-76.53)	**0.024**
30-49	48 (0.37%)		12.44 (7.29-21.21)	**<0.001**
50-69	92 (0.26%)		5.94 (3.67-9.62)	**<0.001**
≥70	35 (0.07%)		1.00	
Sex		0.560	…	…
Female	173 (0.17%)			
Male	3 (0.24%)			
Race		**<0.001**		**0.001**
Caucasian	144 (0.18%)		1.00	
African American	9 (0.06%)		0.38 (0.19-0.79)	**0.01**
Other	23 (0.4%)		1.99 (1.18-3.34)	**0.009**
Marital status		**0.022**		0.563
Married/domestic partnership	85 (0.22%)		1.00	
Single	24 (0.17%)		0.75 (0.44-1.29)	0.300
Separated/divorced/widowed	57 (0.14%)		1.00 (0.67-1.51)	0.983
Insurance status		0.350	…	…
Possessed	95 (0.19%)			
Did not possess	1 (0.08%)			
Cancer-directed surgery		**<0.001**		0.146
Not performed	14 (0.06%)		1.00	
Performed	160 (0.21%)		1.84 (0.81-4.18)	
Radiation therapy		0.076	…	…
No radiation	114 (0.16%)			
Adjuvant radiation	62 (0.22%)			
Neo-adjuvant radiation	…			
Both	…			
Histological grade		**0.008**		0.130
WD	34 (0.27%)		1.79 (0.24-13.57)	0.575
MD	73 (0.22%)		2.23 (0.31-16.23)	0.430
PD	57 (0.14%)		1.37 (0.19-9.96)	0.757
UD	1 (0.07%)		1.00	
AJCC stage		**<0.001**		**<0.001**
I	82 (0.3%)		7.99 (3.94-16.23)	**<0.001**
II	54 (0.22%)		5.09 (2.49-10.41)	**<0.001**
III	12 (0.09%)		1.46 (0.59-3.59)	0.414
IV	9 (0.04%)		1.00	
ER status		0.287	…	…
Positive	115 (0.18%)			
Negative	39 (0.15%)			
PR status		**0.004**		**0.004**
Positive	102 (0.2%)		1.74 (1.19-2.53)	
Negative	49 (0.12%)		1.00	
Years elapsed from diagnosis		0.274	…	…
1	49 (0.22%)			
2	28 (0.14%)			
3	25 (0.15%)			
4	13 (0.1%)			
5	20 (0.2%)			
6	16 (0.21%)			
7	13 (0.24%)			
8	7 (0.2%)			
9	3 (0.15%)			
10	1 (0.15%)			

Abbreviations: AJCC, American Joint Committee on Cancer; CI, confidence interval; ER, estrogen receptor; MD, moderately differentiated; PD, poorly differentiated; PR, progesterone receptor; UD, undifferentiated; WD, well differentiated.

Bold values indicate statistical significance.

aged patients were found to commit suicide more often than older patients, which is consistent with previous findings that younger women with breast cancer fare worse in terms of functional status when compared to older women.[25] Older patients might also be more familiarized with the idea of death and, for this reason, may cope relatively better with a cancer diagnosis.[26] Nonwhite/nonblack race was also found to be an independent risk factor for committing suicide, and previous studies have reported that these racial groups are associated with increased risk for both depression and suicide.[27,28] Lastly, the differences between states tended to be on par with the respective differences in suicide rates for the states included in our analysis.[29] Cancer-directed surgery may also increase suicide risk, presumably because of the adverse psychological morbidity of mastectomy and the associated alterations in body image.[30,31] Finally, patients with

PR+ tumors were also found to be at higher risk for committing suicide compared to those with PR− tumors, which could potentially be related to the complex relationship that exists between progesterone and mood disorders,[32] but further studies may be required to explain this association. The reduced number of patients in the group of patients diagnosed from 2004 to 2013 compared to those of other periods is explained by the fact that all patients in the study had died. As a result, with shorter follow-up the number of dead patients during this period is expected to be smaller compared to the same number for previous decades.

5 | CONCLUSIONS

5.1 | Study limitations

Regarding potential study limitations, suicide is a complex phenomenon, and the available data could not account for various important patient characteristics that could explain some of the suicide burden noted in our analysis, such as psychosocial stressors, history of mood disorders, and education level. Moreover, data on chemotherapy regimens and timing of administration were also lacking. Additionally, our study is limited by its retrospective character, because data were collected prior to our analysis, and the use of a large multi-institutional database that may predispose towards potential miscoding.

5.2 | Clinical implications

The results of this study demonstrate that there have been no identifiable improvements in preventing suicide among breast cancer patients in the United States over the past decades, either at a national or a state level. This underlines the need for organized efforts towards the early identification of patients at risk for committing suicide, such as those reporting hopelessness/helplessness,[33-35] depression,[36] and suicidal ideation with an aim at reducing the rates of suicide in the population. Several validated tools have been developed for screening either depression or suicidal ideation. Among the best known is the Beck Depression Inventory, a self-report rating tool that contains 21 questions and has been used in a variety of settings.[37] More recently, personalized approaches to suicidality have been suggested with the description of relevant biomarkers,[38] which may assist in better risk stratification and assessment of the response to treatment. The results of this study demonstrate that screening for depression would especially be indicated during the first year after diagnosis, where the risk for committing suicide was the highest. Risk factors identified in this study may also help clinicians recognize patients at risk and refer them for appropriate psychological intervention. Various psychotherapeutic interventions have been described for depressed patients with breast cancer, such as participation in cancer support groups[39] and cognitive-behavioral stress management intervention,[40] and these may improve quality of life and potentially prevent suicide. Training health care providers to recognize patients at risk, promote better communication, and eliminate stigmatization may also be important in the effort to reduce suicide rates in this population. Nevertheless, recognizing patients who face the greatest risk for committing suicide is still challenging, since not all patients with suicidal ideation attempt suicide.

In conclusion, there have been no major improvements in preventing suicide mortality among breast cancer patients in the United States over the past decades. Younger age, male sex, non-white-nonblack race, single or separated/divorced/widowed marital status, cancer-directed surgery, PR+ tumors, and short-period elapsed from diagnosis were identified as risk factors of suicide mortality and may help clinicians recognize patients in need for appropriate support.

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Only the mentioned authors participated in the preparation of this manuscript.

CONFLICT OF INTEREST

Nothing to declare.

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SUPPORTING INFORMATION

Additional Supporting Information may be found online in the supporting information tab for this article.

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